



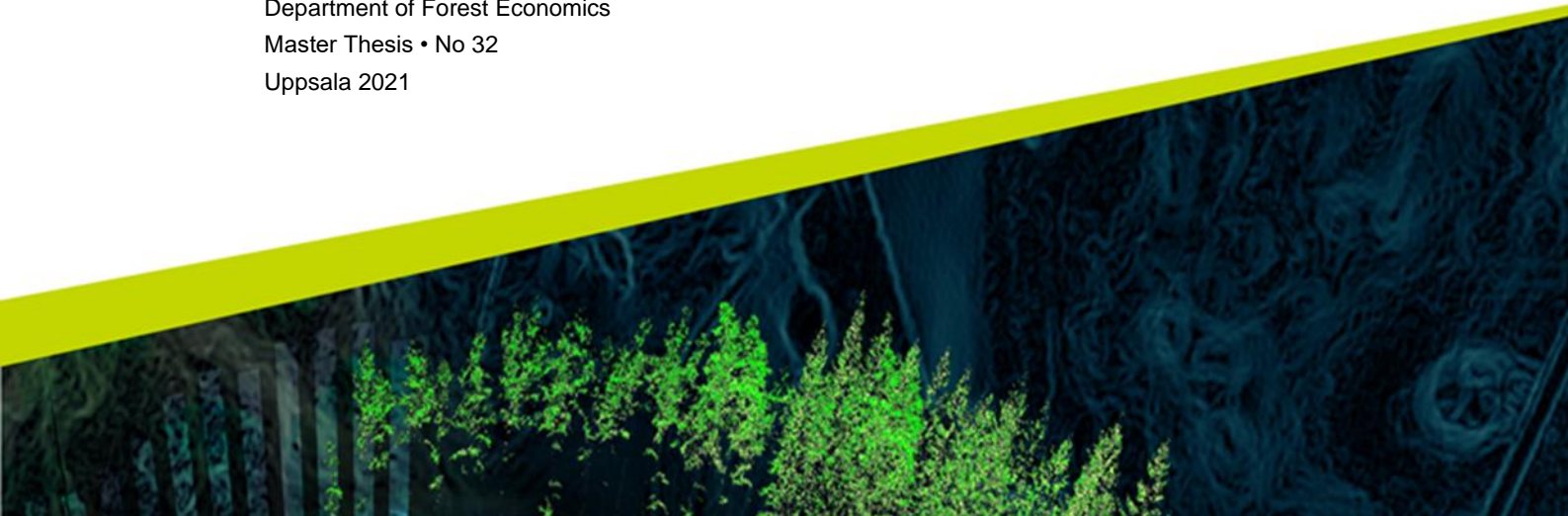
Commercial forestland investments

– A comparative analysis of ownership objectives

*Kommersiella skogsmarksinvesteringar
-En jämförande studie av ägarmål*

Mikael Olsson & Gustaf Sparrevik

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Department of Forest Economics
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Capital Asset Pricing Model (CAPM), fastighetsmarknad, juridisk person
skogsfastigheter, Vertical Integration

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Summary

Since the early 1990s interest rates have been decreasing, which has led to lowered yield on traditional secure financial assets as bonds. It has resulted in a flow of capital in the financial market towards alternative investments in the search for yield beyond the stock market. The forest asset has traditionally been desirable in a portfolio for the diversification aspect associated with the unique characteristic of the biological growth being uncorrelated to the financial markets. However, the interest in forestland investments has become more diverse through the monetization of non-timber values. In Sweden, the price of forestland available for purchase by juridical persons has increased rapidly since the abolishment of the price regulation in the early 1990s. This study aims to identify forest owner categories of commercial forest investors within the Swedish forestland property market.

The thesis used a multiple case study design conducted through a mixed-method data collection combining quantitative and qualitative data. The quantitative part consisted of a total survey from secondary data of the last 20 years' transactions of forestland from juridical persons. It was followed by a landowner classification which constructed owner categories present on the Swedish property market of forestland. The quantitative analysis was followed by a qualitative part, using semi-structured interviews to understand the owner categories objectives and perception of risk and opportunities with forestland ownership. The data analysis method used was theoretical interpretation and the applied theories were the net present value (NPV), Capital Asset Pricing Model (CAPM), Vertical Integration (VI), taxes, and types of risks in forestry.

The results from the quantitative part derived nine owner categories from the secondary data, where six of the categories were related to forestry land use. The qualitative analysis indicated that the different owner categories have various objectives of acquiring forestland. Forestland was primarily seen as a financial asset and as a strategic resource for the industries. Taxes were not found to be a significant reason to invest in forestland for any owner category. The owner categories have in common that they are positive towards increasing their holdings. The main perceived risk among the owner categories was associated with the legislature, reputational and physical risks. The legislature and reputational risks are mainly connected to the uncertainty of prerequisites of the silviculture related to policy interventions.

The contribution of this thesis consisted of constructing a classification of forestland acquirers in the Swedish property market of forestland. Furthermore, it identified different owner categories objectives associated with forestland ownership and the category's perceived risk and opportunities.

Keywords: Capital Asset Pricing Model (CAPM), forest estates, legal entity, property market, Vertical Integration, taxes

Sammanfattning

Under de senaste decennierna har marknadsräntorna sjunkit, vilket har lett till sänkt avkastning på traditionellt säkra finansiella tillgångar som obligationer. Det har resulterat i ett flöde av kapital på den finansiella marknaden mot alternativa investeringar i sökandet efter avkastning bortom aktiemarknaden. Skog som tillgångsslag har traditionellt varit önskvärd i en portfölj för dess diversifieringsaspekt associerad med den unika egenskapen i skogens biologiska tillväxt. Under det senaste decenniet har intresset i skogsmark vidgats genom en sakta monetärisering av icke virkesrelaterade värden. I Sverige har priset på skogsmark som kan köpas av juridiska personer ökat snabbt under de senaste decennierna. Denna studien syftar till att identifiera kategorier av kommersiella skogsinvestorer inom den svenska skogsfastighetsmarknaden.

Studien använde en fallstudiedesign utförd genom en datainsamling med en "mixed-metod" som kombinerar kvantitativa och kvalitativa data. Den kvantitativa totala undersökningen innefattade sekundärdata i form av transaktioner av skogsmark de senaste 20 åren som även användes som grund för att konstruera ägarkategorier som finns på den svenska skogsfastighetsmarknaden. Det följdes av en kvalitativ del, som använde semistrukturerade intervjuer för att förstå ägarkategoriernas mål och uppfattning om risker och möjligheter med skogsägande. Den använda dataanalysmetoden var teoretisk tolkning, de använda teorierna var nettonuvärdesmetoden (NPV), Capital Asset Pricing Model (CAPM), Vertical Integration (VI), skatter och typrisker för skog som tillgång.

Resultatet från den kvantitativa delen skapade nio ägarkategorier från sekundärdata, där sex av ägarkategorierna var relaterade till skogsbruk som markanvändning. Följande kvalitativa del indikerade att de olika ägarkategorierna har flertalet olika mål att förvärva skogsmark. Innehav av skogsmark sågs som en finansiell tillgång och en strategisk resurs för industriföretagen, skatter visade sig inte vara en betydande anledning till att investera i skogsmark för någon ägarkategori. Gemensamt för de studerade ägarkategorierna i den här fallstudien var att alla dessa är positiva till att öka sina skogsinnehav. Den huvudsakliga upplevda risken för ägarkategorierna är förknippad med lagstiftningsrisker, opinions- och fysiska risker. Lagstiftnings- och opinionsrisker är främst kopplade till osäkerheten om skogsbrukets förutsättningar relaterade till politiska beslut.

Bidraget från denna studie var en ägarklassificering på förvärv av skogsmark på den svenska skogsfastighetsmarknaden. Studien bidrog även till att förklara olika mål för ägarkategorier förknippade med deras skogsägande tillsammans med olika kategoriers upplevda risker och möjligheter med ägande av skogsmark.

Nyckelord: Capital Asset Pricing Model (CAPM), fastighetsmarknad, juridisk person skogsfastigheter, Vertical Integration

Table of content

1	Introduction	1
1.1	<i>Background.....</i>	1
1.2	<i>Problem.....</i>	1
1.3	<i>Aim and delimitations.....</i>	2
1.4	<i>Outline</i>	2
2	Empirical background	4
2.1	<i>Categories of investments in forestry</i>	4
2.2	<i>Value of forest assets.....</i>	4
2.2.1	<i>Roundwood prices</i>	4
2.2.2	<i>Biological growth</i>	4
2.2.3	<i>Land appreciation</i>	4
2.3	<i>Ownership of Swedish Forestland.....</i>	5
2.4	<i>Silviculture.....</i>	6
2.4.1	<i>Costs in silviculture</i>	6
2.5	<i>Roundwood market</i>	7
2.6	<i>Forest Estate Prices.....</i>	8
3	Theory	10
3.1	<i>Forestland as a financial asset.....</i>	10
3.1.1	<i>Net Present Value</i>	10
3.1.2	<i>Capital Asset Pricing Model (CAPM)</i>	10
3.1.3	<i>Forest asset and the Capital Asset Pricing Model</i>	13
3.2	<i>Forestland and taxes.....</i>	14
3.3	<i>Vertical integration.....</i>	14
3.4	<i>Risk and opportunities</i>	16
3.4.1	<i>Economical</i>	16
3.4.2	<i>Physical</i>	17
3.4.3	<i>Operational</i>	17
3.4.4	<i>Regulatory.....</i>	17
3.4.5	<i>Reputational.....</i>	17
3.5	<i>Conceptual framework</i>	18
4	Method	19
4.1	<i>Approach.....</i>	19

4.2 Literature review.....	20
4.3 Research design	20
4.4 Data collection.....	21
4.4.1 Property data	21
4.4.2 Semi-structured interviews.....	23
4.4.3 Unit of analysis.....	24
4.5 Data analysis.....	24
4.5.1 Classification of forestland categories	25
4.5.2 Theoretical interpretation	26
4.6 Procedure.....	26
4.7 Quality assurance	27
4.7.1 Construct validity	27
4.7.2 Internal validity	28
4.7.3 External validity.....	28
4.7.4 Reliability.....	28
4.8 Ethical considerations	28
5 Results.....	30
5.1 Who purchases forestland?	30
5.2 Objectives of acquiring forestland	30
5.2.1 Rationales of investment	30
1.1.1. Investment horison.....	34
5.2.3 Increasing the forest holdings.....	35
5.2.4 Decreasing the forest holdings	36
5.3 Perceived opportunities	37
5.3.1 Sources of revenue in the future	38
5.4 Perceived risks.....	39
6 Analysis	40
6.1 Analysis of quantitative data	40
6.2 Ownership objectives of acquiring forestland.....	43
6.3 Perceived opportunities	45
6.4 Perceived risks.....	46
7 Discussion.....	48
7.1 Who purchases forestland?	48
7.2 Ownership Objectives of acquiring forestland.....	48

7.3 Perceived opportunities	49
7.4 Perceived risks.....	50
7.5 Methodological discussion.....	50
8 Conclusions	52
8.1 Contributions from this thesis.....	52
8.2 Suggestions for future research	52
Bibliography	54
<u>Appendix</u>	
<u>Appendix 1. Capital Asset Pricing Model (CAPM)</u>	
<u>Appendix 2. Interview guide-Aquirers</u>	
<u>Appendix 3. Interview guide-Financial market actor</u>	

List of figures

Figure 1. Illustration of the outline of the study.....	2
Figure 2. Productive forest land per ownership category from (Swedish forest agency, 2021).	5
Figure 3. Costs for felling (SEK/m ³ solid under bark) in large scale forestry. Year 1998-2019 (Swedish Forest Agency 2021).	7
Figure 4. Costs for silvicultural measures (SEK/ha) in large scale forestry, entire Sweden, current prices. Year 1998-2019. (Swedish Forest Agency 2021).	7
Figure 5. Volume weighted average prices on delivery timber. Whole Sweden. Year 1995-2020 (Swedish Forest Agency 2021).	8
Figure 6. Average purchase price of agricultural estates with 100% forestry value in Sweden. 1999-2019. (Statistics Sweden 2020).....	8
Figure 7. Nominal interest rates from 1987-2021 in Sweden (Sveriges riksbank 2021).	Fel!
Bokmärket är inte definierat.	
Figure 8. Capital market line (CML).	11
Figure 9. Security market line (SML).	13
Figure 10. Model of manufacturing companies supply chain (based on Galbrait 1983 and Lönnstedt 2003).	15
Figure 11. The conceptual framework of the study.	18
Figure 12. Model of ownership classification.	25
Figure 13. Summary model for the study's practical approach and analysis including the theoretical framework.	26
Figure 14. Using the conceptual framework for analysis.....	40
Figure 15. Summary of the ownership categorisation based on the developed model in figure 6 the boxes illustrate the percentage of the total transactions, and the size of the quadrants corresponds to the percentage of the selection.	41
Figure 16. Development from 2000 to 2020, number of transactions per ownership category and year.	43
Figure 17. Perceived opportunities of forestland.	46
Figure 18. Perceived risk of forestland.	46

List of tables

Table 1. Summary of method choices	19
Table 2. Constraints for public official's request.....	22
Table 3. Variables of interest for the quantitative data	22
Table 4. Interviews for qualitative data collections	24
Table 5. Utilisation of tests and tactics to achieve validity, reliability, and phases when implemented in the case study design (based on Yin, 2009; authors modification)....	27
Table 6. Summery from public official's request	30
Table 7. Summary of transaction categorisation	42

Abbreviations

CAPM	Capital Asset Pricing Model	5
CIF	Conservation Impact Forestry	2
NIPF	Non-industrial private forest owners	2
NPV	Net present value	4
MPT	Modern portfolio theory	5
SMCA	Swedish Mapping and Cadastral Agency	13
TIMO	Timber Investment Organization	17
U.S	United States of America	1
VI	Vertical Integration	10

1 Introduction

The thesis begins with a chapter in which the study's subject area and context are described. Furthermore, a background and a problem statement are presented, which follows with the aim and research questions. Finally, the chapter ends with an outline of the study.

1.1 Background

The financial market has been subject to decreasing interest rates since the millennium shift, leading to lower bond yields. Hence investors have surged for new investments outside of traditional financial assets to preserve capital yields (Kazemi *et al.* 2016). Simultaneously, alternative investments have sparked high volumes of capital streaming towards non-traditional asset classes. As of the increasing alternative investments, forest assets have gained increased interest from investors because of unique characteristics as biological growth (from the timber volume growth) and portfolio diversification (Chudy & Cubbage 2020). However, forest as an asset is not a new phenomenon. Forests have been an essential asset for humans for thousands of years, generating a spectrum of values. The land-use practices have changed over time depending on the pricing of the ecosystem services a plot of land can produce. When the western world developed from an agrarian society into an industrialized, the demand for resources increased dramatically. Unlike previous years when the forest did not have a monetary value, the need for timber started to create an income opportunity for forest owners. This transformation resulted in the monetization of the forestland because of the products which could be extracted. The increased demand for timber in combination with technological progress in the operations made forestry an increasingly important asset. The first actors realising this was the forest industry itself that started to invest in forestland mainly to secure the supply of resources to their industries. With time ownership structures have altered, and new stakeholders have discovered an interest in the forest asset.

Furthermore, the goal of forests as an investment has become more diverse. Historically, investments in forestland as an asset class have been advantageous because of the relatively low risk, the steady income, and the hedge against inflation (Chudy & Cubbage 2020). More recently, investors have gained an increased interest in the non-monetary characteristics of forests. Including impact investing and the gradually monetized ecosystem services, which historically have not been of interest in forestry as carbon storage and conservation payments (*ibid.*). In the last years, several Swedish forestry companies have reappraised the book value of their forestland due to high transaction prices in significant sales of land to institutional investors. The price increases in the last years have raised the question of which aspects that explains the market price of commercial forestland.

1.2 Problem

Financial investments in forestland have increased in the U.S since the 1980s, facilitating regulations for timberland investments (Clutter *et al.* 2005). In the rest of the world, the characteristics of forestland investment as a financial asset have not been studied to a high degree. The alternative investment era that has been present in the 2000s has shed more light on investments in other regions than North America. In Sweden, forestland prices have increased by approximately 176 % since the millennium shift and the prices exceed the financial yield of forest harvest (Statistics Sweden 2020). Besides that, the market prices of forestland

available for acquisitions from juridical persons are purchased at a higher price than for non-industrial forest owners (NIPF) (Knutsson 2015; SVEFA 2020). This price increase has been present while the role of forests has globally been subject to change towards providing multiple ecosystem services. In the U.S, the rationales of investment in forestland have been diversified, to also include aspects of conservation impact forestry (CIF) and environment, social and governance aspects (ESG), which is gaining interest from a wide range of investors (Chudy & Cubbage 2020). Busby *et al.* 2020 found that CIF could be included in a diversified timberland portfolio and increase the overall return through the increased sources of cashflow. However, little qualitative research is done on who the investors are, their objectives, and their forest management strategy; furthermore, it has not been studied before in Sweden. Though there have been several studies on the characteristics of forestland as an asset class (Hultkrantz & Mantalos 2018; Busby *et al.* 2020; Chudy & Cubbage 2020), less has focused on attaining a deeper understanding of the market dynamics of commercial forestland. Hence, this study aims to understand the market dynamics of Swedish forestland and what factors could explain the demand for commercial forest assets.

1.3 Aim and delimitations

The thesis builds on the increased interest in the last decades to invest in forestland and the appraising of forestland as an asset class. *Hence this study aims to identify categories of commercial forest investors in the Swedish forestland property market.* To meet the aim, the following research questions will be further examined:

- Which commercial actors purchase forestland?
- What are the objectives to acquire forestland?
- What are the perceived opportunities with owning forestland?
- What are the perceived risks with owning forestland?

This study focuses on the dynamics of the market of forestland in Sweden. The market can be divided into two different submarkets, forestland available for NIPF and forestland available for NIPF and juridical persons. This study has been limited to the forestland available for NIPF and juridical persons since the aim is to understand the forest owner categories in the market for juridical persons. This thesis is delimited to the monetary objectives of acquiring forestland as it is believed to be the main rationales for juridical persons. Hence non-monetary goals and values are not included in the scope of this thesis.

1.4 Outline

The study contains eight chapters illustrated in Figure 1.



Figure 1. Illustration of the outline of the study.

The first three chapters of the work describe the introduction, the empirical background of the study, and the applied theories. It follows with Chapter 4 where the method used to study the

observed phenomenon is described. In Chapter 5 the results from the quantitative and qualitative results are presented. In Chapter 6 the results from Chapter 5 are analysed based on the conceptual framework. In Chapter 7, the results are discussed and related to previous research as well as a discussion regarding the chosen method. Finally, in Chapter 8 the conclusion of the study is summarised.

2 Empirical background

The chapter gives a brief overview of the aspects of investments in forestland in general and especially in the Swedish context. Firstly, the main approaches of investing in forestland are outlined followed by the main return drivers of a forest asset is described. Next, the context of the Swedish forest estate market is described in relation to the ownership structure, the land acquisition legislation, the roundwood market, the forest estates prices, and the costs in forestry.

2.1 Categories of investments in forestry

There are several ways to invest in forestry, which are different in terms of ownership, risk, and availability. First, to buy a forest property, as direct investment and have full control of the cashflows and the real estate appraisal is one way which is the context of this thesis. A private equity investment in forestry has internationally been popular in different sorts of land trusts depending on the legislature in different countries. Furthermore, private equity investments in forestry are often restricted to high deposits to be able to invest. However, another approach to investing in forestland indirectly is to buy shares in forest companies with forestland. In some countries, it is also possible to purchase futures contracts of products in forestry and thereby investing in the forest resource (Chudy & Cubbage 2020).

2.2 Value of forest assets

Forest assets could be described as a type of financial asset; the price of forest assets is strongly correlated to variation in the forecasted cash flow and variation in the market discount rate. In forest assets, the most critical factors influencing the cash flow and hence the return are dominated by biological growth and timber prices (Chudy *et al.* 2020).

2.2.1 Roundwood prices

The value of a forest asset is derived as other financial assets, the value of an asset is the value of the projected cashflows (net present value) received (Brealey *et al.* 2014). Thus, the price of the forest asset is altered if timber prices change. Hence the timber prices are one of the most important return drivers of a forest asset.

2.2.2 Biological growth

The unique attribute of forestland is the biological growth that consists of two components: the growth in volume biomass and the growth from lower-priced commodities to higher-priced. Several studies have shown that biological growth is one of the most important determinants of return from a forest investment (Cubbage *et al.* 2020). Since biological growth influences the yield of the production, it is therefore of high relevance for future cashflows. Moreover, compared to other investments like stocks or bonds, the forest has a little or negative correlation to the prices of financial assets (Chudy & Cubbage 2020). Therefore, it is the biological growth component that makes forestland a diversifying complement to other investments.

2.2.3 Land appreciation

The formal valuation of land as an economic resource was first stated in the economic land rent theory in the late 18th century. The theory was further applied to forestry by Hossfeld and Faustmann. Faustmann developed a mathematical formula formulizing the value of forestland

as the infinite series of forest rotations, the so-called land expectation value (LEV). However, the valuation of forestland when the benefits are not only forestry-related is to integrate a transaction approach. The approach predicts the land value of a property based on the comparison of several similar properties sold in the proximity area and hence tracks the market price (McDill 2004). In the U.S the forestland appreciation has been an important part of an investment, comprising approximately 5-8 % of the appreciation of forestland. Moreover, the appreciation could be higher in areas close to densely populated areas because the land could be of interest for other land use, and hence the value of the land is disconnected from the forestry value.

2.3 Ownership of Swedish Forestland

Figure 2 shows the ownership distribution of the Swedish forestland.

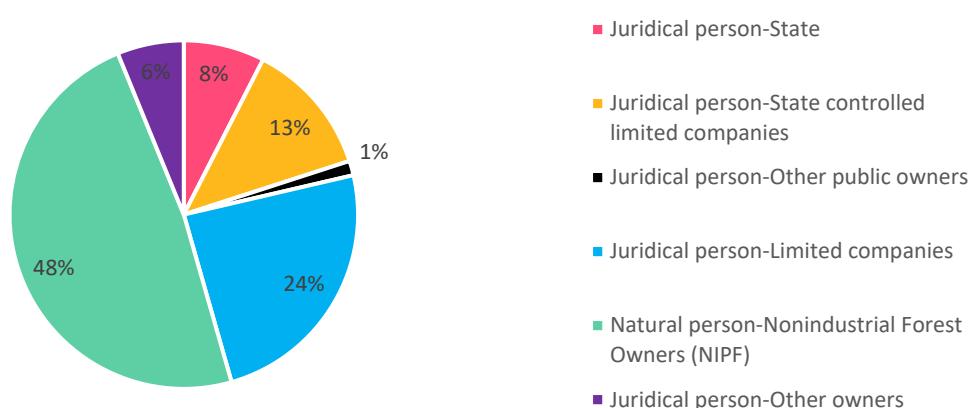


Figure 2. Productive forestland per ownership category (Swedish Forest Agency, 2021).

The Swedish land acquisition legislation further described later in this chapter fixes the NIPF percentage of the total forestland ownership at a minimum level, which is approximately 48 percent. The private limited companies own 24 percent of the forestland. Companies controlled and owned by the state or other public owners account for 22 percent of the ownership. Other owners are six percent.

TIMOs

Timberland investment management organization (TIMO) is private companies acting as investment managers for an institutional client, primary pension funds, endowments, and wealthy individuals. The forestland is owned as partnership shares or illiquid direct investment broadly in separate account but also pooled funds. The organization purchase, manage and sell forestland in favor of the investors (Lönnstedt & Sedjo 2012). TIMOs developed during 1970 in the United States after the introduction of a legislative act that promoted institutional investors to broaden their asset portfolios in forestry (Clutter *et al.* 2005). During that time forest was primarily owned by forest industry firms, and the introduction changed the ownership pattern making forestland assets moving from industry firms to institutional investors (Lönnstedt & Sedjo 2012). Unlike the industrial actors whose main objective might be to supply the integrated wood-industry with timber, TIMOs strategical concerns focus on (I): having a superior higher total return on the investment compared with competitors, (II); develop total asset value together with management, (III); create new types of financial products to

expand the group of stakeholders to invest in the asset, (IV) continues to manage the forest at as low a cost as possible (Block & Sample 2001). This could be further explained as TIMOs do not care for what type of goods or service revenues are derived from. The importance is to increase revenues from forest assets at the lowest possible management intensity.

The Swedish Land Acquisition Legislation

At the beginning of the 20th century, the Swedish forest policy was at a crossroads. Forest companies had been buying forest estates from private forest owners at a rapid pace, especially in the northern part of Sweden. In 1906 legislation banned companies from acquisition forestland from private forest owners. This culminated in the land acquisition act of 1945 which aimed to preserve the ownership of agricultural land to farmers and rationalize agriculture practice (SOU 2001:38). Price control of forest estates was implemented in 1979, meaning forestland was not allowed to be sold above the economic yield from forestry (prop.1978/79:85). In 1990 legislation changed radically when the market of forest estates was liberalized by abolishing the price control (prop. 1990/91:155). The legislation does not restrict a juridical person to buy and sell land between each other. However, juridical persons could only purchase from NIPF with the restriction of selling an equal share of land to NIPF within five years. Sawmills could receive a perception from the act to buy forestland for the raw-material supply to the mills.

2.4 Silviculture

Forestry has some characteristics which make it different from other investments. The main peculiarity is the amount of time between the investment (regeneration) and the return (harvest). Further important aspects are the inherent risk of abiotic and biotic damages as well as the uncertainty the future stumpage prices. The long investment horizon further exaggerates the uncertainty and risk of wood production (Swedish Forest Agency 2012).

The most dominated silviculture system in Sweden since the 1950s has been clear-cutting. It divides the forest into several compartments (stands) where the diameter and height distribution are even throughout the stand. The stand is growing through different stages of development from bare forestland to harvestable stands and the elapsed time from harvests is referred to as one rotation. The choice of silviculture and harvest practices in forestry is depending on the objectives and further the strategies to reach these. The silviculture strategy could be seen as the decision support to reach the objectives of the forest owners. It is important to emphasize the influence of the different owners' objectives and preferences when finding the optimised silviculture strategy. Three main silviculture strategies could be aggregated, to maximise: volume production, value growth, and the financial yield of wood production.

2.4.1 Costs in silviculture

Figure 3 describes the development of felling-costs in Swedish forestry. For a long period in the second half of the 1900s, the forest sector reduced the costs in forestry due to technological advances. However, since the millennium shifts the costs in Swedish forestry have not continued in this direction and have instead increased. The explanation for this is partly the hurricane Gudrun in 2005 followed by the financial crisis in 2008 (Eliasson *et al.* 2019).

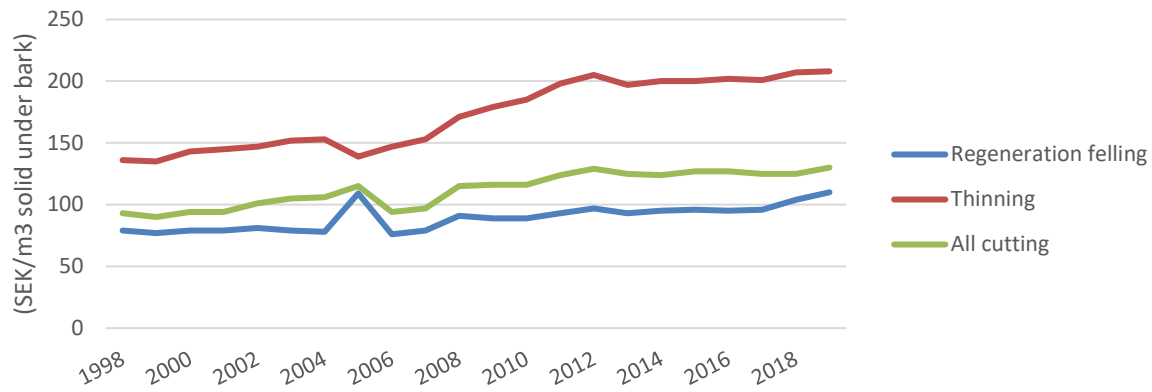


Figure 3. Costs for felling (SEK/m³ solid under bark) in large-scale forestry. Year 1998-2019 (Swedish Forest Agency 2021).

Figure 4 describes the development of the costs of silvicultural measures. Similar to the costs for felling the costs for scarification, planting and precommercial thinning have also increased since the millennium shift.

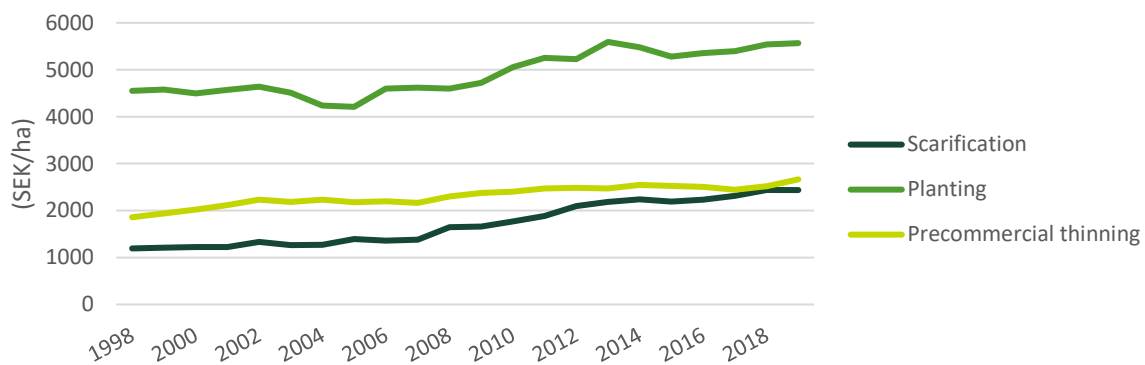


Figure 4. Costs for silvicultural measures (SEK/hectare) in large-scale forestry, whole Sweden, current prices. Year 1998-2019. (Swedish Forest Agency 2021).

As shown in figure 3 and 4 costs in forestry operations between 1998 and 2018 continuously have increased except for the hurricane Gudrun in 2005 when most of the operation costs dropped. The highest increase occurs during the financial crisis between 2008 and 2012 and even if the change has subsided, no indications of reduced costs are shown.

2.5 Roundwood market

Wood prices are impacted by supply and demand and can be affected by the global trade markets. Toivonen *et al.* (2000) found that the round wood market in Finland and Sweden is integrated. Although there was a strong correlation between wood markets in Austria and the two Nordic countries it was not fully integrated (*ibid.*). A more recent study from Chudy & Hagler (2020) confirmed the integration between Sweden and Finland but the authors could not find the same situation between other markets. This was explained by the lack of perfect substitutability between species and the significant transaction cost between trading regions (*ibid.*). The globalization has created increased competition in the global wood market and thus

diminishing prices of the products. In Sweden, the prices of roundwood have remained steady the last decades (Figure 5).

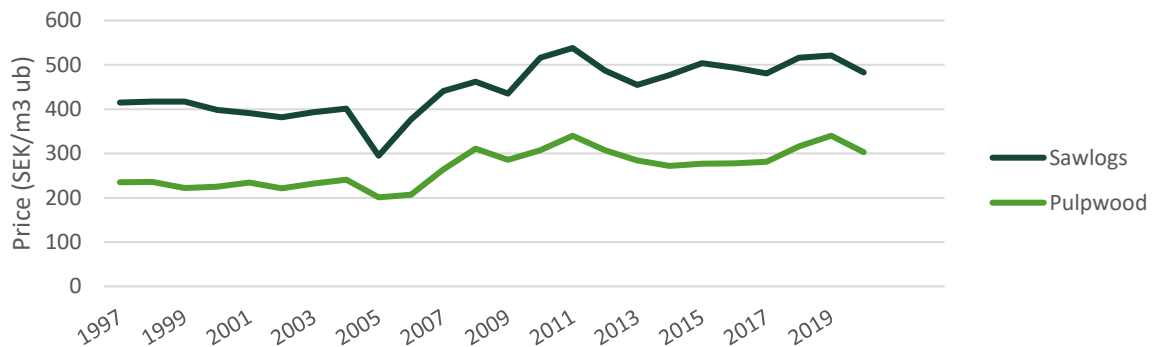


Figure 5. Volume weighted average prices on delivery timber divided into sawlogs and pulpwood (SEK/m³ under bark). Whole Sweden. Year 1995-2020 (Swedish Forest Agency 2021).

In Figure 5 the nominal prices of sawlogs and pulpwood are illustrated. As figure 4 the hurricane Gudrun in 2005 affected the prices, mainly on the price of sawlogs. Both the prices of sawlogs and pulpwood have increased during the last 15 years.

2.6 Forest Estate Prices

Forest appraisal has since the abolishment of the price regulation 1991 become more complex (Johansson 2001). Prices are affected by a multitude of attributes, physical and immaterial. Furthermore, the heterogeneity of forest estates increases the complexity as one estate is not the same as the other. An accurate appraisal of forest estates is important from different perspectives; by formulating forest policy to understand the effects on the property market and the financial situation of forest owners. Moreover, forest properties are used as collateral for loans, thereby appraisal is of importance for the creditors to estimate the financial value of the asset. Uncertainty in appraisal could raise the transaction costs and thereby inducing unpredictability in forest investments. The prices of forestland in Sweden are illustrated in Figure 6.

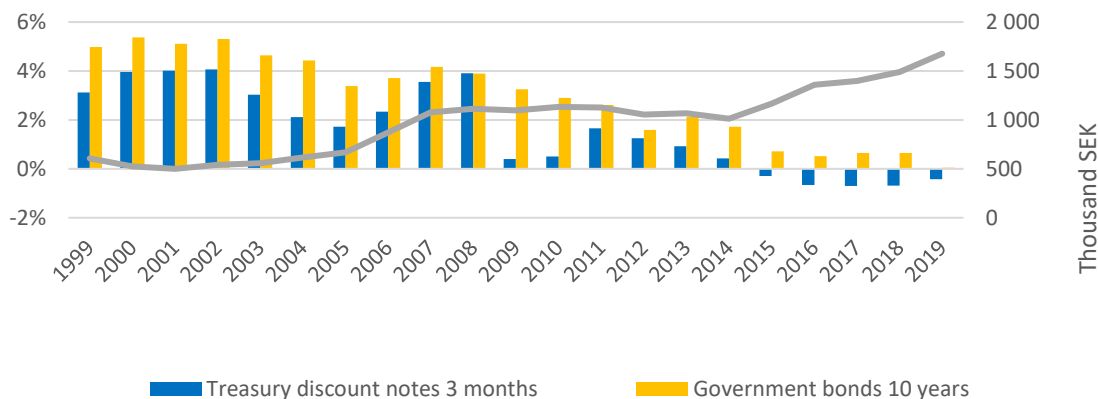


Figure 6. Nominal interest rates (Swedish central bank 2021) and the average purchase price of agricultural estates with 100% forestry value in Sweden 1999-2019 (Statistics Sweden 2020).

The prices of forestland have increased steadily since the millennium shift (figure 6). Since 1999 the average price of an agricultural estate with 100 % forest value increased in price by 176 % (Statistics Sweden 2020). The grey line shows the development of interest rates from 1999 to 2019. The price increase of forestland has occurred simultaneously with decreasing interest rates which have continually decreased since the 90s and are in the late 2010s pending around zero interest.

3 Theory

The chapter introduces the theoretical foundation of the thesis, which is divided into two parts. The first part is theories of forestland as a financial asset, followed by vertical integration of owning forestland and the taxation aspect of forestland. The second part of the theory is comprised of risk in relation to forestland. The chapter synthesizes the applied theory into the theoretical framework of the thesis.

3.1 Forestland as a financial asset

Investments in forestry characterize low input costs and a long-time span between the investment and the return of harvest. Hence the Net Present Value (NPV) is widely used in forestry calculations for considering the time-value of money. Forestland as a financial part of a portfolio through the Capital Asset Pricing model has emerged in the last decades, through the special attributes of the asset class.

3.1.1 Net Present Value

The net present value (NPV) is the sum of the discounted cash flow streams from an investment described in equation 1. The NPV is used in investment analysis established with a long investment horizon as forestry. The chosen discount rate affects the value of cash flow depending on the time where they occur. The level of the discount rate set the time value of the cash flows; hence higher discount rate discriminates the value of future cash flows compared to a lower discount rate.

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

R_t = revenue at time, t

C_t = cost at time, t

r = discount rate

T = time

The discount rate or the required rate of return is used to evaluate investment decisions and perform appraisals; it is fundamental when projects span over a long-time horizon. The discount rate compiles different components, which are affecting the final discount rate. The first component is capital cost, which comprises the required return based on borrowing costs and the required return on equity. The second component is to consider the rate of return for alternative investment opportunities. The third component is the degree of investment risk, which is regarded as the required return rate. Forestry has a relatively low discount rate in comparison to other sectors. Forestry is characterized by long rotation periods, meaning a long time is elapsed between investment costs and revenues.

3.1.2 Capital Asset Pricing Model (CAPM)

The Modern portfolio theory is a framework for pricing financial securities. The objective of the theory is to maximize the expected return for any given level of risk in an investment (Markowitz 1952). The assumptions made in the theory are as follows: (I) the investor does want to maximize the discounted return from the investment and (II) return is something desirable and the variance in return is undesirable (the investor is risk-averse). Markowitz

contributed to the understanding that when assets that are not correlated are combined in a portfolio, the variance is not the sum of the variance of the assets. Hence diversification could reduce the risk (variance) when assets are combined in a portfolio (Gyawali 2008).

The Capital Asset Pricing Model (CAPM) is an extension of Markowitz's Modern Portfolio Theory (MPT). It has been formulated through the contributions of several researchers: Sharpe, Linter, Mossin, and Jensen. (Gyawali 2008; Ferruz *et al.* 2010). CAPM wants to determine the expected return of an asset and find the applicable discount rate for the security. The fundamental rationale of CAPM is that the required rate of return from an investor is lower when the investor's portfolio is diversified and vice versa; this is valid because the risk of independent investments is distributed among several assets (Perold 2004). Important to notice is that transaction costs and taxes are not accounted for in CAPM. For detailed formulas calculating the risk of assets in CAPM, see appendix 1.

Capital Market Line (CML)

The Capital Market Line is the extension of the MPT-problem of deciding the allocation between risky assets and creating an optimal portfolio, reaching the so-called efficient frontier. The efficient frontier curve as shown in figure 2 indicates an efficient portfolio, which determines the asset combinations which create the highest expected return of a portfolio for every given level of risk. Tobin (1958) added an aspect of deciding the optimal allocation with the integration of a risk-free asset also displayed in figure 2. According to Tobin, creating an optimal portfolio consists of two choices, choosing the combination of risky assets (as Markowitz MPT) and how the allocation between this portfolio and the risk-free asset alternative should be (Figure 8).

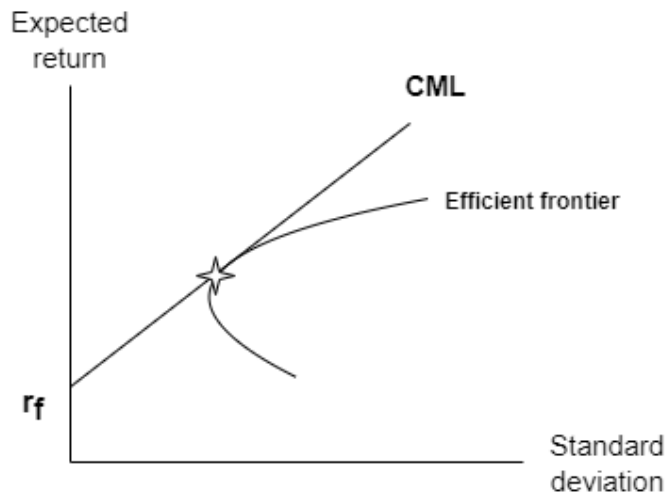


Figure 7. Capital market line (CML) and the efficient frontier.

Equation 2 is the mathematical expression of the CML. The market risk premium in the numerator of equation 2 is a concept called the market risk premium, which is formalised in equation 3. The market risk premium implies the required increased return the market is demanding for taking risk above the risk-free return.

$$E(r_p) = r_f + \sigma_p \left[\frac{E(r_m) - r_f}{\sigma_m} \right] \quad (2)$$

$E(r_p)$ = expected return of the market portfolio

r_f = return on risk free asset

σ_p = standard deviation of portfolio

$E(r_m)$ = expected return of the market portfolio

σ_m = standard deviation of the market portfolio

$$\text{Market risk premium} = E(r_m) - r_f \quad (3)$$

r_m = expected return of market portfolio

r_f = return on risk free asset

The risk-free asset is a security that could have no risk; hence the expected return is always the actual return for the risk-free asset. The choice of the specific risk-free asset in calculations varies depending on many factors, such as the investment horizon. Lundgren (2005) used a short-term Swedish government bond in his calculation of Swedish timberland financial performance.

The Sharpe-ratio formalized in equation 4, named by the founder (Sharpe 1964) is called the risk-adjusted return and is used to compare different portfolios' performances. The star illustrated in figure 8 indicates the portfolio with the maximum Sharpe ratio. The numerator in the Sharpe ratio is the risk premium described in equation 2.

$$\text{Sharpe ratio} = \frac{r_p - r_f}{\sigma_p} \quad (4)$$

r_p = return of portfolio

r_f = return on risk free asset

σ_p = standard deviation of portfolios excess return

Security Market Line

Unlike the Capital market line, the security market line is pricing individual securities (assets) and not pricing an efficient portfolio. The rate of return an investor is demanding to invest in an asset with a given level of risk is described by equation 5. The Security market line (SML) in Figure 9 evaluates whether an assets appraisal is correct.

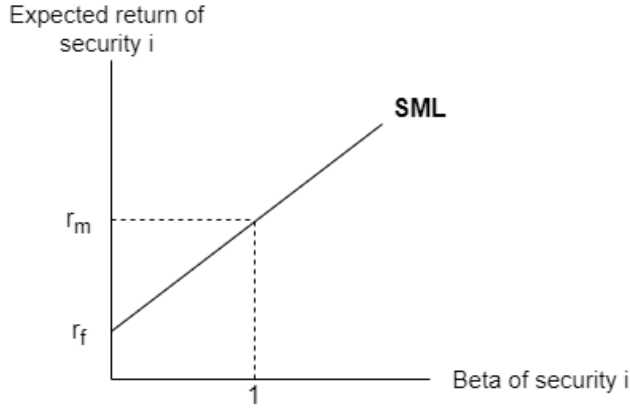


Figure 8. The Security market line (SML).

Theoretically, the expected return of an asset is priced according to the systematic risk (β) and the risk-free interest rate (r_f). Implying the higher the systematic risk (β) of a security the higher the expected return is required to be, in other words, the investors require a higher return with an increased level of risk (hence the slope of the line is the market risk premium). The β of the overall market portfolio is 1, which individual securities are compared with in terms of less or increased volatility. Equation 5 formalizes the calculation of the expected return for a security. For detailed formulas calculating the β , see appendix 1.

$$E(r_i) = r_f + \beta[E(r_m) - r_f] \quad (5)$$

$E(r_i)$ = expected return of asset i

β = the systematic risk of the asset

r_f = return on a risk – free asset

$[E(r_m) - r_f]$ = market risk premium

3.1.3 Forest asset and the Capital Asset Pricing Model

The diversification potential of incorporating forestland in a portfolio has been shown in several studies (Zinkhan *et al.* 1992; Mei 2019). The diversification properties of timberland investment have two levels; (1) the diversification of the timberland portfolio itself and (2) the diversification of a mixed-asset portfolio by including timberland (Busby *et al.* 2020). The traditional diversification of forestland in a portfolio has been the low return correlation of the asset compared to other types of assets. Biological growth, one of the significant drivers of return in a forestland investment, reduces the systematic risk, β of a forest asset by being entirely uncorrelated for other assets on the financial market. Another major driver of the return is the stumpage prices of the wood commodities, in which price dynamics (supply and demand) are used in various sectors. Hence, the cashflows from forestry are not fully correlated with the price of financial assets as bonds and stocks, meaning the price of forest assets is further uncorrelated with other financial assets, thereby contributing to portfolio diversification (Chudy & Cubbage 2020).

Forest assets have historically been a hedge against inflation and thereby inducing diversification in a portfolio (Wan *et al.* 2013). In a study by Lundgren, (2005) Swedish forest assets showed an inflation hedging potential.

The diversification potential of the internal timberland portfolio through conservation impact forestry could improve the risk-adjusted return of a portfolio (Busby *et al.* 2020). Conservation impact forestry (CIF) means combining traditional forestry with payments for ecosystem services (PES) and create cash flow streams that are uncorrelated to one another (*ibid.*). The management strategy has emerged in the U.S, and the payments are diverse as carbon credits, conservation easements, and water quality credits. However, the most practiced CIF is combining timber returns and carbon credits (Busby *et al.* 2020).

Fu (2012) emphasizes four different approaches to enhance the riskiness and diversification of an investment portfolio: Spatial, temporal, product and market, and investment structure and strategy. The *spatial* approach means investing in different geographical locations and varying the distribution and size of the various timberland investments. This approach could achieve risk reduction through the lack of cointegration of the global roundwood markets and the spatial distribution of physical risks (Chudy & Hagler 2020). The *temporal* method involves varying the timberland's maturity in the timberland portfolio and invest in a spectrum of investment funds. The *product and market* approach are to grow various tree species, sell several wood products, and examine income from non-timber products. Wood is used for multiple products, and the products are not fully cointegrated (Chudy & Hagler 2020). The *investment structure and strategy aspect* of the portfolio could be to use different strategies in different locations, with different managers, to further increase the timberland diversification.

3.2 Forestland and taxes

Investment in forestland is advantageous for various tax benefits. The long-time span between the cashflows from harvests opens up for tax planning in forest investments (Lundgren 2005). Corporates with high profitability in other sectors could invest in the surplus of the business. In Sweden, investments in forestland is advantageous for various tax benefits, in forestland instead of paying an often 30 percent capital gains tax or dividend. Moreover, investing in forestland is an investment in biological growth, which could be seen as tax-free growth because tax is only present when the timber is harvested. Furthermore, when the timber is harvested, 25% of the revenues can be deducted as a cost from the purchase of the forest estate. These tax benefits create a risk-premium of buying forestland, which financially decreases when the property prices are approximating a risk-premium of 30% for properties available to be purchased by legal entities (Handelsbanken Skog & Lantbruk 2021). Stamp duty is paid when buying a forest estate through the registration of ownership, which is for the year 2021 paid at 4,25% of the purchase price (Sveriges Riksdag 1984). However, the stamp duty could be reduced by making indirect transfers of ownership and avoided if the acquisition is made through the swapping of shares in the limited company that is the registered owner (Stegfeldt 2014). The listed tax benefits of buying forest property as a legal entity result in a decreased required rate of return, and by that discount rate in the investment decision could be set at a lower level (Handelsbanken Skog & Lantbruk 2021).

3.3 Vertical integration

Vertical integration is a concept within business strategy related to Porter's four dimensions of scope (Porter 1985). For this study, the vertical scope is of interest, which means the extent of the value chain's activities within a specific organization (Lönnstedt 2003). According to Frommueller & Reed (1996) the generally accepted definition of vertical integration is that:

barriers for competitors to entry and thereby foreclose them (Mahoney 1992). Mahoney (1992) also states that another reason to have backward vertical integration is to increase the costs of a company's rivals by reducing the number of suppliers in the market. This in turn will strengthen the earlier mentioned advantage of increasing the barriers of entering the market. If competitors must invest in two different supply chain stages, it requires an additional amount of capital from the competitor (*ibid.*). Vertical integration does not have to occur in an environment to handle competitive markets. It could also act as a solution in a regulatory environment when the final stage is faced with a regulated efficient rate-of-return. By putting a price on above the marginal cost for intermediate products the firm could avoid the effects of the constraints (*ibid.*).

With input and/or output price advantage (III), (Mahoney 1992) presents that a firm could gain profit by controlling several stages in the supply chain. He argues that instead of having a product that crosses several successive stages of production where each actor possesses a certain power to obtain a specific price. If instead, a firm controls all these stages, it can keep the prices down and obtain a more significant profit (*ibid.*).

Vertical integration for cost and price uncertainties (IV) means that a firm can reduce the uncertainties in the presence of stochastic events. As a downstream buyer, one could secure a better pricing forecast and security to buy the capital necessary for production (*ibid.*).

3.4 Risk and opportunities

Knight (1921) divides uncertainty into two classes: quantifiable and unquantifiable, which is defined as risk and uncertainty, respectively. In forestry the uncertainty is often not quantifiable, meaning that with Knight's definition the uncertainty in forestry is mainly uncertainty and not risk. However, uncertainty is often not distinguished between risk and uncertainty in research and not applied in this thesis either because it is often a constructed theoretical distinction. Henceforth uncertainty in this thesis will be referred to as "risks" but meaning both the quantifiable and unquantifiable. Risk in project management, a branch of business administration is dividing risk into two groups; positive risk, which is the opportunity of an event to occur, and negative risk, which is the threat of an adverse event (Project Management Institute 2017). Risk has always been present in forest investment decisions; however, the handling of risk has not traditionally been incorporated in the investment analysis; one reason is that forestry has a long investment horizon making the modeling of risk complex. Thus, decisions are often made through deterministic assumptions, assuming the dependent variables affecting the profitability is the same during the investment horizon (*ibid.*). The risks in forestry were divided into five main categories, modified from the classical book from (Duerr 1960) classification of risks in forestry which is further described henceforth.

3.4.1 Economical

The forest asset is like other financial asset classes subject to macro risks such as inflation, interest rates, and currency fluctuations. Direct forestland investments are generally associated with high transaction costs, low liquidity, and consequently, forestland investments have a longer timespan (Mei 2015). The market risk is the price volatility of the inputs and outputs in forestry; inputs as regeneration costs and outcomes as the prices of the commodities produced from forestry as lumber and pulpwood. Moreover, the asset valuation of the forestland is also affected by the market preference on the forest property market (Duerr 1960).

2.4.2 Physical

The physical risk in forestry is factors affecting the possible output and quality of the growing stock. These are divided into two main categories: abiotic and biotic risks. *Abiotic* components of risk are comprised of non-living functions. In the context of forestry, negative risk components could be windthrow, wildfire, flooding, drought, snow (Jactel *et al.* 2009; FOREST EUROPE, UNECE and FAO 2011). The magnitude of the abiotic agents is varying from stand-level to landscape level. *Biotic* components of risk are the biological (“living”) functions as pathogens, pests, and grazing (FOREST EUROPE, UNECE and FAO 2011). The biotic risks could create visible catastrophic losses of the volume of wood for forestry and reduce the growth and vitality of the trees; hence making the trees more susceptible to other biotic damages and abiotic. Abiotic and biotic agents could interact and facilitate the other agent and create negative risk through multi-damaged forests.

The physical risks are a natural part of ecosystems and foster ecological succession and evolution. However, the physical risks could lead to extensive damages in forestry, dramatically affecting the financial return, both in catastrophic events and as small-scale disruptions (FOREST EUROPE, UNECE, and FAO 2011). On the one hand, climate change could, through higher carbon concentration and following increased temperature enhance the growth in the forests through higher photosynthetic ability (Kirschbaum 2000). On the other hand, climate change could exaggerate the effects of the physical risk in terms of frequency and magnitude; however, the uncertainty is extensive in the forecasts (Kirilenko & Sedjo 2007; Brunette *et al.* 2020).

3.4.3 Operational

Operational aspects are the risks associated with the availability of silviculture practices, which could be affected by weather events and machine capacity (Duerr 1960). Forest technology advances could affect the logging costs and thereby the forestry rate of returns. Other operational risks associated with the logging costs are the cost of labor in afforestation, pre-commercial thinning, and harvesting operations.

3.4.4 Regulatory

The forestry legislation is diverse in different parts of the world. Every country has its unique forest history with various governance of the forest resource. Furthermore, the regulation in forestry is often old. The regulations set the boundaries for the business and thereby the prerequisites of the financial result. The law decides the minimum rotation age of forest stands depending on the on-site productivity and area, affecting when income is generated and the NPV of a forestland investment (Duerr 1960).

3.4.5 Reputational

Market-based certification schemes have been present in forestry since the beginning of the 90s when it was developed for tropical forests, but it is now present in all types of forestland globally (Perera & Vlosky 2006). Market-based certification schemes are used to reduce the impact of forestry and thereby ensure the legitimacy of the forest products. Moreover, social pressure could enhance the reputational risk to regulatory risks as policy interventions are required (Duerr 1960). For example, in silviculture, certifications could give a premium to certificated businesses if constraints as the usage of alien tree species and environmental considerations are met. Moreover, reputational risk could lead to policy interventions and thereby may result in legislative interventions.

3.5 Conceptual framework

Based on the literature review that initiated the study and chosen theories, a conceptual framework was developed to fulfill the aim of the study. The data collection and analysis were conducted in two steps, with the initial phase of identifying investors then followed by a qualitative data collection with one case of each ownership category. In figure 11 an illustration of the conceptual framework is shown. The inner-circle represents the research questions of this study (1.1;1.2;1.3-4) and the quadrants represent the applied theories and data sources used for the analysis with a reference to where a description of the concepts could be retrieved. Research question 1 *Which commercial actors purchase forestland?* is answered through the ownership categorization (1.1). The categorization is made with data from a total survey of secondary data from the Swedish cadastral authority. Research question 2 *What are the objectives to acquire forestland?* is answered through the investment objectives (1.2). The objectives are analysed from three dimensions: forestland as a financial asset, taxes, and forestland, and vertical integration. Research questions 3 and 4 *What are the perceived opportunities with owning* and *What are the perceived risks with owning forestland?* is answered through determining the perceived opportunities and risks (1.3-4). The perceived opportunities and risks are analysed with a framework based on Duerr (1960) classification of risks in forestry, resulting in five dimensions of risk and opportunities.

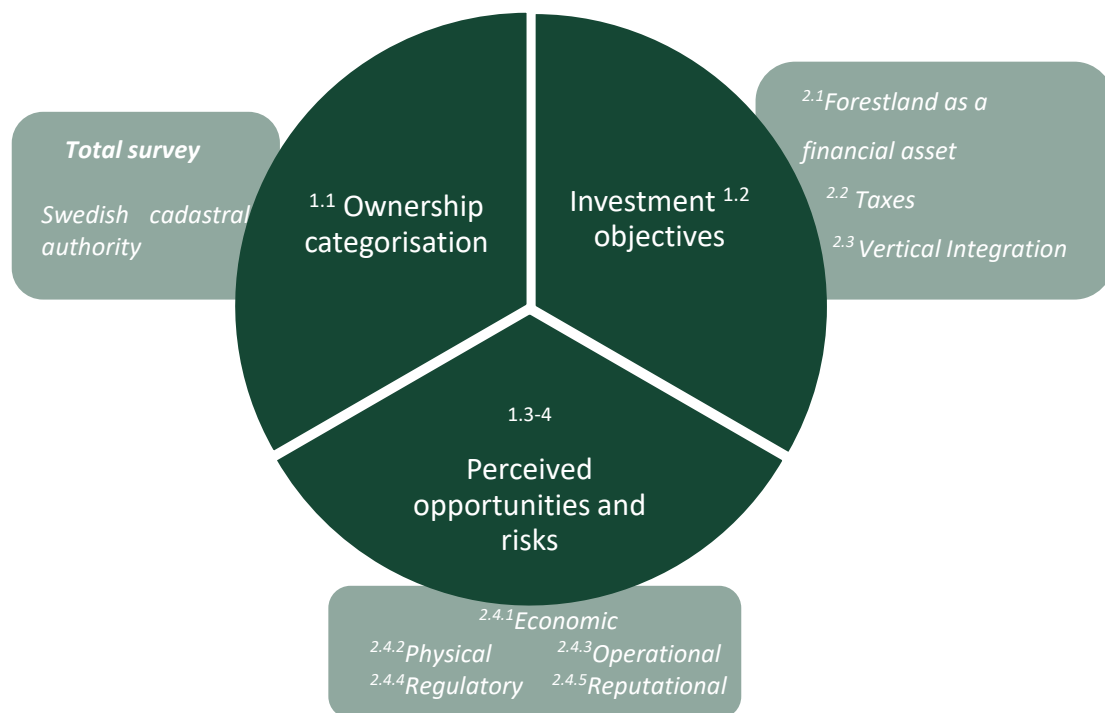


Figure 10. The conceptual framework of the study.

4 Method

The chapter summarizes the method used in performing the scientific study. It begins with the applied approach of the study and continues with describing the type of case study, the collection of data, and the method of analysing the data. Finally, the chapter ends with a summarize of the procedure and the practice of assuring quality as well as the ethical considerations in the thesis.

Within this study, several essential method choices have been made. In table 1, the main method choices from approach to data collection method are schematically summarised together with a short motivation.

Table 1. Summary of method choices

Method selection	Chosen method	Motives
<i>Approach</i>	Abductive	To be able to alternate between empirics and theory.
<i>Design</i>	Case study	To get a deeper understanding of the phenomena being studied and to get a deep understanding of actors from each ownership category.
<i>Data collection</i>	Quantitative and qualitative	A combination of the two was chosen to be able to answer who is investing in forestland and to identify individual motives of the investment.
<i>Data sources</i>	Primary, Secondary	To be able to understand the context for this study, primary data was necessary. Secondary data was chosen for its suitability and time efficiency.
<i>Primary data</i>	Interviews	Semi-structured interviews were chosen to be able to direct the interview depending on the respondent's opinion.
<i>Secondary data</i>	Public property data	It was chosen because it is the impartial Swedish mapping, cadastral, and land registration authority (SMCA)

In the following sections, each and one of the six method choices shown in table 1 is clarified and described to provide a detailed understanding of the overall framework of this study.

4.1 Approach

The selection of a research approach is a fundamental choice for any type of research, and it is determined by how the researcher wants to develop the reasoning about what is being studied. For this study, an abductive research approach was chosen since the theoretical framework was developed together with the results from observations, which characterizes an abductive approach (Alvesson & Sköldberg 2008). Abductive reasoning is an alternative method compared to the traditional *deduction* and *induction* which often is connected to *quantitative* and *qualitative* traditions respectively (Robson & McCartan 2016). Deductive and inductive research methods could be the opposites of each other. In a deductive method approach, the researcher is developing a theoretical hypothesis which then is tested through empirical observations. In an inductive method approach, the researcher is generating theories from empirical observations. According to (Bryman & Bell 2017), abductive approaches have increased in popularity within business administration which can be explained by the limitations of deductive and inductive reasoning. The weaknesses of deductive research are

how to handle the choice of theories applied without any observations (*ibid.*). As for inductive research (Dubois & Gadde 2002), it questions the inevitable prior knowledge for every researcher. In the abductive research approach, these limitations are parts of the flexible process since the researcher moves back and forth between empirical observations and theory to expand understanding of the phenomena (Dubois & Gadde 2002).

4.2 Literature review

The initial work began with a literature review where other investigations and applicable theories were used to understand the problem being studied. By looking at earlier research and problematization, the researcher can strengthen his contribution and increase the quality of the work (Robson & McCartan 2016). During this process, the background and problem were developed together with smaller dialogs with brokers specialized in forestland. The dialogues were carried out to gain an insight into the market of interest effectively.

Literature specifically used for analysing ownership categories was gathered from the earlier studies, mainly in the US. The information was carried out from digital search engines for academic journals such as google scholar, Scopus, ResearchGate, etc. Other secondary data was collected from current newspaper articles and chronicles from industry magazines. The statistics presented are primarily gathered from authorities such as the Swedish Forest Agency, the Central Bureau of Statistics, and industry surveys.

4.3 Research design

A case study is a commonly used flexible research design where the researcher aims to get a deeper understanding of the phenomenon being studied by focusing on specific cases and their real-world reality (Robson & McCartan 2016). The case is often referred to as an: individual, group, organization, situation, or almost anything that the study focuses on (*ibid.*) The approach is therefore particularly suitable for research questions answering who, how, what, where, and why (*ibid.*). Robert Yin, a well-known researcher within the area of case studies defines a case study as:

“An empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin 2009)

What is important to reflect on from this definition are first that a case study is more of a strategy or approach instead of a method that is troubled with research in a wide sense with a narrow focus (Robson & McCartan 2016). The empirical part of the study focuses on gathering evidence about the reality for the particular case and, therefore, issues the possibility of generalizing findings (*ibid.*) The approach creates, however, opportunities to use multiple methods of data collection that can generate triangulation (Yin 2009).

Since this study aims to identify categories of forestland investors and their unique reality the were multiple case studies were chosen. Depending on the focus of the research, not only single case studies are usable. If more than one case is studied, the variant of multiple case studies can be used (Yin 2009). If a study aims to compare variables between two or more actors, a multiple comparable case study is a useful approach (Bryman & Bell 2017). The approach however can be questioned due to the analogy of a survey. Bryman & Bell (2017) however argues that the

differences between them are the focus. Surveys are used if general results are requested, and comparable case studies are used if the aim is to get a deep insight into each case and its unique context (*ibid.*), which is following this thesis.

4.4 Data collection

When conducting a case study, both quantitative and qualitative methods for data collection can be used. The most common strategy for case studies is as (Robson & McCartan 2016) describe the flexible qualitative strategy. However, the approach does not have to be limited to either one of them if a mixed method is used. A mixed-method has been developed for this study since the authors intend to identify and compare the different investors operating in the real market. This entails a further explanation since the focus and allocation between the two methods is important depending on the type of research. For this study, a *sequential explanatory* design was chosen. This type of multi-strategy research is described by an initial stage of quantitative data collection followed by qualitative data collection (Robson & McCartan 2016). The sequential explanatory design generally points priority to the quantitative data gathering, but for this study, no clear allocation was made since both methods were equated (*ibid.*). The design ensemble this study since the quantitative data collection will identify the acquirers in the prior stage followed by the qualitative method to clarify the findings from the earlier stage (Robson & McCartan 2016). The combination of methods generates several benefits, e.g., *triangulation, completeness, offsetting weakness and providing stronger inference, and explaining findings* (*ibid.*). However, the combination of methods involves problems needed to be addressed. Criticism is primarily pointed at the different epistemological thesis that separates the two methods and the different paradigms that qualitative and quantitative research represent (Bryman & Bell 2017). Therefore, a clear distinction between what questions the different methods are aimed to answer is important (*ibid.*).

The quantitative data collection was primarily correlated to research question 1, where secondary data as a complete survey was collected from the Swedish mapping, cadastral, and land registration authority. In addition, the survey was extended with official information about the organizations from annual reports and websites. To answer research questions 2, 3, and 4, a qualitative research approach is applied by semi-structured interviews with seven different cases and one pilot interview.

4.4.1 Property data

Property data was collected to find the investors who purchase forestland. The collection was made through a public official's request to the SMCA. This data only includes transactions through the cadastral authority and do not account for swapping of shares or reallootments. The request is compiled of 6 different constraints illustrated in Table 2.

Table 2. Constraints for the public official request

Constraint	Motives
Within all Swedish regions	This study focuses on the whole Swedish forestland market.
Agricultural unit Unexploited (110)	To exclude properties where buyers might have other interests than forestry. Internal code 110.
Purchased by Juridical persons	To be able to exclude non-industrial private forest owners
Area above 50 hectares	To exclude small properties with a potential non-forestry focus
Occurred during the last 20 years	To have the ability to make longitudinal analysis and get a sufficiently large sample.
Only purchases	To make sure that a financial transaction has occurred.

To access a sample used for this research, several constraints were required (table 2). Since this study focuses on the Swedish market as a whole all the regions were required to maintain a total investigation. Since the study focuses on purchases of land for the interest of forestland, limitations to only include agricultural units without buildings were necessary. Otherwise, the acquisition could be focused primarily on other land use than forestry which is outside of the focus for this study. The reason to only concentrate on juridical persons is the purpose of the study, NIPFs represent a heterogeneous group of owners with other potential rationales of investing than is mentioned in this study. To further narrow the search to only sample the forestry investments, the area was restricted to be greater than 50 hectares of forestland. Small properties could be sold for other purposes, for instance, mining or land development. To make sure that a satisfied sample size where gathered, the time horizon of the last 20 years was set, this also enables a longitudinal approach to analyse changes over time (Bryman & Bell 2017). Only purchases were chosen only to include the financial transaction from the ownership change.

The requested variables from SMCA were chosen in the early stage of the process. To make sure to not set aside important information from all the transactions, several variables were set of interest. In Table 3 the variables are chosen, and the associated motives of selection are displayed.

Table 3. Selected variables of interest for the public official request

Variable	Motives
Property designation	To know which property that is purchased and its location.
Transferor	To be able to analyse further who the earlier owner is.
The legal owner (buyer)	To be able to find more information about the owner.
Transaction date	To have the ability to analyse changes over time.
Total property area	To have the ability to find out information about forestland percentage.
The total area of forestland	To have the ability to find out information about forestland percentage.

The necessary variables chosen were numerous to not to miss any essential information to carry out the analysis. By obtaining the variables shown in Table 3, a deeper understanding of each transaction could be created, and thus any duplicates could be excluded from the material. This was shown when the same property could occur in two transactions where the property previously had joint ownership.

4.4.2 Semi-structured interviews

Interviews are one of the most important sources of information connected to qualitative case studies (Yin 2009). The method is flexible in such ways that it can be adapted to find out specific goals that the researcher strives for (Robson & McCartan 2016). Tracy (2012) believes that the method is suitable to gather information, but also to confirm what researchers already have shown. However, an interview is not limited to the qualitative approach for data collection, it could also be used for quantitative research (Robson & McCartan 2016). A quantitative interview differs significantly from a qualitative one as the first aims to be well structured and with a focus on the researcher's question without side information from the respondent's point of view (Bryman & Bell 2017). In a qualitative interview as conducted in this study, the respondent is encouraged to clarify and further process the answers. Therefore, an opportunity is given to show what is considered to be of interest (*ibid.*). A qualitative interview can therefore be less structured than the quantitative which Tracy (2012) means could strengthen a discussion rather than controlling it. It could achieve benefits since the respondent's perspective will be given the opportunity to be presented and thereby provide an in-depth understanding of the context.

Robson & McCartan (2016) identifies three different types of qualitative interviews based on the level of structure: *structured interviews*, *semi-structured interviews*, and *unstructured interviews*. A structured interview usually includes several fixed questions where the respondent answers with an open response in a fixed order (*ibid.*). What distinguishes this method from quantitative interviews is that there are no answer alternatives for the respondent (*ibid.*). Semi-structured interviews are based on an interview guide where the questions are predetermined in a way that gives the respondent an ability to answer openly but does not have to be followed in strict order (Bryman & Bell 2017). In this study, the semi-structured interviews were chosen to gain a deeper understanding of the reality in which the interviewer can deviate from the interview guide with clarifying questions to understand each individual context.

The interviews were carried out with the video conference software Zoom, the choice of this software was selected for the appropriateness of recording the interviews which facilitates transcription of interviews and allow the researcher to focus on the conduct of the interview (Robson & McCartan 2016). Transcription is important in semi-structured interviews for several reasons, it helps in the analysis to find keywords and themes (*ibid.*). Furthermore, the transcription also serves as a validity tool when sending the transcripts to respondents for confirmation. The confirmation process objective is to reduce the misconceptions between respondent and interviewer (Bryman & Bell 2017). The transcription was also important for the translation of the interviews from Swedish to English and was made with caution to avoid distortion of the material.

Pilot interview

The pilot interview was implemented to test the interview and the questions it contains before proceeding with the qualitative data collection. Robson & McCartan (2016) describes a pilot study as a minor feasibility study of the actual project that will then be conducted. Therefore, piloting can fulfill several functions as the researcher get an opportunity to learn more about how to handle the method or serving as an exploratory phase of the study, which can provide beneficial theories before the next step, which then gives an explanatory focus (*ibid.*). To take advantage of a pilot interview, an expert in the financial market was chosen. The respondent was chosen for his experiences of the property market of forestland. The respondent was

therefore considered to be an appropriate equivalent for the investors and thus served the purpose of the piloting.

4.4.3 Unit of analysis

The unit of analysis in this thesis was the forest estates market for legal entities in Sweden. The quantitative part of the thesis was the basis of selecting the different case study companies that were interviewed and comprised the qualitative part of the study. Potential interviewees were contacted by email with an invitation to participate in the study. In the selection of participants in the study, an ambition was to have representation by both genders. However, due to several invited persons declined to participate in the study, the respondents were all male. Furthermore, as several persons declined in participating in the study, the number of interviewees did not reach the desired quantity of respondents. In Table 4, all interviews of this project are presented.

Table 4. Interviews for qualitative data collections

Category	Position	Respondent	Tool	Interview date	Duration	Validation
Financial market actor	Forest industry expert	Male	Zoom	2021-04-16	50 minutes	Transcript (2021-05-05)
State-owned Ltd	Property manager	Male	Zoom	2021-04-19	45 minutes	Transcript (2021-05-18)
Sawmill	Forest manager	Male	Zoom	2021-04-21	45 minutes	Transcript (2021-05-19)
Other legal entity	Forest manager	Male	Zoom	2021-04-22	60 minutes	Transcript No feedback ¹
TIMO	CEO	Male	Zoom	2021-04-22	50 minutes	Transcript (2021-05-05)
Forest Industry	Forest manager	Male	Zoom	2021-04-27	50 minutes	Transcript (2021-05-26)
Private firm	Business advisor	Male	Phone	2021-04-28	55 minutes	Transcript (2021-05-04)
TIMO	Board member	Male	Zoom	2021-05-03	50 minutes	Transcript (2021-05-10)

A total of eight interviews were conducted including the initial pilot interview (table 4). One respondent from each ownership category in research question one was chosen. TIMOs were suspected of being a differentiated group based on the pilot interview conducted. Therefore, a second interview was conducted with another TIMO. During the interviews, three respondents wished to participate anonymously. Therefore, it was decided that all respondents would participate anonymously as it was considered the most ethically correct.

4.5 Data analysis

Since the study uses a mixed-method and was carried out in two steps there are two different methods of analysis based on the type of data involved. The quantitative data is analysed through a categorisation model and the qualitative data was analysed through theoretical interpretation.

¹ The respondent from the category *Other legal entity* was not possible to reach despite several attempts by the authors.

4.5.1 Classification of forestland categories

In the classification of forestland categories, a framework developed by (Zhang *et al.* 2012) was used and further adjusted to be applied into a Swedish context as the U.S forest estates market categories differ from the Swedish market. Zhang *et al.* (2012) developed their framework from the US Forest Service Forest Inventory Analysis (FIA) database of ownership structure. To fit the Swedish context, the model was combined with classifications from the Swedish forest agency by Christiansen (2018) which did not incorporate TIMOs and thereby was further improved. The established model is shown below in Figure 12.



Figure 11. Model of ownership classification.

By distinguishing the owners through a number of conditions shown in Figure 12, six different categories of owners could be identified. In order to categorize each legal entity based on the model, additional data was collected on the main business, the existence of the forest industry, owners, and corporate form. The corporate form was based on the framework from the Swedish Tax Agency (Skatteverket 2021).

This project focuses on the objectives of acquiring forestland for forestry use. Therefore, condition one and two was implemented to exclude those corporations where land could be suspected of being purchased for a purpose other than forestry. These categories include

Municipalities, Agencies and Other land use, which continues to be outside the study. The actors investing in forestland for forestry are divided into six different categories: *Forest Industries*, which are companies with both sawmills, pulp and paper mills, or firms only active in pulp and paper production. *Sawmills*, represents firms that have an industry with the focus of mechanical processing of solid wood. The division between the two types of industries is based on the difference in main raw material and size of industry. *TIMO* (Timber investment management organization) includes companies owned by institutional owners; this category is further described in the empirical background. TIMOs is an ownership category that does not appear previously in a Swedish context, which meant that this group would be distinguished from other private companies. *State-owned Ltd* (state-owned limited companies) was chosen as a separate group as it accounts for 13 percent of the total Swedish forestland and includes the largest forest owner in Sweden (Christiansen 2018). *Private firms* are a category to identify private limited companies investing in forests. These firms may be participants in another group but must have a clear goal linked to forestry. The final category of buyers is other legal entities that cannot be distinguished in the earlier mentioned groups.

4.5.2 Theoretical interpretation

The choice of interview analysis method was thematic analysis with a theoretical interpretation. The theoretical interpretation is a type of thematic analysis when the constructed theoretical framework drives the data analysis (Braun & Clarke 2006). Kvale & Brinkmann (2014) express that in theoretical interpretation the analysis is guided by a theoretical and paradigmatic approach. The objective of the interviews in this thesis was to gather primary data of the investigated phenomena. The interview guide was divided into three different sections which were designed from the theoretical perspective and thesis context as well as the research aim of this thesis. In theoretical interpretation, a systematic analysis method is often not used, instead, the researcher reads the transcripts several times and tries to reflect on data from a theoretical point of view and construct themes, thus interpret the data (Kvale & Brinkmann 2014). However, the theoretical interpretation could also result in skewness in aspects dealt with in favor of the aspects where theory could explain the phenomena (*ibid*). To reduce the skewness, the interpretation of the interviews should not use the theories in a definitive manner as in natural sciences but rather as plausible explanations of the phenomena.

4.6 Procedure

The study approach followed the principle presented in the overall analysis model in Figure 13.

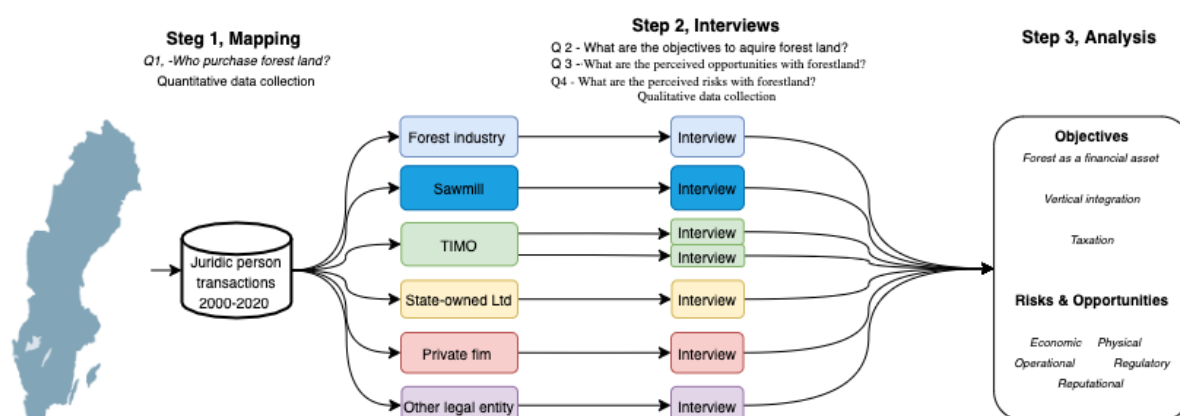


Figure 12. Summary model of the study's practical approach and analysis including the theoretical framework.

The model in Figure 13 aims to present the approach in chronological order to facilitate an overview for the reader and how each step in the project relates to the study's research questions and theories.

4.7 Quality assurance

To evaluate the quality of a research design, quality assurance techniques are used to ensure the trustworthiness, conformability, and data dependability of the conducted research. Furthermore, the fundamentals of achieving high-quality research in business administration are to construct and maintain validity and reliability in the study (Yin 2009; Bryman & Bell 2017). To evaluate and ensure the quality of the research in social sciences four tests are commonly used to perform quality: construct validity, internal validity, external validity, and reliability. Some of the tests are applied in formulating the case study whereas others are tested in other phases of the research (*ibid.*). Yin (2009) relates this test to the case study design and further incorporates tactics to deal with the tests and when the research attention should be focused on addressing each test. A compilation of the quality assurance measures is shown in table 5.

Table 5. The utilisation of tests and tactics to achieve validity, reliability, and phases when implemented in the case study design (based on Yin, 2009; authors modification)

Tests	Case-study tactic	Implementation in this study
Construct validity	Construct several steps of evidence	Transcription of interviews
	Evidence triangulation	Gathering data from multiple sources
	Piloting	Test of interview guide with a market expert
	Review of evidence	Input from supervisor and opponents. Validation of respondent transcript
Internal validity	Ensure systematic anchored results	Identical framework for each interview
	Facilitate explanation through models and illustrations	Analytical models developed from the conceptual framework
External validity	Connect evidence with other literature	Abductive approach with analysis based on a conceptual framework
	Define opportunities and limitations of chosen research design	Described in method chapter and method discussion
Reliability	Account of chosen theories and method	Presented in chapters 2 and 3
	Continuous review and examination	Proposal and half-time seminar
	Digital recordings of data	Interviews are taped with Zoom-recording
	Joint data-collection	Both researchers were involved in all interviews and reviewed the transcripts.

4.7.1 Construct validity

Case studies have historically been a subject of criticism regarding the subjective involvement in the research as subjective data collection (Yin 2009). In this study, the primary data (semi-structured interviews) have been collected with a mixed method combining qualitative and quantitative data. Furthermore, this study has incorporated a variety of secondary data in the

form of scientific articles, newspapers, governmental records, and corporate publications. Moreover, in the composition case studies need to create a logical measurement to describe the phenomena, which is often checked in two steps; firstly, the phenomena investigated need to be defined by relating specific concepts to the objective of the study (Yin 2009). Secondly, concepts of the study are formulated into specific measures to establish a chain of evidence between the investigated phenomena and the research study (*ibid.*). This thesis has identified concepts relevant to the study and further operationalized them by introducing theories that could measure the concepts. A literature review has been done in the forest property market for non-industrial forest owners (NIPF) and legal entities in the U.S market to increase the relevance of identifying typologies in this study. To ensure construct validity, data were collected from multiple sources to maintain evidence triangulation. Also, a pilot interview was conducted to test the developed interview guide before the main qualitative data was collected.

4.7.2 Internal validity

Internal validity is mainly focused on dealing with causality issues in the research. Moreover, it is important to be certain to be able to explain a causality between two variables without knowing a third variable is affecting the relationship (Yin 2009). However, this is only a concern in explanatory studies when the interpretation of the data is a key point in the study. Another aspect of internal validity which is of importance for case studies with an explanatory study is making inferences. A researcher conducting a case study needs to have a design that makes the inferences logical to achieve validity (Yin 2009). To generate internal validity the researchers conducted a common guide for the interviews and analytical models developed from the conceptual framework.

4.7.3 External validity

External validity in case studies is whether the results in the case study could be generalized to other situations. Criticisms of case studies as a research design are often focused on the lack of possible generalization beyond the specific case study. In case studies the result is different from other studies with a more statistical approach. The aim is that the analytical findings could create theories that could explain other similar situations (Yin 2009). In order to show how conclusions of this study can be generalized, a thorough review of the method and its limitations has been presented.

4.7.4 Reliability

One of the foundations of research is that a study can be replicated. Reliability is a test in research where this is dealt with. The reliability test reduces the risks of conducted research being biased or inadequate generalization beyond the case study. To ensure reliability, the method of the study needs to be robustly constructed and described to being able to replicate the study (Yin 2009; Bryman & Bell 2017). By maintaining close contacts with the supervisor and other students, the work has been reviewed with continuity. To avoid differences of interpretation between the researchers in the study, all interviews were conducted jointly. The transcripts of these interviews were then controlled by both before they were sent for validation.

4.8 Ethical considerations

Research conducted through interviews involves people, undoubtedly the ethical perspective of these research designs needs to be integrated into the design of the data collection. Ethical considerations in research are ethical codes and guidelines practically integrated into the research design and the ethical issues (Robson & McCartan 2016). Ethical codes and guidelines

are the fundamentals of the interview, which could be divided into four areas: informed consent, confidentiality, consequences, and the role of the researcher. Informed consent means the participants of the study are informed of the aim, the voluntary participation (including the right to withdraw at any time), and the possibility to correct the statements in the interview afterward (Kvale & Brinkmann 2014). *Confidentially* is the handling of the data obtained in the research. In qualitative studies where the participant's statements are the foundation of empirics, integrity needs to be ensured. The issue of confidentiality in research is the trade-off between ethics and the quality of the science. Anonymised participants decrease the possibility of replicating the study, and thereby reducing the validity (Kvale & Brinkmann 2014). In consequence, the emphasis is on making judgments of the consequences of the study both for the scientific contribution and the participants of the study. Considering the role of the researcher, the focal point is the integrity of the researcher. The integrity of the researcher is paramount in the qualitative interview because the empirics of the study is obtained through the interviewer (Kvale & Brinkmann 2014). Moreover, ethical integrity is not only important towards the participants of the study but also in achieving a high scientific quality of research, with emphasis on correctness and be representative of the study (*ibid*). Ethical issues are more ambiguous than the guidelines, tending towards the area of moral issues and research philosophy. This does not make it less important, on the contrary, the ethics and morality of the researcher are essential to the scientific study. However, it could be seen more like a theme and perspective from the researcher to include throughout the study. An ethical consideration that emerged during the interviews was the condition for respondents to be anonymous. Since three of the interviewed cases wanted to be anonymous the researchers chose to keep all respondents anonymous. This was chosen in order to give all respondents the same condition and not create concerns fore telling something secretive.

5 Results

This chapter includes the empirical findings of the study. The chapter is divided between the secondary data collected from the public request, annual reports, and the primary data collected from the interviews. The structure follows the order of the four research questions, starting with the results on the quantitative data on purchasers of forestland followed by the qualitative data presenting the motives for investing in forestland. The chapter ends with perceived risks and opportunities.

5.1 Who purchases forestland?

In total, two public officials' requests from the Swedish cadastral authority were made representing all forestland transactions made by a juridical person between 2000-2020. The data are used to answer the research question of which commercial actors purchase forestland and as a selection of cases for the qualitative data collection. The survey resulted in a number of 384 transactions made by a juridical person in Sweden since 2000 (table 6). All of Sweden's 21 counties were represented and aggregated in the three main regions South Sweden (Götaland), Middle Sweden (Svealand) and North Sweden (Norrland).

Table 6. Forestland transactions made by juridical person from 2000-2020

Region	South Sweden	Middle Sweden	North Sweden	Sweden, Total
Number of real estate transactions	108 (28%)	99 (26%)	177 (46%)	384
Total forest area (ha)	10 937 (16%)	15 448 (22%)	43 737 (62%)	70 122
Mean real estate (ha)	112	161	249	183
Median real estate (ha)	102	97	144	105
Number of buyers	64	56	81	185
Transactions per buyer	1,7	1,7	2,2	2,1

In table 6 results from the public official's request is presented in three different regions: South Sweden, Middle Sweden, North Sweden, and finally with a summarise from the whole Sweden. In total, 384 transactions were carried out between 2000 and 2020, which corresponds to 70 122 hectares of land. The majority of all transactions concerned North Sweden (46%) followed by South Sweden which accounted for 28%, and finally, Middle Sweden represented 26%. The mean real estate area goes from 112 hectares in South Sweden to 161 hectares in Middle Sweden and 249 hectares in North Sweden. There are 185 different buyers distributed on all transactions which correspond to an average of 2,1 transactions per buyer. In South- and Middle Sweden the number of transactions per buyer is 1,7, whereas in North Sweden one buyer on average is present in 2,2 transactions.

5.2 Objectives of acquiring forestland

5.2.1 Rationales of investment

The interviewed *Financial market actor* means the objectives of different categories are diverse. It is the private firm who have single-taxed money and have become wealthy in the company outside of forestry, furthermore the person has often long dreamt of buying forestland. The respondent means the category has similarities to non-industrial private forest owners

(NIPF) with the personal interest of buying forestland. Another category is those who want to spread the risk and sees the forestland as a long-term investment. Moreover, another category is the category that buys forestland domestically and abroad for strategic reasons to secure wood supply to the own industries. Finally, there is also a category that buys forestland because they have lost property ownership due to provisions for nature conservation.

The objectives of one of the ownership categories TIMO, *TIMO-1*, were to reach the maximum total yield of the investment through maximizing the value growth and achieving an adjusted yield.

“To get maximum value growth and an adjusted yield. The goal is to achieve the best possible total return on the investors' capital” - TIMO-1

“The total return has increased because the value growth has risen so much due to exactly what you said that the prices of forestland are rising. Furthermore, how the yield keeps up depends on the timber price development” - TIMO-1

TIMO-1 thinks the increased activity of investing in forestland is substantially affected by the level of the interest rate. The respondent explains that the interest rate decline and the present low-interest environment is affecting the forestland prices a lot. Furthermore, the prognosis from financial institutions forecasts of low interest for a long time also affects the interest of investing in forestland. Moreover, the difficulty of gaining yield on traditionally stable assets as bonds has made investors seeking towards all alternative investments that can deliver a stable yield at low risk, and forestland is one of them. The forestland part in an investment portfolio is different from other investment vehicles in the alternative investment category with the value-growth of the forest. The respondent means it is seldom the whole growing stock is harvested and it subsequently means a value growth that increases the capital in the forest. Simultaneously the forest sequesters more carbon that could be a potential upside. Furthermore, the forest asset has relatively low risk, and the sector has good prospects and hence an investment could expect good value-growth and yield. To meet the demand of forestland in a portfolio, the allocation of the forest holding is done by combining different types of forest estates in accordance with the two components; yield and appreciation. Risk diversification is done through investments in diverse geography and countries and hence, for example, reducing the risks of calamities and sudden industrial closures.

The *Sawmill* company is interested in investing in forestland if the price is right, and forestland serves as a good investment as financial security and as a source of timber supply. The forest manager says the following about the owners of the sawmills objectives of buying forestland:

“He sees it both as an investment for security, but it is also a question of timber supply also, it is both. But he is very strict that he also wants to do sound investments, we are measuring ourselves and we put quite a lot of effort into the measurements.” - Sawmill

The own forestland is also used to employ the contractors, and sometimes that aspect is more important than the forest holdings being a raw material supply. The respondent continues that the forest holdings are favorable to possess but that the volume and the area of the holding need to reach a certain level to be interesting, otherwise it is too small. Furthermore, he continues they have about enough for the holdings to help some during the spring and the thawing of

frozen soil. The company wants to do sound financial investments otherwise they do not invest in a forest estate, thus they put substantial time into doing their measurement of the growing stock in the investment objects as the growing stock occasionally differs from the forest management plan. The respondent emphasises buying forestland is to make good business. The sawmill is also interested in forest estates with a high proportion of young forest, it does not need to be forest mature for final felling to a large extent.

Regarding buying forestland for taxation benefits, the respondent tries to answer for the owner and mean that it could be one possible reason, the owner has continuously reinvested the earnings in both the sawmill and into forest holdings. The sawmill raw material supply from the own forest holding is small, approximately 15-20% of the total consumption of the sawmill, and the harvest is not as high as the net annual increment, hence the growing stock is increasing. The respondent means it is an illogical caution not to harvest the available growth that many forest owners have, but the owner wants to have capital in the forest as security:

“We also harvest quite carefully, so we build forest stock. We could harvest a lot more than we do but it is the illogical caution that many have. Personally, I think the owner is too careful, there is a risk to wait with the grown forest. But the owner would like to have a little bit of buffer also, as security so to speak”. – Sawmill

The *Other legal entity* sees the forestland as a secure financial asset for financing the entity's other activities. When they buy forestland it is to compensate for land that has been expropriated by the authorities for nature conservation.

“If we put it this way, it is mandatory with an acquisition permit to buy as a legal entity so we cannot increase our holdings only when we buy from another legal entity. Thus, that is the prerequisite, and we often buy forestland to compensate. The last years it has been to compensate for established nature conservation areas when we have lost land.”-Other legal entity

The entity also purchases forestland to improve land consolidation. For historical reasons, the forest holdings are fragmented, and to create bigger parcels of forestland, small units are sold, and others are bought to make a more consolidated forest holding.

“We also buy land when we want to improve the land consolidation.”- Other legal entity

On the question of whether the decision of buying estates close to the own forest holdings or to buy estates close to industry, the respondent considers the net income in the operations in the inland estates needs to rise to compensate for the closure of industries in the inland. The respondent continues to explain that the wood consumption is now concentrated to the coast and the outlook for future profitability is thereby better there. The entity's overall investments could take more risk as the forest holding is a relatively low-risk real asset. However, the respondent continues that those discussions have been around for a while, to increase the portfolio's risk level but the large investments in forestland have been seen as a stable and secure asset for the owners.

The *State-owned Ltd* buys forestland to improve the company's core business, the forestry, and to improve the forestry forest estates is purchased to increase the rationality of the forestry operations.

"It is because we want to improve the holdings for the forestry, the core of our business. As a part of more rational forest management, we supplement and acquire land, that is our view." - State-owned Ltd

Moreover, rationality in forestry is to achieve the land consolidation of the forest holdings and complement with the type of forestland the company requires and be closer to the buyers of the timber, the industries.

The *Forest Industry* owns forestland and has the industry to refine and create value on the forest holdings. The company buys forestland to support the industry's supply of roundwood for the long-term, the industry is consuming more roundwood, and more raw material is needed in the future than is now available. According to why the company buys forestland, the respondent explains:

"It is a question that has two parts; one is that we are a forest company with forest industry so we have the forestland as the core of our business and then we have a number of industries to refine and create value on these forest holdings. And then we buy forest to supply our industries in long term, and we have an expanding industry, and we see that it will be needed more raw material in the future than it is available today" - Forest Industry

The respondent considers the forest holdings important to give security in the supply of raw material and thereby facilitate investments in capacity in the industries. Furthermore, the forestland could also help when it is bad conditions and achieve a competitive level in logging costs with a substantial operating fleet. Furthermore, forestland is considered an asset with good value-growth and has historically been a good investment for the company, with a stable and secure return. On the question of what aspect of the raw material supply the forestland can provide, the respondent put it this way:

"It is the fundament that a stable and reliable supply of our industries and especially when we do large investments" - Forest Industry

The *Private firm* buys forestland because the owner believes in the forest's role in a future bioeconomy associated with global climate change, moreover, the forestland forms a contrast to the other businesses in the corporate group which is in the tech sector. Furthermore, the owner looks upon the forestland as leaving a legacy for future generations.

"The owner himself says that he has a belief on the forest importance in the society in a future bioeconomy and he has some kind of feeling to leave something real behind also. The rest of the corporate group is in the tech sector and that is not that real. But the main part is of course that they believe in the forest as a part of a future bioeconomy with the climate change issue and so on." - Private firm

Regarding whether the taxes impact the decision to invest in forestland the respondent means that it is not the main reason to invest in forestland. Furthermore, for the taxation, it does not matter if it is forestland or anything else from a taxation point of view. The company sees the forest investment as significantly more long-term and less volatile than the other businesses in the investment portfolio, which are characterized by large fluctuations. The real internal rate of

return is favorable of a forestland investment for this kind of investor because bank deposits are giving close to negative interest for big investors. Consequently, the cost of lending for big investors is low which further makes the real growth in a forest estate compelling.

The ownership objective of *TIMO-2* to possess forestland is to gain a return from sustainable forest utilization for the owners. On what role forestland has in an investment portfolio and if forestland could create an efficient portfolio, the respondent explains why forestland is desirable.

“Forestland is a long-term asset that does not fluctuate up and down in the same way as for example the stock market and for us, it is a value that it is a stable real asset that does not necessarily develop as the stock market. If the stock market can fall without that forestland falls in value and of course vice versa also. Hence it spreads the risks in our total investment strategy to have a share of forestland investments.”-TIMO-2

Moreover, the respondent discusses aspects of forestland and portfolio on the supplementary discussion if forestland contributes to an efficient portfolio.

“Yes, it contributes to a more efficient portfolio, but of course given the return you can gain it must be acceptable in relation to the level of risk. However, we think it is even if it is quite low.” - TIMO-2

Further, the inflation attributes of forestland the respondent means it is a real asset and follows the inflation in the long run while in the short run, it does not necessarily follow the inflation.

TIMO-2 answers the follow-up question about the yield from forestland that is not central in the investment.

“Of course, it is attractive to have a stable cashflow, but it is perhaps less central for us than for other actors, we have pretty much patience and this is a small part of our total investments, and we are not forced to have a cashflow from the forestland every year”-TIMO-2

“Forestland has risen substantially the last 2-3 years and is probably part of a longer trend, and of course you cannot expect that it will continue in the same way, but the expectations on return have decreased as a result, it is anyway our judgement. And because we still own forestland our required rate of return has obviously decreased, otherwise we would sell it”- TIMO-2

1.1.1. Investment horizon

The *Financial market actor* thinks most of the owner categories have a very long investment horizon. However, the *Private firm* which has made a lot of money in their company has maybe not as long as the other categories. But forestland investments have still in general, longer investment horizons than most other asset classes.

TIMO-1 has perpetual ownership of forestland and has no intention of liquidating the holdings. The respondent continues that they want to maximize the total return and thereby could work with intensive forestry. Hence the company could increase the growth and thereby the return.

Measures to increase the long-term growth and vitality of the forests could be done because of the long horizon and increase the value-growth of the forestland investment. The *Sawmill* has not sold forestland and thereby has a long investment horizon in their acquisitions, it is only some swaps of land that could change the horizon of the acquisitions. The respondent thinks that if the sawmill for some reason would be liquidated the forest holdings would be kept by the owner. The *Forest Industry* has a perpetual perspective in the strategy of the land, the basis of the calculations is on the return they receive from the yield and how that will connect to the supply of the industries and the value-added that they could create.

The *State-owned Ltd* has a long-term perspective and the forest investments that are made without an intention of selling them. The *Other legal entity* considers forestland as long-term investments, they do not buy and sell speculatively. They invest in forestland as a long-term strategic investment and the bought forest estates are acquired to be kept. The entity looks upon forestland as long-term also in the aspect of forestland as a capital-protected asset that will hold over time and hence short profits that affect the long-term profitability is not pursued. *TIMO-2* has a long investment horizon in their forestland possessions and has no intention of exiting from the forest asset. However, if the price of forestland rises to a level where the relationship between future return and price becomes unfavorable, they could sell forestland.

“We do have a very long investment horizon; we intend to possess forestland until further notice so to speak. Vi has no plans on trying to time the market with an exit, it is more a question of where the market goes. If the price becomes so high compared to the return and the condition for a future return is not good enough then we could become a seller. But we do not think it is a special point in time, we think we will continue to own forestland until we see that it is better to invest in something else.” - TIMO-2

The *Private firm* has a long investment horizon, at least ten years. On the question of whether the horizon could change dependent on the state of the market or the value of forestland is altered the respondent means it could affect the horizon, but then it is a shift in the strategy not in the horizon.

5.2.3 Increasing the forest holdings

The *Financial market actor* thinks many of the categories will hesitate to increase the holdings because they have in the past bought at a lower price and afterward been experiencing a price increase. However, the respondent thinks it differs between the categories. The respondent continues that the forest industries have in the past bought forestland when they have made a lot of money and the calculations have shown forecasted timber deficit in the future and thereby could increase the willingness to purchase forestland.

Every ownership category is positive of increasing their forestland holdings in Sweden. However, the *State-owned Ltd* has political governance that makes them for various reasons being a net seller of forestland. 2 categories, *TIMO-1*, and *Private firm* are actively looking to increase the forest holdings, and the other categories have no active goal but are screening the market and would be interested to buy if the circumstances are suitable. However, many of the categories mean there is a small supply of forest estates available for juridical persons to buy. *TIMO-2* put it this way:

“We see it as a long-term investment that we would like to have. We could grow in size but there is no liquidity in the market, there is no one that wants to sell forestland on an industrial scale” -TIMO-2

The *Private firm* is prioritizing forestland close to persistent industries and forest estates which do not have too much old-growth forest. On the other hand, the *Forest Industry* is interested in forest estates in a wide range of, sizes, preferably close to the own industry but not necessarily.

“If the land acquisition law did not stop us, we would certainly want to buy more forestland from private landowners in our area, but it is a fairly sympathetic and good law basically, so we have to work with changed zoning really, then aim for legal units when that type of units of opportunity arise” - Forest Industry

The respondent describes that the proximity to the own industry is an advantage, but the respondent also states that it is at least as important with a connection to an already owned forest holding to be able to create a rational use. But on the other hand, this does not mean that there is no interest in creating compound forest holdings in other parts of Sweden. The respondent explains that if suitable objects appear on the market anywhere from 500 hectares to several hundred thousand hectares is of interest in acquiring. The decisive factor for such a deal is what the price of the forest would end up with.

TIMO-1 is interested in buying forest estates with good site-productivity, close to industry, and good accessibility. Furthermore, for the *TIMO-1* the forest estate must not be mismanaged from a forest management point of view unless simple forest management could adjust the mismanagement.

5.2.4 Decreasing the forest holdings

The *Financial market actor* thinks many of the private firms will be considering selling their forest estates if the prices continue to rise, the respondent thinks that the high prices will increase the supply of forest estates from this category. The respondent thinks the TIMOs willingness to decrease their holdings depends on the alternative investments that compete with forest investments. The respondent explains about TIMOs:

“With TIMOs it depends on the alternative investment and how they develop. If it is shown that the return is low, and the land appreciation does not continue then I think the investments will be considered” - Financial market actor

The *Other legal entity* means they have managed forestland for a long time and see no reason to sell their land. The discussion has been to sell the forestland in periods, but the owners think the forest asset is safe and secure for them, thus the selling of forestland for them is mainly to increase the land consolidation. The *Sawmill* only sells land that is too far away from the sawmill because if it is too far away it is not helping the sawmill business. *TIMO-1* sees fundamentally no reason to sell forestland if they have been enough accurate in their investment analysis. However, if some individual forest estates that are irrational for the forest management they could be sold. But the respondent means the main goal is to increase the total forest holding and hence the company does not work actively to buy and sell to a large extent.

TIMO-2 wants to buy more not sell, the reason to sell forestland is the forest assets competitiveness in price and return towards viable alternative investments.

“Of course, it is the price, everything has a price in our perspective, but it is not only an absolute price but also a price compared to the other investment opportunities”.- TIMO-2

The *Private firm* does not consider selling is in question for the time being. On the question of what could make them becoming net sellers, the respondent means it is then a reprioritization among the other investments. Moreover, the price is also a part and a potential changed overall investment strategy for the company.

The *State-owned Ltd* has through political governance an objective to sell a part of the forestland to NIPFs and where to sell is decided in proportion to the regional forest holdings in the region. Apart from the selling objective, the company sells forestland which is peripheral relative to the forest holdings to increase the rationality of the forestry and being able to concentrate the properties.

The *Forest Industry* is selling forestland which focuses on selling properties that are far away from the industries and forests that are difficult to conduct a rational forestry. They mainly sell these forests to NIPF and then can buy back the same area from NIPF, in regions close to industries or roundwood terminals to achieve more efficient logistics. Due to this, there are usually no large areas for sale, and this can also change some between the years.

5.3 Perceived opportunities

The *Financial market actor* sees an opportunity in gradually increasing wood-prices over time, for many reasons as increased construction in wood and a general biomass demand. Furthermore, the respondent explains that regulatory changes regarding bioenergy and biofuel could create a deficit in supply and hence increase the prices of the raw material. This combined with a competitive industry which the respondent think could create a potential upside in forestland investments. In addition, the respondent thinks it will be a potential upside with additional revenue streams from mainly wind power.

TIMO-1 belief in a continued value-growth of forestland because of the high demand for sustainable investments. Furthermore, the respondent thinks it is good demand for several forest products that will contribute to gradually increasing timber prices. In the long-term, new income opportunities will be possible as carbon credits, solar parks, and wind power according to the respondent.

“On short-term it is a continued good value-growth because of high demand on sustainable investments. It is good demand on the most forest products which makes that we believe in gradually increasing wood prices”.- TIMO-1

TIMO-2 thinks the legitimacy aspect of utilizing the forest resource while simultaneously sequestering carbon could increase the legitimacy of forestry in long-term. Furthermore, the respondent continues that the forest products are substituting other materials that are not climate-neutral and. In the short-term the opportunity is the present high prices on forest products continue and that it eventually affects the sale of timber to the industries.

Other legal entity does think in long-term that the forest has amenities that we do not know today which could be extracted in the future. Furthermore, the world population will increase, and the forest and its products from the photosynthesis process could ensure sustainable consumption. The *State-owned Ltd* has a belief in the forest's importance over time.

Forest Industry sees potential in the land appreciation of forestland in both the short and long-term. The *Sawmill* thinks the forest asset and the security it provides the company is important and also as a buffering tool in the timber supply.

The respondent from the owner category *Private firm* believes climate change could increase the forest growth due to climate change. However, the respondent means it will be important to identify the areas that will benefit from climate change in contrast to areas that disbenefit from climate change. The respondent means the demand for forest products will increase and hence increasing the roundwood prices.

5.3.1 Sources of revenue in the future

TIMO-1 is working a lot with new sources of revenues and thinks these will increase in importance for the total returns from forestland. Furthermore, the respondent means to maximize the return from forest estates it will be trade-offs between different sources of revenue to optimize the return.

"We work a lot with these new sources of revenues; wind power, solar power, carbon credits so that share of the total revenues from forest estates will definitely increase"-TIMO-1

"We see it as a pure landowner that wants to maximize the return on the forest property and where the revenues come from does not really matter it is more to distribute the revenues against each other and optimize the total revenues."TIMO-1

TIMO-2 thinks the most obvious factor that could change the sources of revenues from forestland is the carbon credits market. That the carbon sequestration of a forest estate is monetized, and polluters pay forest owners to capture carbon.

The *Other legal entity* thinks the sources of revenue will be somewhat constant, however, the respondent does think the new revenue opportunities will be introduced.

"I Think it will be somewhat the same...but I could imagine it will be introduced other sources of income as carbon credits or conservation provisions which could be bought and sold, that these other values that exist in forestland could be capitalized in the economy in some way in the future". - Other legal entity

State-owned Ltd thinks the sources of revenue from forestland will not change dramatically. The roundwood will still be the big source of revenue together with some local supplementary incomes but the respondent does not believe in radical changes in sources of revenue. *Forest Industry* thinks the factor that could have an impact on the revenue streams of relative significance is the future of carbon credits. The *Sawmill* does not think there will be another land-use that has a high willingness to pay for forestland. However, the respondent thinks that new forest products that we do not know today could be an opportunity in the future.

The *Private firm* does not think the sources of revenues will be dramatically changed, but side incomes as hunting licenses revenues could increase in importance in some parts of Sweden. However, the respondent is positive towards new sources of revenues and answers to the question of the potential of carbon sequestration that it could be an opportunity and it could serve as a carbon offset for the corporate group.

5.4 Perceived risks

TIMO-1 thinks the risk of forestland in the short term is an economic depression or a financial crisis. In the long-term, the most significant risk is climate change and how it will affect the forests in terms of potentially more forest damages. The respondent continues that there are risks associated with potential law enforcement in forestry and emphasize the unpredictability of outcomes related to altered legislation. *TIMO-2* thinks the risk in the short term is the increased damages on the forests in terms of the high bark beetle population the recent years. In the long term, the respondent means that the most significant risk is associated with the forestry policy meaning that the Swedish forest sector does not get adequate prerequisites to be competitive.

The *Other legal entity* emphasizes that the essential prerequisites for forestry are unclear and call for more predictability in the legislation. The respondent explains the reasoning that the legitimacy of harvests should not have to be decided in courtrooms.

“The terms for the forest owners should be clearer, that is how I see it. The regulations...it should not have to be decided in courtrooms to find out who has right”.

The *State-owned Ltd* sees risk in climate change and the potentially increased frequency of forest damages and big catastrophes that drastically change the forests. Furthermore, the general public's opinion of forestry could change forest management in the future. *Forest Industry* sees risk in opinion against the forestry sector and the weakening of the proprietorship of land. The opinions against forestry and legislature changes could be driven by the climate issue and the price of carbon credits. In the short term, high prices on carbon credits could affect non-industrial private forest owners not to harvest.

The *Sawmill* sees the legislation as the biggest threat. The respondent means it is unclear what will be prohibited and what will be allowed in forestry in the future. The risk of having large areas of old-growth forests and the uncertainty that it will be allowed to harvest creates uncertainty both for the supply to the industry and the management of the forest holdings and how the company could utilize it. Furthermore, the respondent thinks it is a risk with multi-damaged forests and insect damages, however, the respondent does not think of windthrow and wildfires as severe risks.

The *Private firm* thinks it is considerable risk with the legitimacy of forestry connected to the general public's opinion of forestry. Moreover, the respondent is concerned about how the increased pressure on forestry is affecting the market-based certification schemes without compensating with higher prices. In the long-term the forest damages associated with a warmer climate are seen as risk and uncertainty how it will affect the growth and traditional forest management. I could mean that the future strategy of forest management would imply to have stands that endure until final felling.

6 Analysis

In this chapter the data is analysed through the framework developed in chapter 2. The chapter begins with an analysis of the quantitative data and thereafter the qualitative data.

The analysis is supported by the conceptual framework presented in the theory chapter of this work. Figure 14 is a development of figure 11 that illustrates the results that emerged in the analysis linked to each research question.

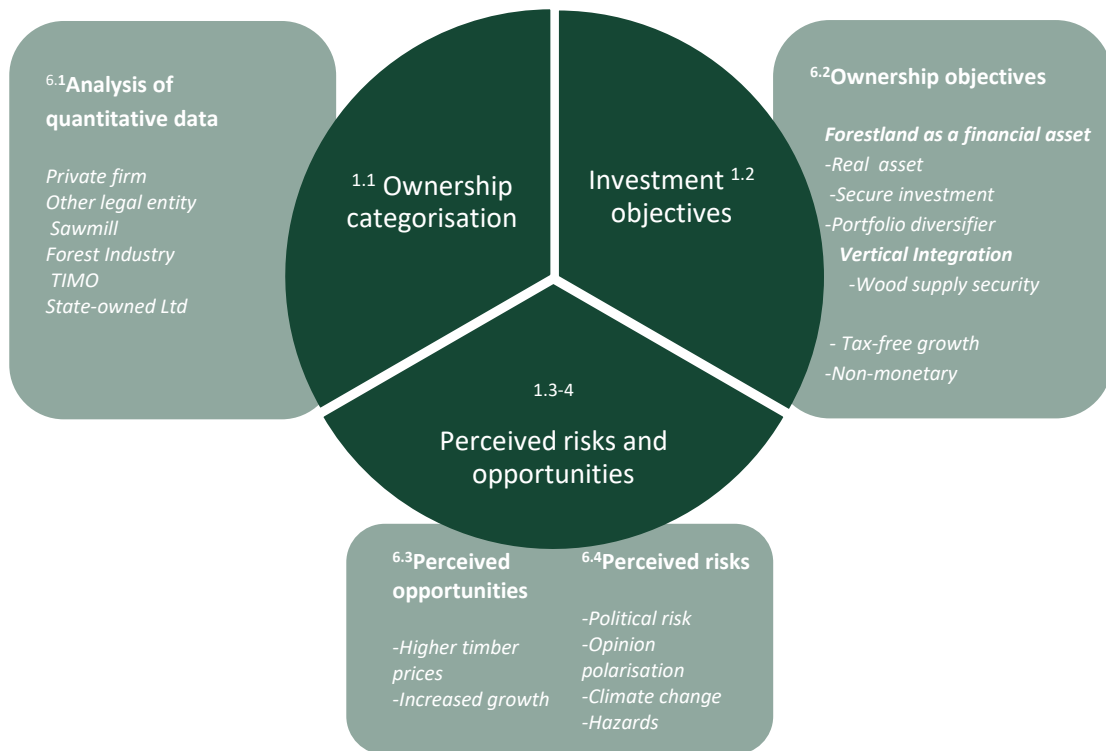


Figure 13. Summary of the findings in the context of the conceptual framework for analysis.

The inner-circle represents the research questions of this study (1.1;1.2;1.3-4) and the quadrants reflect the sections that appear in the chapter as well as the key concepts that have been derived from the analysis. The ownership categorisation (1.1) uses the model in figure 6 where all the categories were identified in chapter 6.1. The investment objectives (1.2) are analysed from three dimensions: forestland as a financial asset, taxes, and forestland, and vertical integration. In chapter 6.2 the analysis showed a clear existence to the two theories forest as a financial asset and vertical integration while taxes and forestland did not occur as clearly. The perceived risks and opportunities (1.3-4) are analysed in chapters 6.3-4 where economic opportunities are emphasised as well as the physical and regulatory risks.

6.1 Analysis of quantitative data

The result presented from the quantitative secondary data was analysed by the model presented in figure 6. To complement the lack of information about the juridical persons which appeared in the list from Swedish mapping, cadastral, and land registration authority, information about the *business concept* and *company form*, etc. was gathered through annual reports. A

summarised illustration of the result of the categorisation is presented in figure 15. The boxes illustrate the percentage of the total transactions, and the size of the quadrants corresponds to the percentage of the selection.

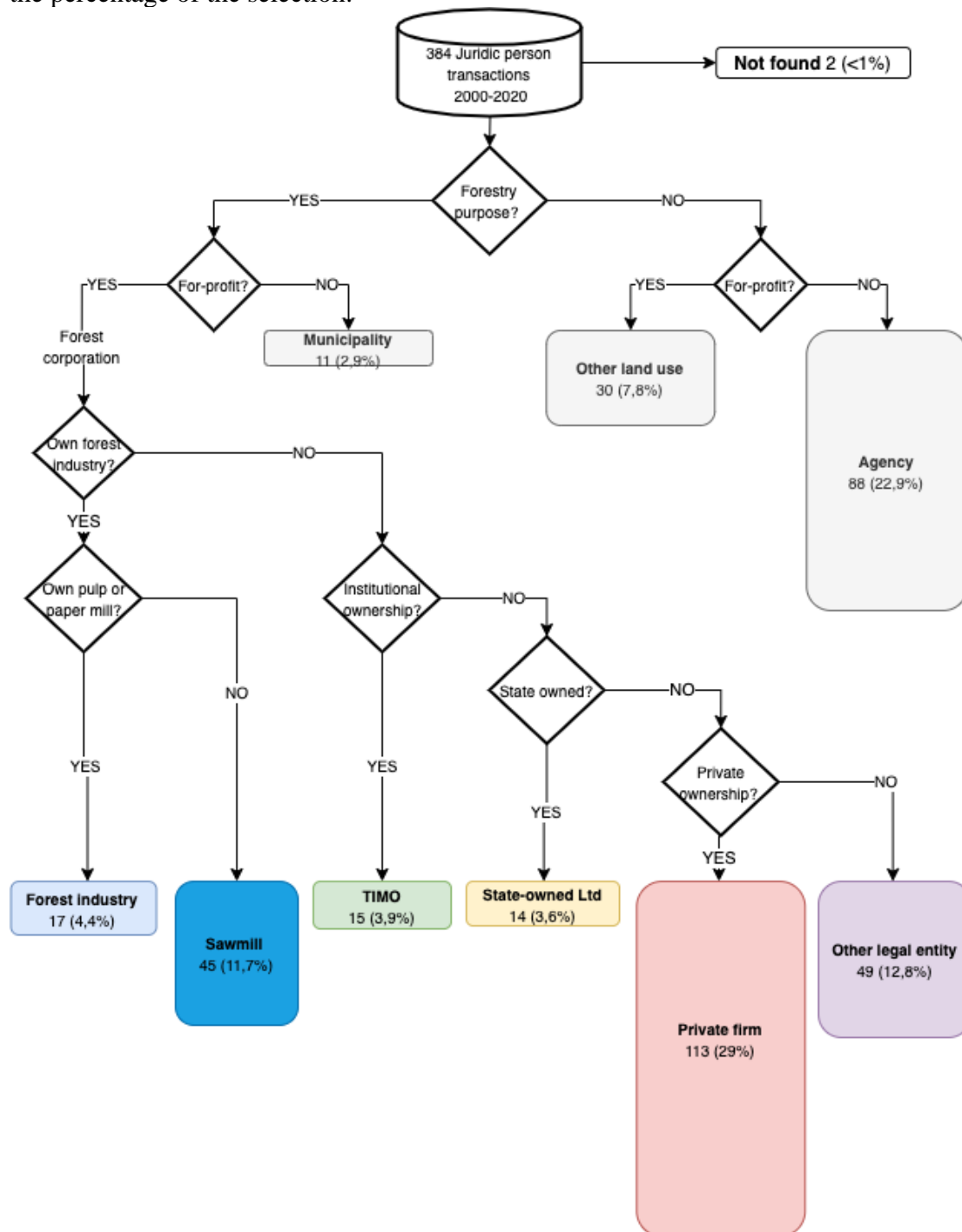


Figure 14. Summary of the ownership categorisation based on the developed model in Figure 6.

As shown in figure 15, the *Private firm* is the largest category that represents 29 percent of all transactions. The category represents a differentiated group of corporates and corporate groups active in several different industries. The similarity between these firms that combines all of them in the same group is that all of them have a business description that clarifies that the company works with forest management and associated activities. *Other legal entity* is the second biggest category of investors within the group of Forest corporation. The category

represents 12,8% of all transactions. It includes Commons, different Dioceses, and several foundations. *Sawmill* is the third biggest group within forest corporations and the fourth largest of all categories (11,7%). The category includes sawmills and other mechanical wood industries. Within the 19 different companies, 18 of them were sawmills from small-scale production to large sawmill groups and one firm had a firm specialised in classical Swedish wooden fences. *Forest Industry* stands for 4,4 % of all real estate transactions (17) where the purchasing companies are subsidiaries to five different pulp & paper groups in Sweden. *TIMO* is the third smallest category of investors. The group stands for 3,9% of all transactions and is distributed on 11 different firms owned by three different *TIMOs*. *State-owned Ltd* is the smallest category within forestry corporations represented in 3,6% of all transactions. The group represents three different companies. Focusing on non-forestry corporation *Municipality* is the smallest category with 11 different transactions carried out by 11 different municipalities. *Agency* is the largest category within non-forestry corporations and the second largest category of all. It includes the four Swedish agencies: Environmental Protection Agency, Fortifications Agency, County Administrative Boards, and Transport Administration. *Other land use* is for-profit firms where the main business idea is focused on other land use than forestry or similar activities. 7,8 % of the transactions were made by firms within the category. The category is a differentiated group with firms focusing on the exploitation of real estate, construction and mining companies.

Regional differences

Based on the geographical division shown in Table 6 from the earlier chapter the three regions are merged with the owner categories from the categorisation shown in Table 7.

Table 7. Summary of buyer categorisation of the transactions. Number of transactions with the corresponding percentage of total sample.

Number of transactions	South Sweden	Middle Sweden	North Sweden	Total Sweden
<i>Private firm</i>	36 (9,4%)	24 (6,3%)	53 (13,8%)	113 (29%)
<i>Other legal entity</i>	6 (1,5%)	17 (4,4%)	26 (6,8%)	49 (12,8%)
<i>State-owned Ltd</i>	9 (2,3%)	4 (1%)	1 (0,2%)	14 (3,6%)
<i>Sawmill</i>	12 (3,1%)	1 (0,2%)	32 (8,3%)	45 (11,7%)
<i>Forest Industry</i>	3 (0,8%)	1 (0,2%)	13 (3,4%)	17 (4,4%)
<i>TIMO</i>	6 (1,5%)	4 (1%)	5 (1,3%)	15 (3,9%)
<i>Municipality</i>	3 (0,8%)	4 (1%)	4 (1%)	11 (2,9%)
<i>Agency</i>	17 (4,4%)	39 (10,2%)	32 (8,3%)	88 (22,9%)
<i>Other land use</i>	15 (3,9%)	5 (1,3%)	10 (2,6%)	30 (7,8%)
<i>Not found</i>	1 (0,2%)	0	1 (0,2%)	2 (0,5%)
<i>Summary</i>	108 (28%)	99 (26%)	177 (46%)	384 (100%)

Derived from table 6 regional couple of regional differences can be observed. In all of the three Swedish regions, every ownership category was found. Two transactions were made by a legal actor that could not be found in the open sources used for the analysis. Northern Sweden is the region with the largest number of transactions. The two categories concerned with own forest industries, *Sawmill*, and *Forest Industry* show similar patterns where both of these categories occur in most cases in northern Sweden in > 70% of transactions within the category. The remaining part of the transactions is mainly carried out in southern Sweden, while only 2 transactions within these categories can be traced to central Sweden. *TIMOs* are one of the smallest actors on the market in terms of the number of transactions. However, *TIMOs* are the

category that has the most even distribution between all of Sweden's three regions. The largest category on the market, *Private firm* is also the most common in each of the regions when excluding the non-forestry transactions. *State-owned Ltd* does not buy forestland in northern Sweden, it occurs mostly in southern Sweden.

Taking the historical perspective Figure 16 illustrated the number of transactions per ownership category within the group of forest corporations.

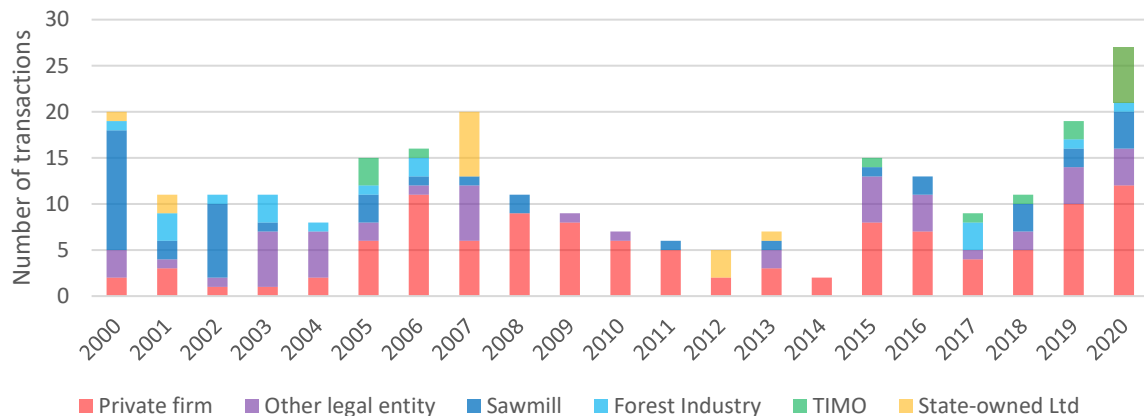


Figure 15. Development from 2000 to 2020, number of purchases per ownership category and year.

The graph in Figure 16 illustrates the development of transactions from 2000 to 2020 and divides it into the current category. The graph shows four local peaks and one maximum occurred in 2020. The first local peaks occur in 2000 with 20 transactions. Thereafter a smaller drop follows during a couple of years until 2007 when once again 20 transactions were made. After the peak in 2007 followed a slow decline until 2014 when the number of transactions began to increase. Since that time transactions have been increasing each year and showing an upgoing trend in real estate transactions. Looking at the different ownership categories the figure shows that the larger ownership categories, *Private firm*, *Other legal entities*, and *Sawmills* are more frequent each year compared to the smaller once: *Forest Industry*, *TIMO*, and *State-owned Ltd* which could be seen in a few single years. Focusing on the category of *TIMOs*, the analysis gives an indication of increased presence on the market during the last years except for 4 transactions 2005 and 2006.

6.2 Ownership objectives of acquiring forestland

Forestland as a financial asset

Related to forestland as a financial asset several categories emphasize the financial aspects of the asset, however, they do it in different ways. TIMO-1 is emphasizing achieving the highest total return through maximizing the value growth and an adjusted yield. Thus, the biological growth in the forest has not to be realised continually and thereby the TIMO could use harvest flexibility to postpone harvest depending on the business cycle. TIMO-2 is having a similar opinion about the importance of the continuous yield but is giving the steady yield less importance. Moreover, the TIMOs answers indicate that forestland has an important role in portfolio diversification, being a real asset with a value-growth with the biological growth which is growing independent of the financial market. TIMO-2 indicates that forestland is contributing to an efficient portfolio even if the return is low because the risk is also low. It can

be derived from the theory that the return of a forest asset could be relatively low as the biological growth has a low beta. However, the required rate of return of a financial asset is according to the CAPM derived by adding the risk-free interest rate. The TIMOs mean the present low-interest rates are affecting the demand for forestland substantially, TIMO-1 means this could affect the prices for a long time because the outlook is probably low-interest rates for a while. TIMO-2 means there is a breaking point if the risk-free rate increases to a certain level. The answers indicate the risk-free interest rate is affecting the investments in forestland, in a low-interest environment the forest asset is valuable because it could give a relatively high risk-adjusted return through the inherent low risk. However, as for other asset classes with an associated risk, the risk-free interest rates effect through an increase in the required return from the asset.

The *Other legal entity* emphasizes the low risk and the steady return from their forest asset as favorable for the organisation. The *Sawmill* buys growth forest estates to have a high value-growth which indicates a perspective of forestland as a financial asset. Two out of four diversification approaches from Fu (2012) were expressed in the interviews with the TIMOs. One of the TIMOs had a spatial approach in their strategy with investing in forestland over a large geography and countries to decrease the risk of being highly exposed to industry structure and physical risks in the area. Both of the TIMOs have a product and market approach, especially the difference from other owner categories they are keen on examining non-timber revenues. Both of the TIMOs are working actively to increase the non-timber revenue streams both traditional sources of revenue and new sources of income.

Forestland and Vertical Integration

In the interview study, it emerged that two of the six interviewed owner categories name vertical integration as a reason why they invest in forests. The *Forest Industry* describes that the objective of the investment is based on two causes, whereas securing wood supply for their industry is the main. The arguments can be connected to the theory of backward vertical integration (Nicovich *et al.* 2007b), where firms invest in earlier stages of the supply chain, in this case, for raw material supply. This objective also occurs for the ownership category *Sawmill*. In addition to the difference in requirement of volumes of wood, the two different cases also have two different degrees of self-sufficiency of wood.

The benefits of vertical integration and reduced *transaction costs* could be derived from the interviews of both Forest Industry and Sawmill. The Sawmill mentions that in times it can be challenging to purchase raw material from NIPF based on the resources available to buy and then becomes useful as a supplement. This can be equated with the benefits of reduced transaction costs for raw material supply. The Forest Industry does not state that the forest investment is the basis for reducing transaction costs, even though it may result from the acquisition (Lönnstedt 2003).

When the respondent from Forest Industry was asked why the raw material supply should take place via own ownership, the respondent mentions that the company has traditionally had a degree of supply that is based on the desired security and stable raw material supply. This can be linked to *strategic advantages* mentioned in Mahony's framework where the company can secure its supply and exclude competitors from competing for the same resource (Mahoney 1992). This increases the difficulties for competitors to enter the market. Although vertical integration binds capital for the company, the Forest Industry explains that it signals security to its investors and makes it worthwhile to secure future wood supply necessary to make significant investments in the industry.

Input-output price advantage was not the reason Forest Industry and Sawmill took up as an explanation for the investment in forestland. Both industrial companies state that they seek a joint holding in areas close to their industries or terminals. In this way, companies can reduce their transport costs, generating an input-output price advantage. The Sawmill had only carried out a sale of one real estate as this was too far from its industry to be used. Instead, it was sold to invest in forests within the area that the company was considered an acceptable catch area. For the same reason, the Forest Industry purchases forestland. They chose to sell the land too far from the industries to buy back land in closer proximity to their industries. This can be seen as an investment to increase rational use, which results in lower operational costs and lowers the commodity price that will supply the industry.

Cost and price uncertainties are mentioned by the Sawmill and the Forest Industry. The Sawmill states that their own forest assets' main purpose is to provide security of wood supply for uncertainties. The respondent states that it can be challenging to obtain harvest objects from private forest owners during the wet spring thaw and that the own forest assets can provide a buffer. It is also for this reason that the company has chosen to previously postpone the harvest of mature forests. This entails cost advantages in the presence of unpredictable events. The Forest Industry also states that its holdings provide security in the presence of stochastic events. To reinforce this benefit, the company also sees advantages in having a certain spread on its forestland. The differences between the Forest Industry and the Sawmill in this aspect are that the Forest Industry has no intention of postponing the harvest of grown forest to have a buffer. Their felling level is based on yield from annual growth.

Forestland and taxes

Private firm means from a taxation perspective it does not matter if you invest the surplus in forestland or anything else. However, the company's interest in investing in young forests means the taxation of the incomes from forestry is postponed as the growth in the woods is "tax-free." An altered overall investment strategy could shorten the investment horizon of the forestland and hence capitalize the investment. The *Private firm* is prioritizing forestland close to persistent industries and forest estates which do not have too much old-growth forest. This strategy of not buying too many forest estates with old-growth forest could partly be explained by the willingness to postpone taxation and achieve "tax-free" growth.

6.3 Perceived opportunities

With guidance from the theoretical framework of opportunities from chapter 2.4 and the interview empirics from chapter 5.3, Figure 17 was constructed to illustrate the differences in perceived opportunities.

		TIMO 1	TIMO 2	Other legal entity	Forest industry	Sawmill	Private firm	State-owned Ltd
Opportunities	Economic	- Increased value growth - Increased timber prices - New revenue sources			-Land appreciation		-Increased timber demand -Lasting value of forest land	-The value of forest land will have a lasting value
	Physical						-Climate change an potential increased growth	
	Operational					-Forest land as security in timber supply		
	Reputational		-Forest role as carbon sink while providing sustainable products	-Unrealised amenities form forests -Sustainable forest products				
	Regulatory							

Figure 16. Perceived opportunities of forestland.

The identified perceived opportunities for the categories are summarized in Figure 17. Although the categories have diverse perceptions of the opportunities of forestland, the most mentioned opportunities are the economic and reputational aspects. The economic opportunities mentioned by several actors consider the belief in the long-term value of forestland. TIMO-2 and Other legal entity categories emphasize the reputational aspect of the sustainable products the sector can contribute with.

6.4 Perceived risks

With guidance from the theoretical framework of risk from chapter 2.4 and the interview empirics from chapter 5.4, Figure 18 was constructed to illustrate the differences in perceived risks.

		TIMO 1	TIMO 2	Other legal entity	Forest industry	Sawmill	Private firm	State-owned Ltd
Risk	Economic	-Economic crises			-Carbon credits market reducing roundwood supply from NIPFs			
	Physical	-Climate change and forest damage	-Bark beetle damages			-Multi-damaged forests and insect damages	-Uncertainty of forest climate change impact on forest	-Climate change impact on forests
	Operational							
	Reputational				-Demand on reduced forestry and increased provisions		-Certification schemes	-Forest management systems
	Regulatory	-Unpredictability of legislation	-Prerequisites for forest sector	-Prerequisites for forest sector	-Weakened proprietorship	-Unpredictability of legislation		

Figure 17. Perceived risk of forestland.

The identified themes of risk and types of perceived risks and for the different categories are summarized in Figure 18. Several categories consider regulatory and reputational risks of the great importance of forestland. Furthermore, the owner categories perceived risks are in the whole spectra except the operational dimension. The reputational risks seen by the categories are not from the reputational aspect of the products produced from forests. It is from the reputational risks connected to conventional silviculture. The respondents think it is a risk that the public opinions of forestry could alter forest management. The reputational risks are often associated with reputational risk becoming a regulatory risk through pressure from the public. The *Private firm* does think the risk is that certification schemes will be more extensive due to increased pressure on the certification organisations. All categories except for *Forest Industry* see physical risks of forestland ownership, and several respondents connect increased physical risks with climate change. The physical risks mentioned are often associated with multi-damaged forests and insect damages. The *Forest Industry* does not see considerable physical risks for their forestland, as the extensive forest holdings are geographically diversified.

7 Discussion

In this chapter, the data is analysed through the framework developed in chapter 2. The chapter begins with a discussion of the quantitative data and thereafter the qualitative data. The chapter ends with a methodological discussion.

7.1 Who purchases forestland?

A similar quantitative analysis of the Swedish market for forestland has not been conducted before this study to our best knowledge. The quantitative analysis indicates that *Private firms* are the most frequent buyers of forestland, and the largest forest industry companies are not buying forestland to a large extent. Possible methodological biases of this distribution are discussed under the methodological discussion. The quantitative analysis indicates an increased number of forestland transactions in the last years, and the TIMOs have, according to our results, become more frequent acquirers in the last years. In the quantitative results from this study the most frequent purchasers are not the large forest owners, but instead small private companies in the constructed owner category *Private firm*.

7.2 Ownership Objectives of acquiring forestland

The ownership objectives of the different categories from the first research question indicate that the different ownership rationales of forestland as a financial investment, vertical integration, and taxes can largely explain the category's objectives. The *TIMOs* see forestland as an essential part of an investment portfolio which is in line with other studies done with the perspective of institutional actors (Clutter *et al.* 2005). Furthermore, The *Forest Industry* sees forestland as both a financial asset and as a tool for achieving the benefits of vertical integration. The *Private firm* sees the taxes as one desirable trait of a forestland investment, but our results do not indicate that it is a decisive part of other capital investments.

The *Private firm*, *Other legal entity*, and *Sawmill* describe non-monetary values as a partial explanation for investing in forestland. In the private firm example, it could be explained by what the *Financial market actor* told, that this category is quite similar to the NIPF. The *Sawmill* indicates a similarity with *Private firm* in that the non-monetary aspect as personal interests and leaving something behind is present. The *Other legal entity* emphasizes non-monetary values as the tradition of possessing the forestland for a long time. One could argue that the mentioned owner categories do not distinguish themselves from one another in some aspects to the degree that requires them to be in different categories. However, the overall rationales of the investments are differing even if the non-monetary values are decisive in the acquiring decision.

Regarding the forest industry and its ownership of forestland, Chudy & Cabbage (2020) explains the development in the U.S when forest industries sold their forestland to preferably TIMOs and Real estate investment trusts (REITs). The REITs were developed in the 1960s through the Real Estate Investment Trust Act which created an exception of corporate tax if the main revenues are distributed to investors as dividends (Mendell 2016). The change of ownership in the U.S was driven by several factors. One primary reason was the United States Congress Act, forcing pension funds to diversify their assets beyond financial securities, which sparked the growth of TIMOs. Other factors were the interest from the forest industries to improve the financial performance, through capitalizing the high land appreciation and shifting

the strategy towards specialisation. To summarise, there were policy effects behind the interest from TIMOs and REITs to acquire forestland, and at the same time, the forest industry had reasons to dispose of forestland which enabled the ownership change. In the Swedish property market, the REITs are not present due to the unfavorable tax situation, unlike the U.S. legislation. In our study of the Swedish context, the *TIMOs* are interested in acquiring additional forestland but the *Forest Industry* and the other owner categories are also interested in increasing their holdings. Lönnstedt (2003) means it is a tradition in the Swedish forest industry to possess large forest holdings. In this study, the arguments from the forest industry have to a large extent, been associated with monetary and strategic aspects of the ownership. Hence, our study does not indicate a change in strategy and tradition from the forest industry to possess forestland. One could discuss if the land appreciation does not continue; some categories could want to liquidate their assets and potentially shift ownership towards institutional actors. But the results from this study do not indicate that any actor would be willing to sell under the present market situation, perhaps the categories think the land appreciation will continue to follow the historical development

The reason that *Forest Industry* and *Sawmill* were the only cases motivating their forest investments with arguments related to vertical integration was expected since they were the only ones owning industries with roundwood as raw material. The respondent from Forest Industry states that it is largely a matter of maintaining a traditional degree of self-sufficiency to take advantage of all the benefits that it entails to own the forest. Since the industry expands its production capacity the company needs to increase its raw material supply to maintain this position. This requires that the company either increase the production capacity on the forestland already owned, or by expanding the area of forestland which both are mentioned during the interview. It could be concluded that the main objective of the two industrial respondents invests in forestland as a type of security for their raw material supply. This goes in line with Lönnstedt (2003) results where the interviewed Sawmill also mentions the safety of their raw material supply. However, the category of Pulp & Paper that could be compared to the Forest Industry of this study, the answers are somewhat different. Lönnstedt (2003) stresses that Pulp & Paper companies focus on backward vertical integration to affect prices which did not emerge in this study. It may be explained that this question could be sensitive and thereby not mentioned in the interviews. However, the respondent from the Forest Industry stresses that they believe that stable round wood prices are the best for both their suppliers and themselves.

7.3 Perceived opportunities

The TIMOs see an opportunity in new sources of revenue from forestland; however, in Sweden, the market for other payments other than forestry-related is not significant. Still, the respondents mean they are interested in a variety of sources of revenue, carbon credits being the most interesting. In the U.S., the market conservation easements and carbon credits are providing forestland with different sources of income which Busby *et al.* (2020) find could create a risk-efficient portfolio. None of the respondents sees regulatory opportunities. This could be explained by all actors being satisfied with current legislation. The respondents might see that legislative changes would only limit the freedom under responsibility applied today. What was not addressed during the study is the possibility that legislation could restrict other sectors and hence could benefit forestry and increase the return on forest investment.

7.4 Perceived risks

This thesis indicates that several owner categories see risks of the regulatory and physical risks of forestland. The tendency of the regulatory risks is the uncertainty of new regulations affecting silviculture. None of the categories is implicitly mentioning operational risks with forestland, it could be explained by the lowered level of risk of this aspect compared to more fundamental risks as the regulatory risks.

7.5 Methodological discussion

The quantitative data used in this study was secondary data from the Swedish mapping, cadastral, and land registration authority. The data is the official transactions of forestland; however, several transactions are not visible due to reduced stamp duty if the transaction is made by transferring shares or creating subdivided property units through reallocation. The decision was made that the official transactions data was an objective data source, which data from a forest appraisal firm would not be, especially as the study's context was countrywide. The emphasis of the acquirers in the quantitative data being private firms could be explained by the unwillingness of the private firm sellers to accomplish the transaction through share-swaps or reallocation. While the other owner categories could be working regularly to avoiding the stamp duty. However large transactions from large categories are visible in the data when it cannot be avoided, when buying from specific categories, for example, from NIPFs.

The applied mixed-method in this study requires attention. The quantitative part was made through a total survey of who buys forestland in Sweden. The following qualitative part that was made after the quantitative could be further discussed there through a methodological point of view. Using a few case studies to represent each owner category is not enough to generalise the objectives for the different ownership categories. Still, our results from the interviews could indicate that the constructed classification in the thesis has created owner categories that distinguish from one another.

In this study, taxes were not found to be a significant objective of acquiring forestland. However, this could be explained by the sensitive nature of the topic. The *Financial market actor* indicated that forestland investments could, for some actors, be advantageous from a taxation perspective. However, the *Private firm* respondent in this study meant that forestland is not different from other investments that decrease the financial surplus and thereby postponing the tax.

The choice of interviewees in the qualitative part of the study was made through the quantitative part, as some feasible entities were not willing to be part of the study or did not answer our invitation this could have affected the results of this study. The choice of representatives in the entities aimed at interviewing persons in leading positions involved in strategic decisions in the entities. However, for practical reasons, this was not always possible to achieve. The annual reports that were partly used to identify the business idea of actors were not reaching further back in time than five years which means that if a company had altered the business idea, it could possibly change some classified transactions.

In the qualitative part of the thesis, mainly research questions 3 and 4 connected to the perceived risk and opportunities could give biases in the interviewees' personal perceptions. Meaning the interviewees are not communicating the perceived risk of the organisation they represent.

Moreover, when the study was conducted could affect the perceived risk and opportunities. In the period of this thesis, the forest debate has been extensive regarding the regulatory and reputational aspects of forestry in the public eye, which could be affecting the respondents' answers.

8 Conclusions

The chapter begins with a brief overview of the contribution of the thesis and ends with suggestions for future research by the authors.

8.1 Contributions from this thesis

The main conclusion from this multiple case study is that the different ownership categories created in this thesis on the Swedish property market of forestland have various objectives of acquiring forestland. Furthermore, the respondents from each owner category have in common that they are positive towards increasing their holdings. In the case studies, the main perceived risk of the owner categories is associated with the legislature, reputational and physical risks. The legislature and reputational risks are connected to the uncertainty of prerequisites of the silviculture, related to policy interventions. The participants in the study see a variety of opportunities with forestland, mainly associated with the demand of the forest products enabling sustainable consumption. The quantitative part extinguished nine acquiring categories of forestland, where six of them could be directly associated with forestry. The category which constituted the largest number of transactions was the owner category *Private firm* which is a large owner category group with many different small companies. The results in this thesis do not indicate a potential development as in the U.S where there has been a decreased ownership of forestland from forest industries to TIMOs. This multiple case study indicates that the respondents from the two TIMOs have an interest in acquiring more forestland, however, the result also indicates that the respondent from the *Forest Industry* is also keen on acquiring more forestland due to a combination of strategic and financial rationales. The study also indicates that the owner categories see differently on the opportunities of new sources of revenue where the majority of categories think that payments that are not associated with roundwood will increase in the future. To summarise the answers to our research questions: (1) The most frequent acquirer of forestland found in this thesis was the owner category *Private firm*; (2) The objectives of the owner categories were a mix between financial and strategic aspects; (3) The perceived opportunities were diverse from the different owner categories but with an emphasis on the financial dimension; (4) The main perceived risks among the owner categories were regulatory and physical risks of forestland ownership.

8.2 Suggestions for future research

In this study, the authors have constructed ownership categories for commercial forest owners on the Swedish forest estate market through an explanatory research design, combining quantitative secondary data with an interview study. The study could serve as a basis for future research to study the different owner categories' objectives and perception of the future investment risks and opportunities with forestland through a quantitative survey. It could also be of interest to develop a method that includes the transactions carried out through swapping of shares and reallocations to strengthen the quantitative data of owner categories.

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Appendices

Appendix 1. Capital Asset Pricing Model (CAPM)

Risk in CAPM

The total risk of holding an asset according to the model is described in equation 1. The total risk can be divided into two components: systematic risk, also defined as market risk, and unsystematic risk, also referred to as the unique risk of the asset. The systematic risk is described in equation 2. Systematic risk state how the fluctuations of an asset correlate with the overall market. The determinant of systematic risk is macroeconomic variables as the gross domestic product (GDP), employment rate, and inflation (Gyawali 2008). The unsystematic risk, described in equation 3, is associated with the asset, company, or industry characteristics and is thereby uncorrelated to the market risk.

$$\sigma_i^2 = \beta_i^2 \sigma_m^2 + \sigma_\varepsilon^2 \quad (A1)$$

σ_i^2 = Total risk of asset i

β_i^2 = systematic risk of asset i

σ_ε^2 = unsystematic risk of asset i

σ_m^2 = variance of the market portfolio

$$\beta_i = \frac{COV(r_i, r_m)}{Var(r_m)} \quad (A2)$$

β_i = systematic risk of asset i

r_i = return of asset i

r_m = return of the market

$$\sigma_\varepsilon^2 = \sigma_i^2 - \beta_i^2 \sigma_m^2 \quad (A3)$$

σ_ε^2 = unsystematic risk

σ_i^2 = variance of asset i

β_i^2 = β for asset i

σ_m^2 = variance of the market portfolio

A component of the CAPM affecting portfolio selection is the covariance between the assets in a hypothetical portfolio. The covariance states how the variance in the return of assets is interlinked with another. The correlation between assets is vital for portfolio diversification as the lower the correlation between assets; the higher is the diversification in the portfolio.

$$\text{Correlation coefficient, } \rho_{ij} = \sigma_{ij} \div \sigma_i \times \sigma_j \quad (A4)$$

Appendix 2. Interview guide-Aquirers

Introduction:

An introduction is given to the subject and the aim of the study, research questions and background are presented, and finally an explanation of why we find the subject interesting to be studied is given to the respondent.

Respondent presentation:

The respondent is asked to present himself or herself by answering several questions aiming to introduce the respondent to describe their professional role in the entity.

Check questions to go through at the beginning.

1. Does the company/corporate group own its forest industry?
 - a. If No: move on to question 2.
 - b. If Yes: does the company own at least one pulp/paper industry?
 - c. If Yes = *Forest Industry*.
 - d. If No = *Sawmill*.
2. Is the company/corporate group owned by institutional players?
 - a. If Yes = *TIMO*.
 - b. If No, move on to question 3.
3. Is the company/group owned by the Swedish state?
 - a. If Yes = *State-owned Ltd*.
 - b. If No, move on to question 4.
4. Is the company part of a corporate group that is active in another industry?
 - a. If Yes = *Private firm*.
 - b. if No = *Other legal entity*.

Theme 1: Investment objectives

1. Why are you purchasing forestland?
2. How do you view the investment horizon when buying forestland?
3. How do you outlook at the market price for forestland?
4. How do you look upon expanding your existing forest holdings?
5. How do you look upon selling parts of your existing forest holdings?
6. What factors determine the annual level of harvest?

Theme 2: Risks and opportunities

1. What opportunities do you see (positive risk) for holding forestland in the short and long term?

- a. Which of the earlier mentioned opportunities is the greatest possibility (positive risk) in the short and long term?
2. What risks do you see about holding forestland in the short and long term?
 - a. Which of the earlier mentioned is the greatest risk in the short and long term?
3. Do you think the sources of revenue from the forest will change in the short and long term?

Theme 3: Other questions

1. Do you have something we have not mentioned that you would like to add?

Appendix 3. Interview guide-Financial market actor

Introduction:

An introduction is given to the subject and the aim of the study, research questions and background are presented and finally an explanation of why we find the subject interesting to be studied is given to the respondent.

Respondent presentation:

The respondent is asked to present himself or herself describing their professional role in the entity.

Theme 1: Investment objectives

1. Why do legal entities buy forestland?
2. How do you think different legal entities think about the investment horizon when buying forestland?
3. What do you think of the present market price of forestland?
4. What do you think different legal entities is considering about expanding their existing holdings?
5. What do you think different legal entities are considering about selling parts of their holdings?
6. What factors determine the annual level of felling?
7. How can they vary between actors?

Theme 2: Risks and opportunities

1. What opportunities do you see (positive risk) for holding forestland in the short and long term?
2. Which of the earlier mentioned is the greatest possibility (positive risk) in the short and long term?
3. What are the risks of holding forestland in the short and long term?
4. Which of the earlier mentioned is the greatest risk in the short and long term?
5. Do you think the sources of revenue from the forest will change in the short and long term?

Theme 3: Other questions

2. Do you have something we have not mentioned that you would like to add?

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