# Does a new tax system have an economic impact on a forest investment?

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# Summary

The Swedish forest owners own more than half of the productive forest land in Sweden. Interest in investing in forestry has increased in recent years which are reflected in price developments in forest land over the last 10 years. Businesses engaged in forestry are often operated as a private firm. The Swedish legislation allows only a few exceptional cases owning forest land in share holding companies. This means that income from forestry for individuals today is usually taxed as work-incomes where the tax scale is progressive. The largest income post in a private firm engaged in forestry is cutting payments. The two deciding factors when a person chooses to do a final cut is the current timber prices and details from the forest management plan when the forest is mature enough to be cut. Timber prices have varied over the years, and the age distribution of the forest for the firm owner is usually uneven. This means that final cutting is concentrated in only a few years over a 20 year period. That in turn means large variations annually regarding payments from the forest for the forest manager. To even out the concentrated payments, the individual firm owner currently has several opportunities to defer income over time, to get a uniform and fair taxation. It is by means of forest account, reservation for allocation fund, funds retained for expansion and interest adjustment for self-employment.

Currently, there is a tax proposal about changing the rules concerning the ability to allocate surplus in a private firm. The tax proposal would remove forest account, tax allocation fund and funds retained for expansion and replace them with a business fund, and meanwhile the rules regarding interest distribution changes. The business fund implies only 40% of the annual surplus can be allocated, resulting in a larger portion will be taxed annually in the progressive tax system.

The study includes two fictive forest buyers that, based on a literature review intend to represent the Swedish forest owner. One forest management plan is the basis for all the forest estimates. The study compares the results of a forest investment for the two different owners with regard to whether the existing or proposed tax is applied.

In order to obtain comparable results a simulation model was developed based on theoretical grounds around the topic, literature written about the problem as well as assumptions based on actual forecasts and data.

The results show that the most crucial factors for the investment's profit is the level of interest rates and price development of forest properties. Revised tax ratios are marginal in this context. The prevailing tax conditions have an effect on how large surplus that can be reinvested in the business. The results show that the existing system is more advantageous when applying the new proposal, it is more beneficial for the owner to make regular withdrawals from the forest.

# Sammanfattning

De svenska skogägarna äger drygt hälften av den produktiva skogsmarken I Sverige. Intresset för att investera i skog har ökat de senaste åren vilket avspeglas i prisutvecklingen på skogsmark de senaste 10 åren. Det specifika med en näringsverksamhet som bedriver skogsbruk är att den ofta drivs som enskild firma. Den svenska lagstiftningen tillåter endast ett par undantagsfall att äga skogsmark i aktiebolag. Det innebär att inkomster från skogsbruk för privat personer idag i regel beskattas som inkomst av näringsverksamhet där skatteskalan är progressiv. Den största inkomstposten i en näringsverksamhet som bedriver skogsbruk är averkningslikvider.

 De två avgörande faktorerna för när en person väljer att avverka är rådande timmerpriser samt skötselplanen i skogsbruksplanen, det vill säga om skogen är mogen att avverkas. Timmerpriser har varierat över åren, och åldersfördelningen i skogen för näringsidkaren är i regel ojämn. Det medför att avverkningarna är koncentrerade till endast ett fåtal år över en 20 års period för näringsidkaren. Det i sin tur innebär stora variationer årsvis med avseende på inbetalningar från skogen för skogsbrukaren. För att jämna ut de koncentrerade inbetalningarna har den enskilda näringsidkaren idag ett flertal möjligheter att periodisera inkomsterna över tid, för att få en jämn beskattning. Det sker med hjälp av skogskonto, expansionsfond och periodiseringsfond och räntefördelning.

För närvarande ligger ett skatteförslag om att ändra reglerna kring att kunna periodisera överskott i en enskild firma. Skatteförslaget avveckla skogskonto periodiseringsfonden  och expansionsfonden och ersätts med en företagsfond, samtidigt ska reglerna kring räntefördelning ändras. Företagsfonden gör att endast 40% av det årliga överskottet kan periodiseras vilket medför att en större del beskattas årligen i det progressiva skattesystemet.

Studien omfattar två fiktiva köpare som utifrån gjord litteraturstudie ska försöka representera den svenska skogsägaren. En och samma skogsbruksplan ligger till grund för de skogliga beräkningarna. I studien jämförs resultatet av en skogsinvestering för de två olika ägarna med avseende på om det befintliga eller förslagna skattesystemet tillämpas.

För att kunna erhålla jämförbara resultat har en simuleringsmodell utvecklats som bygger på generella tillämpningar av investeringsteorin i ämnet, litteratur inom problemområdet samt antaganden som bygger på verkliga prognoser och data.

Resultaten visar på att de mest avgörande faktorerna för om investeringen är lönsam är ränteläget och prisutvecklingen på skogsfastigheter. Ändrade skatteförhållanden är relativt marginella i det sammanhanget. Rådande skatteförhållanden har en effekt på hur stort överskott som kan återinvesteras i verksamheten. Resultaten visar det befintliga systemet är mer fördelaktigt samt att skulle det nya förslaget tillämpas är det mer fördelaktigt för ägaren att göra jämna uttag ur skogen.

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# 1 Introduction

In Sweden 22.5 million hectares are productive forest land, where the major area of privately owned forest is located in southern Sweden. The majority of the Swedish agricultural land is also located to the southern part of Sweden and many firms operate a combination of agricultural enterprises and forest production as illustrated in Table 1 (Jordbruksverket, 2014). For these firms, the forest plays an important role as security when acquiring funds for other investments than in forest (Lundkvist, 1985).

**Table 1: Firms with both forestry and agriculture versus firms with only agriculture business (Jordbruksverket, 2014).**

| Year | Mixed business | Only agricultural | Total |
|------|---------------|-------------------|-------|
| 2005 | 51 843 | 23 965 | 75 808 |
| 2003 | 47 304 | 19 476 | 66 780 |
| 1999 | 59 035 | 21 084 | 80 119 |
| 1995 | 63 104 | 24 201 | 87 305 |

There are 330 000 private forest owners in Sweden and they control half of the total forest area while the rest is controlled by the government and shareholding enterprises. Of the 330 000 private forest owners 110 000 own more than 50 hectares of forest (Jordbruksverket, 2014). Due to the Swedish legislation, corporate enterprises in general are not allowed to acquire land that is privately owned. In accordance to those conditions, 99 % of the private forest owners run their business in a private owned form (Rydin, 2009).

For the moment, 75% of the forest owners live in the township where their forest is located nearby, which means that they are personally involved in their forest in one way or another (Lönnstedt, 1997). The interest to invest has increased during the last years especially among people born in the 50s who consider forest investment to be a safer investment than the stock market. Among the Swedish forest owners, 57 % would invest in more forest if they had more money. The Swedish forest owners generally have a low ratio of dept. 61% of the owners above the age of 60 are not encumbered by loans (Skogsbarometern, 2014). Given these circumstances, the Swedish forest owners both have the the will and capacatiy to invest in forest. In addition, other values relay to hunting and outdoor living are of interest for the investors (Konsult, 2012). The prospective forest investors form a heterogenic group with different interests, preferences and starting conditions (Skogstyrelsen, 2014).

Many of the forest owners do not obtain an even annual income from the forest. (Jordbruksverket, 2014). The payments from cuttings in the forest display strong variations over the years. A larger income from a cutting intends to cover future costs for plantations clearing etc., for a ten year period (Björne, 1967). Considering those conditions, the requirement of spreading a larger amount of income over a number of years is necessary for a forest owner, which is possible today by using a forest account. The forest account is a depositing account where only money from timber sales can be allocated. A deposition to the forest account can be kept untaxed during ten years. In contrast to other types of businesses, incomes and costs usually occur the same year (Lundkvist, 1985). The Swedish taxation system allow the private firms to periodise their incomes over years with instruments such as tax allocation reserves, expansion reserves and for the forest owners, special accounts for cutting incomes. Those possibilities have been important for the Swedish forest owners, in order to keep an effective forestry (Håkansson, 2002). In 2011, the forest accounts had a total value of 13 billion SEK (Skogstyrelsen, 2014).

The prices/per cubic meter timber varies over time, as illustrated in Chart 1, which many forest owners observes when they consider selling timber (Brännlund, 1988). It is not unusual that forest owners run their business without any income during a ten-year period due to shifting prices and age distribution in the forest (Björne, 1967). The forest account, which enables a flow of even income from the forest, is an important instrument in terms of favoring an effective Swedish forestry sector (*ibid*).
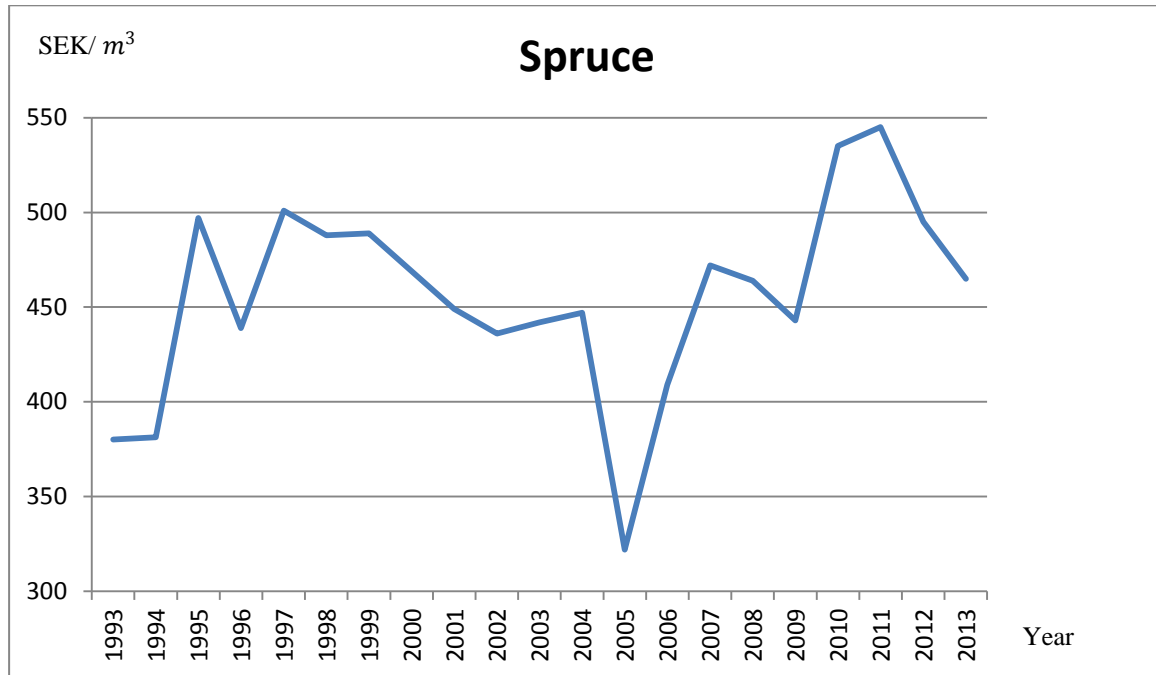


**Chart 1: Historical spruce prices in Sweden (Skogstyrelsen, 2014).**

## 1.1 Problem background

From a fiscal point of view, discussions of how to handle the gradually emergenced value in the forest occurred over time (Holmgren, 2005). There are two systems that have been practiced historically; taxation based on a yearly increment of forest volume in the forest, or taxation of timber sales from the forest. Taxation on timber sales is the system applied in Sweden. In Finland the other system has been applied earlier but Finland changed back to a system similar to the one in Sweden. The problem with taxation of the yearly increment volume in the forest is that the system indirectly forces the owners to small cuttings every year in order to pay the tax. The small cuttings are not rational for the industry and the forest owners have a lesser opportunity to adjust their cuttings to price changes in the forest market (Koskela, 1989). The optimal taxation systems are hard to define and apply in reality due to forest taxation cover topics as natural resource economics, fiscal economics and industrial economics (Koskela & Ollikainen, 2009).

The taxation system in Sweden is based on three income sources capital, labour and business income. At the moment there are no taxation of owning properties and sales of timber are defined as business income. The fact that forest business causes irregular payment streams has resulted in different rules and measures for income disposition over time (Holmgren, 2005) (Rabe, 2002).

During the early 1980s attempts were made to neutralize the taxation between private owned firms and corporations. The basic idea from the proclaimed commission's perspective was that the profits that stayed in the firm would be taxed at a lower rate than the progressive tax rate, which is applicable to withdrawals from the firm. The investigation did not lead to any change in the legislation (Regeringskansliet, 2014).

In 1985 a new investigation, known as URF (Investigation of reformed corporation taxation) made a new attempt to examine the topic. The aim of the study was to develop rules to neutralize how revenues in private firms and stock corporations would be taxed. The main thesis was that the taxation of labor income and capital income would get an equal taxation irrespective of legal form. The investigation did not complete the issue with in reasons of time (Rydin, 2009).

In 1990, a new taxation system was introduced in Sweden. The Swedish government felt that the issue concerning neutral taxation philosophy had to be investigated. The investigation concluded that the differences in taxation were substantial between different legal forms with the new reform. The main difference in taxation between businesses forms was that capital as shareholders lend to the company was taxed as capital income while dividends that are picked out will be double taxed. For a private firm was every income that could be traced to the firm double taxed. This means that a private firm person did not have e the same opportunities to expand their business with easy taxed earnings as a stock corporation company (Regeringskansliet, 2014).

In a private firm all surpluses get taxed as work income, while a single person stock corporation could be taxed in both work income and capital income. The commission reported that private firms also should be able to finance reinvested capital with single taxed savings via a new entry in the tax return. The proposal that the investigation did regarding income sources, interest distribution and expansion founds was adopted by the Swedish parliament in 1993 (Regeringskansliet, 2014).

The forest has been important for investment opportunities to Swedish farmers. In a situation when interest rates are higher than the growth rate of the forest value growth a self-financed investment is most beneficial. The tax rate is also important for the choice of financing options, and the results shows that a higher tax rate will tend to make the external loan option become more favorable (Lundkvist, 1985).

## 1.2 Problem

Taxes entail cash outflows in a firm and the magnitude of the tax expenditure is determined by a politically decided tax code. Since the tax system is a result of political forces and not economic forces it may be perceived as illogical from a business perspective (Ross, 2008). Changes in the taxation system are effective methods for governments to provide incentive for different options that are in line with their political objective (Håkansson, 2002).

The majority of Swedish forest owners operate as private owned firms. Where the earnings are taxed progressively, implying that with a higher result the firm meets a higher tax level. In order to obtain similar conditions the private owned firms have the opportunity to allocate their income with interest adjustment for self-employment, funds retained for expansion, tax allocation fund and forest account (Rydin, 2009).

Different requirements can be expected on taxation system to reach an optimum solution for the economics of society (Connolly, 1999). For example
- The system should be easy
- The system should be neutral

Neutrality can be divided in (Connolly, 1999)
- Neutrality between different industries
- The system should be neutral between different owners
- The system should not be a regulation for the industries

Swedish economists had similar ways of writing about how a tax system should be formed
*"The political economy considerations should require taxation as little as possible should be an obstacle to enterprise economy and capital accumulation"* (Eberstein, 1929. p. 115).

Opportunities to allocate the taxable income are possible in all firms. Forest account gives the forestry extra possibilities but can be justified by the irregular cuttings. Sometimes cuttings have to be concentrated to a specific time during a long time interval. If the forest owners did not have these opportunities the taxable income would vary extensively over time, although if the income measured in in value growth is stable over time. Neutrality in terms of that the tax level for firms should be independent regardless of what type of industries, sometimes require special rules (Håkansson, 2002).

As previously mentioned, the incomes from the forest vary over time due to prices of timber and age varieties in the forest. This has to be regarded while facing a forest investment (Eid, 1976). While facing a forest investment, a presumed payment year 1 is more valuable than a presumed payment year 2 if the payments in real terms are of the same amount (Nilsson & Persson, 1999). To estimate the profitability for an investment could be hard because of shifting size of payments over years and payments shifting value depending on their incident in time. An investment is illustrated in figure 1. The investment illustrates how to face the problematization with calculating the profitability for the investment. The investor starts in year zero and calculate the value of payments t=1, t=2, t=3 until t=n with present value (Eid, 1976).
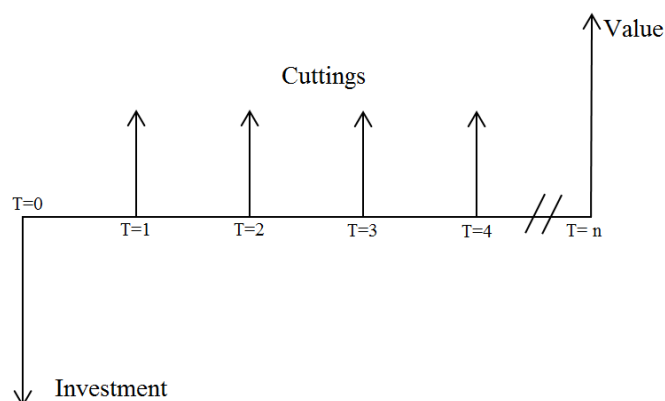


**Figure 1: Illustrates the present value method to calculate the profitability for an investment (Nilsson&Persson,1999)**

A new taxation system for private firms is written in a proposal for the parliament (Regeringskansliet, 2014). The new proposal contains several changes that affect the private firm's opportunities to periodize their income in the firm. The new proposal aims at simplifying taxation of small private owned firms. The commission states that the current taxation system contains too many options for a private firm which causes more problems than utility. The main issues for the Swedish forest owners is that the proposal includes to removing forest account and delimit the factors that affects the basis of how much the firm can be taxed of revenue for invested capital (Regerings kansliet, 2014). It is previously noted that a forest business differ from other types of businesses, why the forestry have special rules for depositing surpluses. The problem occurs when the private forestry owners with irregular income has to deal with taxation rules that are suited for private owned firms with relatively stable incomes. The differences between the current and proposed systems are illustrated in Figure 1.
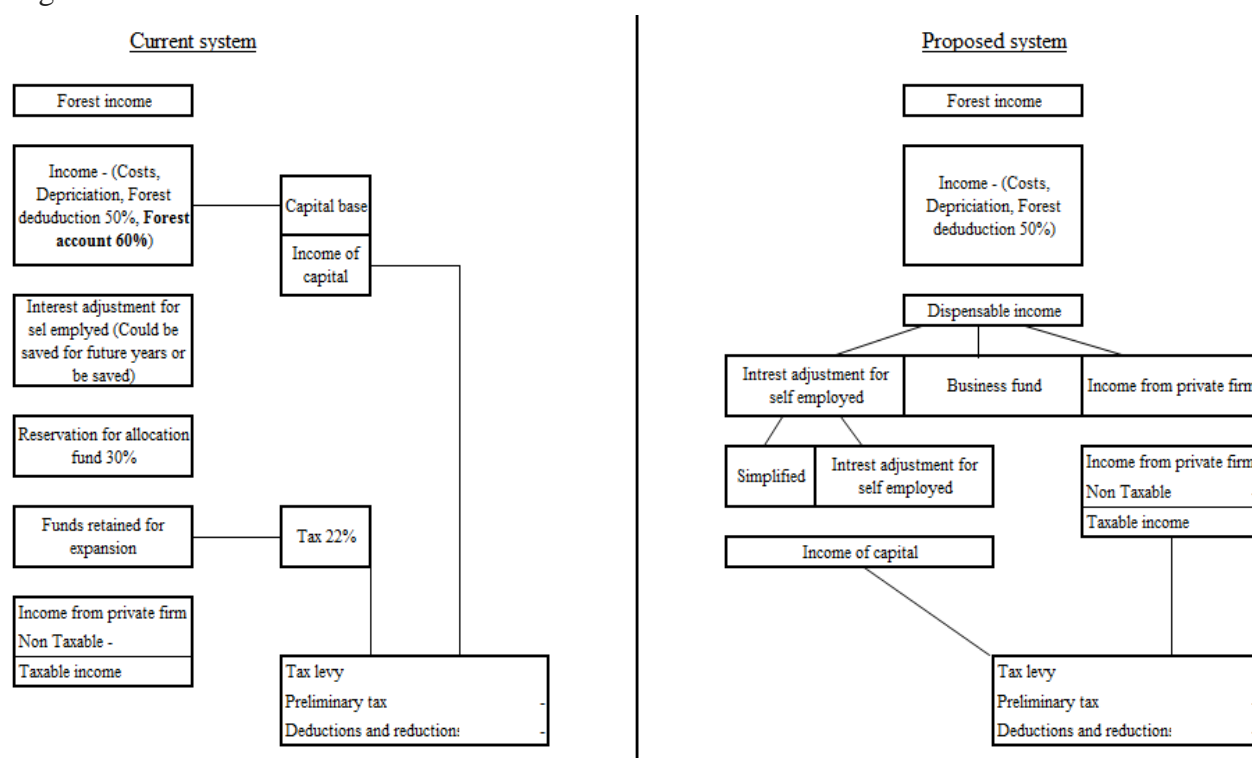


**Figure 2: Difference between current and proposed taxation system. Own processing (Regeringskansliet, 2014)**

## 1.3 Aim and delimitations

The aim of this study is to understand the economic implications of a new taxation system on a forest investment. In order reach the aim, the following research questions will be answered:

- What is the effect in the net present value of a forest investment when a new taxation system is applied?


- What is the effect on the equity development due to different reservations and depositions possibilities of the result for a private firm?

The study will fill a gap in the literature since most of the previous studies relate to a situation where the tax rates are fixed. In this study a progressive tax system scale is included which might considerably affect the annual surpluses.

The only business form that is analyzed in this study is the private firm. This means that it is only tax conditions for this business form that it is possible to draw conclusions from. The new proposed system appears to be suited for the average private owned firm in Sweden with relatively stable income over years (Regeringskansliet, 2014). Therefore, the study will compare an even cutting strategy with an uneven cutting strategy for the same investment. The results will give understanding and knowledge about the economic effects if the new tax system is applied when investing in a forestry business.

The study will also examine if an off-farm income will have an impact on the investment's value after 20 years. Through the collection and processing of empirical data, the empirical application can be evaluated. It should be emphasized that the purpose of the thesis is not to find an optimum strategy for tax planning for a forest farm. The study might be a support for persons that are active in the Swedish forest sector, and to provide them with understanding of how a specific taxation strategy affects the equity and result of a firm with changed tax rules.

Since previous taxation reforms were conducted in order to equalize the possibilities to build up an owned equity, the study also examine if there are any differences in equity development during the investment between the two taxation systems.

# 2 Theoretical perspective and literature review

This chapter outlines the theoretical background used in order to examine the research questions that is posed. The relevant and important theory in this thesis is mainly found in investment theory. A more detailed presentation of the theoretical follows in subsequent section. The chapter also considers concepts from the Swedish taxation law and previous studies that are confirmed within the issue presented.

## 2.1 The Swedish forest owners and their relationship to taxation and economics

(Holmgren & Lidestav, 2005) discuss how the swedish taxation system affects the distribution of revenues from the non.industrial private forest owners. There are three levels to which the income is distributed in; national, municipal and individual interests. The study is based on a case study from a Boreal municipality in Sweden. The results support two views. Of the total revenues that the forestry generated in the municipality the council could only be credited 25% taxated income. However the forestry owners returned 72 % of the revenues back into their firms in forms of operating costs.

Brännlund, (1988) describes the Swedish round wood market. One of the problem to describe a supplier according to the author is a substantial number of different operators both industrial operators and non-industrial owners. A substantially difference between the two types of operators is how they supply the roundwood industry with timber. The industrial operators supply the market with timber on a yearly yield base and they also own a sawmill in the same supply chain. The non-industrial owners have other preferences or more additional preferences than only the yearly yield when they decide to cut the forest. Brännlund formed some supply functions to explain the non-industrial value calculation of forest, assuming that the owner starts with the entire forest land covered by stands of different age classes. The initial endowments are given by following formula:

$$X_0 = (X_{00}, X_1, \ldots\ldots, X_n) \qquad \textit{Equation 1}$$

Where $X_0$ is the number of hectares covered with forest in specific age class period zero. When the hectares of different forest classes are known is it possible to estimate the annual cuttings for a forest area. Let the area of forest land harvested in period $t$ be denoted by following formula:

$$C_t^a = (0, c_{t1}, c_{t2}, \ldots, c_{tn}) \qquad \textit{Equation 2}$$

Holmgren, (2005) discusses how forest ownership and how forestry influences relations, such as the distribution of revenues generated from property, as well as distributed between individuals and societal levels and that is a key basis for development. To answer the question the author discusses the assessment of the private forestry contributions to the municipal economy in relation to current ownership structure and taxation system. In the introduction of the report the author defines the private forestry firm and concludes from the literature that *"firms not recognized as legal entities but as a physical persons, which generally are small and often run on a part-time basis and where income often is difficult to distinguish from the owners other income e.g., from employment "*. Which is based in first order to SKV( 2001).

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From the case study in the literature above the author shows the revenues and costs for one hectare which is illustrated in table 2.

**Table 2: Economic results from on hectare of forest. Own processing  (Holmgren, 2005).**

| Cost or revenue category | Resident owners | Non-resident owners | Total |
| --- | --- | --- | --- |
| Sales revenue (SEK/ha) | 449 | 256 | 384 |
| Operating costs (SEK/ha) | 318 | 186 | 274 |
| Investment (SEK/ha) | 114 | 45 | 91 |
| Disposable income from work and capital (SEK/ha) | 73 | 95 | 80 |

Note that it is not possible to sum up percentages to a sales revenue of 100, since for instance, untaxed reserves or equalization of income not included in this study influence the results as well as the possibility of accumulating a deficit over the years.

Holmgren concludes that there are two types of owners. The resident and the non-resident owners. The non-residential owners did have a higher disposable income than the residential owner which the analysis concludes. They are more rational when maximizing their profits. The low average disposable income per hectare shows that the forest owner is not depending on the forestry for living which suggests that they have other sources of income. The author also suggests they enjoy benefits from other values of the forest property. Re-investment may well add to such values, perhaps especially for resident forest owners.

Lönnstedt (1997) reports in his article how private forest owners relate to decision processes in a qualitative study about goals, time perspective, opportunities and alternatives. The goal for the qualitative study was to preform 35 interviews with different forest owners that represent all types of owner categories. The categories were:

- Full time farmer
- Part-time farmer
- Non-farmers that where living on the property
- Absentee owners

*The forest owner's objective*
The objective of almost all the forest owners was a wish to develop and preserve the property. That objective includes three factors economic, social and emotional factors, independent of the order. A general observation from the owners was that the reason to why they own the property was because they see it as an inheritance from grandparents and as a loan for their children.

*Goal structure*
The economic goals regarding ownership of property may be to increase the value of the forest and avoid or decrease depts. The author's results show that the owners differently decide how to cut depending on how they value these goals.  The respondents were categorized into five groups depending on their goals:

- Formal goals- Achieve a positive cash flow
- Informal goals- The ability to hunt and have wood fuel
- Production goals- Achieving a certain increase of standing volume
- Environmental goals- Ethical aspects and sustainable yield principle is important
- Intangible goals- Wishes to form a certain type of lifestyle

Lönnstedt also establishes different reasons when and why an owner takes the decision to do a final cutting. These decisions are based on five factors, timber prices, financing investments, forest damages, acute economic problems, and a confidence with the forest management plan. Lönnstedt concludes that damages in forest and acute economics are forced decisions. While financing investments and timber prices are optional reasons to cut. Those who cuts for invest investment abilities general have a business beside the forest production, for example agriculture.

### 2.1.1 Summary

Most of the profits from the forestry are reinvested in the business among the Swedish forest owners. The profits from forestry are relatively low compared to the sales revenue, which proves that the profits are reinvested in the business. The goals relating to forest ownership are not only of economic nature, other goals might be recreation and value developing of the property. The different goals of suppliers make the market of wood special, compared to other markets where the supply to a greater extend depends on microeconomics.

## 2.2 Literature review

The impact of the Swedish taxation system on different strategies and decisions in Swedish forestry has been discussed in previous studies. Those studies of most relevance for the topic are presented more detailed in the text. Most of the observed studies examine how the owners should manage their forest given the current tax situation, while other studies discuss how owners with different economic situation are affected when they own forest.

Eid (1976) analyses taxes and their impact on an investment. Eid also discusses fundamental issues that have to be considered when examining investments in forestry. The aim with the study was to understand how taxes affect the investor's willingness to invest when direct taxes on annual profits are paid. The author assumes that investors are economically rational and they require a profit after taxes. The author shows that the annual surplus is reduced by the tax rate which gives a rate of interest before taxation that is equal to interest rate, minus the tax rate. The author also discusses how different deprecation strategies effect the taxation of an investment. If an income tax is neutral in its choice between different investment objects must writing off vary with periodic net receipts. If this is not done the depreciation strategy could be used as a tax planning tool. The author concludes that income tax is neutral in order to the choice of investment when post-tax rate of interest equals pre-tax rate of interest minus tax rate. The author also concludes that a surplus before taxation also have to give a surplus after taxation which is an essential limitation of income tax.

Wåhlin (2013) is discussing how a special law in how to report the assets in an agricultural business affect the taxation for three parts (transferors, assignees and the siblings of the assignees) in an intergenerational transfer for Swedish agricultural business. Whålin concludes that different tax strategies change the distribution of capital and dept for the involved parts. Whålin is calculating the payments for the assignees over a twenty year period and then calculates the payments in today's value with the net present value method. An important and fundamental part of the study is how to calculate the payments with respect to current taxes.

Ahlbäck, (2014) is writing about the large number of forest properties which annually get into succession of ownership. He sets up three different fictive cases and analyze how the different tax strategies effects the final value for the over taker. Every singular case is considred being based on their specific conditions and therefore, no general conclusions can be made from the result more than that there are differences in result depending on chosen tax strategy.

Backman (2013) discusses from the fact that the interest in investing in Swedish forest estates is increasing. The starting point is that different owners may have different tax conditions due to different incomes. Backman's hypothesis is that a successful tax planning could lead to a better financial situation for the individual person. Backman analyze how the liquidity flow divides for different buyers and forest sizes. He makes a difference between first time buyers and buyers with existing forest estate. The result shows that the first time buyers never get better liquidity than the buyers with an existing forest estate in all scenarios. The reason for this result is that first time buyers do not have the same conditions as forest buyers with existing estate to use the interest adjustment for self-employment. The interest adjustment for self-employment is proved to be of great importance for both parts. The conclusion of the study is that people with a sole proprietorship can achieve tax advantages by controlling their income with respect to the revenues and costs that the forest brings. The calculation period is twenty years with four types of buyers as is written below. He calculates the total tax, illustrated in table 3, for the four types of buyer over the period.

- $A_1$ First time buyer who uses forest tax reduction and forest account
- $A_2$ First time buyer who also uses interest adjustment for self-employment
- $B_1$ Buyer with an existing forest estate who uses all tax systems but not adjustment for self-employment
- $B_2$ Buyer with existing forest estate who also uses adjustment for self-employment

**Table 3: Total tax for different forest buyers (Backman, 2013).**

| | Total paid tax in SEK | | | |
|---|---|---|---|---|
| Income from private firm SEK/Year | $A_1$ | $A_2$ | $B_1$ | $B_2$ |
| 100 000 | 1 993 949 | 1 993 949 | 1 941 985 | 1 941 985 |
| 300 000 | 2 206 384 | 2 191 570 | 1 962 701 | 1 962 701 |
| 600 000 | 3 539 344 | 3 105 151 | 2 970 844 | 2 737 267 |

Seth & Wålstedt (1984) is describing how planning has become a negative word, and in many ears it means to avoid paying tax. However, serious tax planning means that a firm should pay that amount of tax that the firm is capable of, and at the moment ability to pay is good. Some years are a high result based on a big capital gain. An example is the Swedish cattle tax that focuses on cattle value increase. The value increase must be declared as a value increase and be taxed even if no cattle has been sold. This type of taxation has a negative effect on liquidity and financing in the firm.

Financing and liquidity are vital terms for a firm in the long run. Tax planning a strategy when the tax should be paid. The tax will be paid one time and without any plans for that the person will only displace the tax problem for the future.

The aim with tax planning is to adjust the tax payments to the solvency in the firm. The most common effect of tax planning is that the taxes are displaced to the future. Since the tax rate are progressive the tax planning have an important effect. The forest account is the most

common way for forest owners to equalize the result over the years. The authors show that with following example:

A forest owner disposes 10 000 sek which has not been taxed. The money could be taxed and be placed on a bank account or remain untaxed with deposition to a forest account. In the latter case the money will be taxed when they are removed from the forest account. If the marginal taxation amounts to 60% remains before deposit to a bank account:

$$10\ 000 - (0,6 * 10\ 000) = 4000$$

If the interest rate in the bank is 10 % the remaining money after five years will be 5 104 sek. If the money instead have been disposed to forest account a tax free increasing of the money of 10% possible per year. After five years when the money are withdrawn from the forest account they have increased to 16 110sek and declared for taxation by 60%. After taxation 6 444sek remains which is 1 340sek more than if the money would be put on the traditional bank account. Should the marginal tax be less after five years would the effect be even better and vice versa. In table 4 below the effects of interest rate after taxation with different marginal taxes are shown.

**Table 4: The effect of have funds on forest account at different tax levels. Own processing (Seth & Wålstedt).**

| Marginal tax year 1 | Marginal tax year 5 | | |
|---|---|---|---|
| | 70% | 60% | 50% |
| 70% | 10 | 16,5 | 22 |
| 60% | 4 | 10 | 15 |
| 50% | -3 | 5 | 10 |

Lunden (2006) discuss the main functions with forest account. The forest account has different functions for the forest owner.

- Spread the tax payments over years to equalize the progressive state tax.
- Cover losses in the firm in years with a negative result.
- Tax credit
- Tax-free savings

The author points out that the forest account has different effects on different persons. For a person that has an even income over the highest taxation inflection point the forest account does not change the amount of tax over years. Since the interest rate on forest account has been higher over years than the traditional bank interest rate is it a profitable deposition opportunity. The forest account is most profitable for a person with a significant vary of income with big tops. The author argues for when it is profitable to displace the taxation for the future. Historical it has been more profitable to displace the taxation for the future when the interest rates are high.

Lunden (2006) also argues for the advantages of converting work income to capital income. When the taxation object has an income over the inflection point the transforming option is preferable. Even if the income is below the first inflection point the interest adjustment for self-employment system is to prefer because of the 30% tax level which in general are lower

than the tax level for labor income. This system does not cause any tax load for the future, it is a definitive tax relief

Håkansson (2002). Discuss and analyze the interest adjustment for self-employment and the impacts on the Swedish forestry. The author means that some types are favored before a forest purchase than others. The favored persons are those with a high income from labor and have possibilities to convert the labor income to capital income by owning forest.

Lönnstedt & Rosenqvist (2001) have analyzed and described the taxation laws for forest during the 90´s. Also in literuture the conclusions by the auothors are that interest adjustment for sel-employed make persons with a high work income more intrested in forest investment. If these high income persons also have a big fortune, a forest purchase is even more interesting because of the oppurtunities to convert work income to capital income. The authors also discuss how these taxation rules effect the forest price, which they think incresingly due to the new type of interests. The authors give the reader a good overwiev of how different reservation opportunities effect directly available money in table 5.

**Table 5: Result reservations consequenses on liqidity and tax of 100 sek forest income. Own processing (Lönnstedt & Rosenqvist, 2001)**

| Taxation action | Tax, income year | Availible funds | Locked funds |
|---|---|---|---|
| Interest adjustment for self-employed | 30 | 70* | |
| Funds retained for expansion | 22 | 78 | |
| Tax allocation fund | 0 | 100 | |
| Forest account | 0 | 0 | 100 |
| Forest deduction | 0 | 100 | |
| High income of private firm | 50 | 50* | |
| Lowincome of private firm | 66 | 34* | |

* The income is fully taxed, for other reservations the tax is transfered to the future

Anderson (1982) means that taxes and fees are posts that are effecting the development of equity in the firm. The auothor also argues for the statement that tax strategy has a positive impact on the growth capacity in the firm. The author intend to provide the reader with an insight in important relationships between different factors in a taxation process. In the article a definition of tax mangement is pronounced:
*"With tax planning refers to the measures in the Financial Statements as an entrepreneur with respect to the applicable tax legislation may take in order to allocate their total tax over time in an effective way for the entrepreneur."* (p. 86)

Anderson means that firm owner's aim is central when planning the firms operations. These aims are therefore also central for the tax management which should be seen as a part of the firms operations. Moreover the entrepreneur's goal of tax planning should be indirectly related to the recess year's objectives regarding for example:

- The firms growth
- The gearing level of the firm

- Private consumption
- Eventual upcoming intergeneral transaction

In the figure the author shows different kinds of factors that could be of interest when tax planning. The figure show the complexity in finding an optimal tax planning where both ecnomic factors and social factors are central.
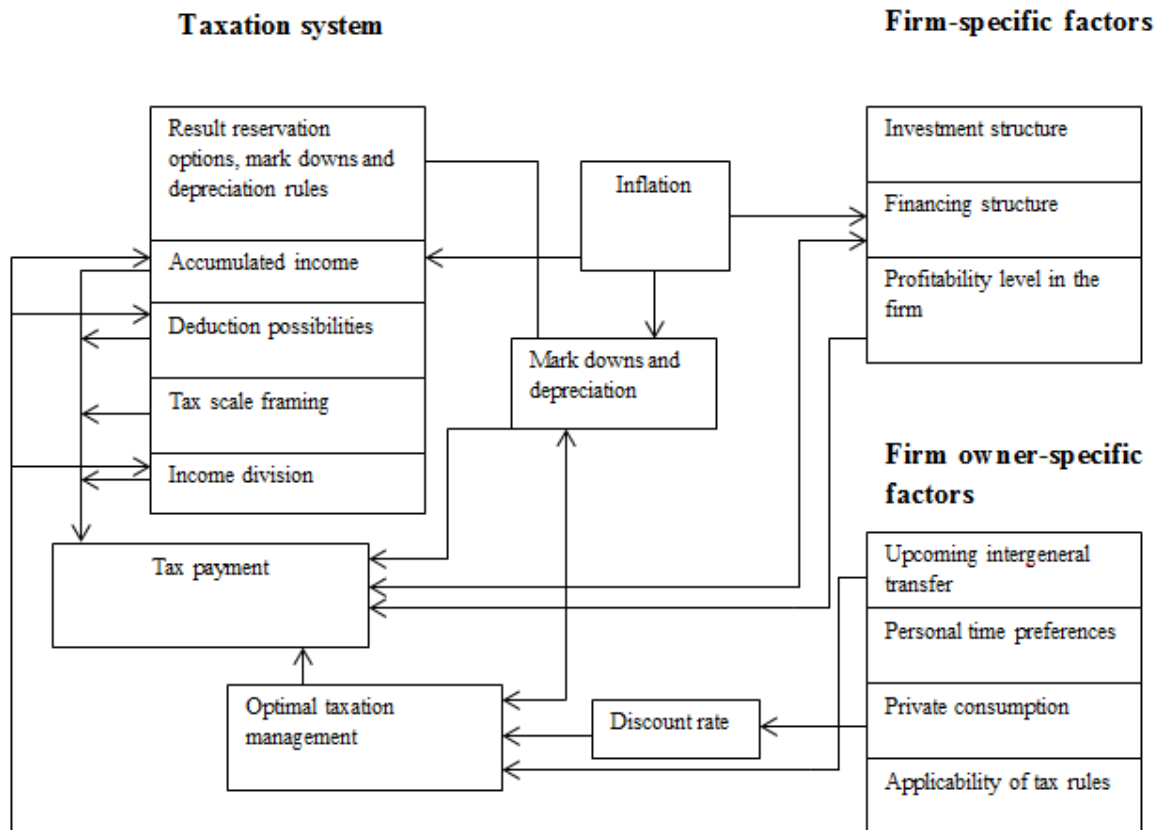


**Figure 1: The complexity to form a taxation strategy. Own processing (Andersson H. , Skatteplanering i Lantbruket, 1982)**

The study of Andersson is based on two typical agriculture businesses, 30-50 hectares respectively 50-100 hectares. The author has developed a model that provides information on the size of the hidden reserves of the company, the development of the financial structure and the taxable income. The model assumes the aim functions, minimization of the total real tax payments and maximizing equity in the planning period.

Andersson concludes that the development of a method of tax planning applicable to farmer is an important measure in the future.

## 2.2.1 Summary

An essential part when calculating taxation on investments is that they have to generate a surplus to get taxed. All literature mentioned above requires that the firm owner is economically rational when investing in forest, which all authors mean is necessary when calculating on an investment. All previously performed studies conclude that different taxation options generate different profits. The Swedish taxation system is complex and every specific person has different conditions in terms of economic situation and personal interests.

All different conditions give different outputs from the taxation system. Tax planning and awareness of the taxation system is therefore necessary to keep the business solid over time. A business that does not have a tax strategy can suffer a lack of liquidity over a few years because of bad the tax planning. The Swedish tax system gives the firm owners several opportunities to declare their income. The firm owners have the possibility to postpone the taxation for the future or declare an income either as a capital income or work income. Previous literature tells that postponing the taxation to the future is preferable and the possibility to convert work income to capital income is advantageous due to different tax rates.

## 2.3 Investment theory

Investment can have three types of meaning which depend on different levels of economy. There is private, enterprise or socio-economic investments. In the different types of levels, the investment economics could have a different meaning. The common meaning of investment in the different levels is that something is procured for long time use, instead of being used for the moment which we call consumption. Through investments we postpone todays consumption for tomorrow (Ross, 2008).

In the long run today's welfare depends of yesterday's investments. Likewise the welfare in the future is a result of those investments that are made today (Nilsson & Person, 1993). The investments also have effects in the short run, by increasing the income and employment. The new income may cause new incomes in the next step. This is called the investments multiplier effect. It may therefore be of importance for a government to apply politics that affect the size and directions of the investments.

Investments, especially in the agricultural sector, extend over a long time (Eid, 1976). The profitability assessment for an investment should involve all the economic impacts during the investment's lifetime (Nilsson & Person, 1993). The result of an investment is calculated as incomes minus costs. A problem arises due to the fact that costs and incomes could turn up at different time periods during the lifetime of the investment. Transactions in different periods of time don't have the same value and cannot be summed directly because of interest rate.  An income year zero is worth more than the same amount of income in year two since an income year zero can be reinvested and yield an interest rate. The phenomenon is identical with payments  (Nilsson & Person, 1993). The aspect of money value in different time periods is therefore central in a profitability assessment for an investment. To do a correct assessment it is necessary to estimate the future cash flow for the investment.

Since interest income in general is calculated with the year as base. The most accepted method is present value implicating to sum all the income and payments for one year and then calculate the value of the transactions in year zero  (Eid, 1976).  The main purpose of calculating the present value is to compare different transactions and relate them to a specific time which is usually at the time of the initial investment. By applying the discount rate, it is possible to value a transaction in the future to a value as of today, i.e. present value. A present value calculation is illustrated in the equation below (Bergknut, 1994), where the discount rate has to be given in nominal terms (Eid, 1976).

$$NV = \sum_{t=1}^{T} \frac{I_t}{(1+r)^n} - I_0$$

| | |
|---|---|
| $NV =$ | Net present value |
| $r =$ | Discount rate |
| $n =$ | number of years discounted back in time |
| $I_t =$ | Payment at year t |
| $t =$ | Time expressed in years |

## 2.3.1 Discount rate

The interest rate is the factor that reflects the reality of the investors expected yield of their money (Andersson, 1978). One way of deciding the discount rate for an investment is to study the yield requirements in the capital market. Capital could be acquired in two ways either loan or invested capital from owners. The lowest acceptable discount rate has to be at least equal to the average capital cost (Andersson, 1997). The cost for borrowed capital can be calculated by dividing the annual interest payments by the annual average debt.

The cost for borrowed capital is calculated by dividing the annual interest payments by the annual average debt. The cost for invested capital is what the investor would receiving the financial market in yield (Andersson & Lagerqvist, 1994). This could be illustrated trough:

*Discount rate ≥ Share of loan * Loan givers rate claim + Share equity * Claim of return*

A theoretically correct discount rate should reflect a capital market where it is possible to both procure and place capital to the given interest rate (Andersson, 1997). The interest rate from an investment on a bank account should be the lowest adopted level for the discount rate. A deposit in a bank account is considered as a risk free investment and if there is a risk in the investment a risk premium should be added on the discount rate (Nilsson & Persson, 1999). The cost of the equity is given by what would be earned if the capital would be placed on the financial market (Andersson & Lagerqvist, 1994).

The nominal cost of capital could be illustrated as follows:

$$R^* = (R_d * h) + (R_e * (1 - h))$$

| | |
|---|---|
| $R^*$ | = Nominal cost for capital |
| $R_d$ | = Average nominal cost for loan |
| $R_e$ | = Alternative cost for equity |
| $h$ | = Average depts. ratio for assets |

A real discount rate could then be calculated as follows:

$$R = \frac{(R^* - i)}{(1 + i)}$$

| | |
|---|---|
| $R$ | = Real discount rate |
| $R^*$ | = Nominal cost for capital |
| $i$ | = Inflation |

An investment decision is in general calculated without any taxation reflections. That is because taxes are not costs that could be directly attributable to the investment. Taxes are although payments and taxes affect the investments' payment consequences both in value and time. Investment appraisal that includes taxation effects of the decision are made in the same way as if taxation effects were not included. The problem is to adjust the payment consequences for the investment and how the tax payments effect the decision (Nilsson & Person, 1993). Since income taxation does not affect the investors' choice of specific investment but have an impact on the annual profits from the firm. The discount rate has the same effect as prior taxation and reduced with the tax level. Equation X is used in the study to calculate discount rate after taxation (Eid, 1976).

$$R_e^* = (1 - s) * R^* \qquad \textit{Equation 4}$$

$R_e^*$     = Nominal discount rate after taxation

$R^*$     = Nominal discount rate before taxation

$s$     = Taxation rate

## 2.4 Taxation

Taxation can be observed from two different points of views, the national economic point of view and the private and business point of view (Lunden, 2006). The majority of public spending is based on taxes and fees from the citizens. Historically public services have been the main purpose of taxation. Today, the taxation contributes to important features like reducing income disparities. Taxation is therefore also a political tool which is why changes in the taxation system are common (Eriksson, 2014).

### 2.4.1 Different types of taxes

Taxes can be focused on different types of transactions. From an economic point of view the national income is the long term tax base (Eriksson, 2014). The taxes could focus on production factors like labour and capital costs. Taxes can also be imposed on the incomes that the production factors generate. Lastly taxes can be imposed on consumption (Seth & Wålstedt).

Some technical concepts are used in the Swedish taxation system to explain their economic meaning and impacts. Proportional tax, progressive tax, and regressive tax are terms that are used in the taxation system (Eriksson, 2014). Proportional tax is a tax that is in the percentage term irrespective of the size of income. The tax on capital is propostional and is for the moment 30%. The council tax is proportional and is in average 32% (Eriksson, 2014). Progressive taxes increase in relation to increasing income (Lunden, 2006). Chart 2 illustrates the tax levels at different incomes (Skatteverket, 2015). The state income tax is a progressive tax and begins at two different levels. The first inflection point is at an income of 420 800 SEK where the tax rate increase to 20 %. The second inflection point is on an income over 602 600 SEK where further 25% are taxes of the income (Eriksson, 2014).
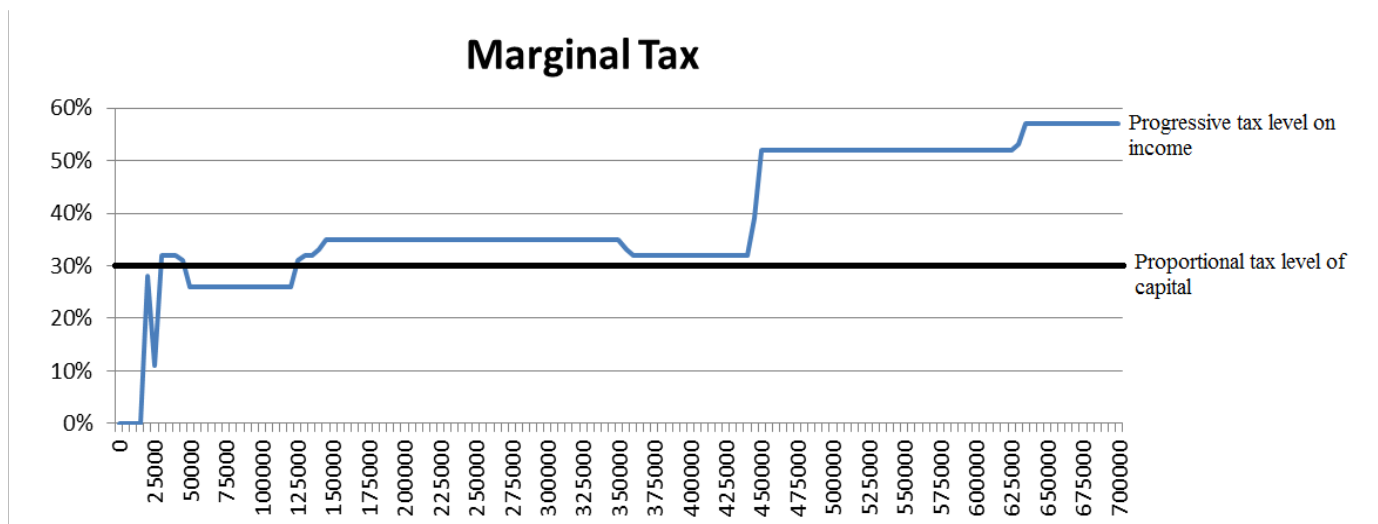
**Chart 2: Progressive taxation for different incomes (Skatteverket, 2015)**

### 2.4.2 Index-linked tax

The calculation of income tax is based on taxable income (Eriksson, 2014), and it varies depending on which tax tool being used. Once the income tax is to be calculated for different periods of time, the significance of the results assume that the tax rates will be indexed to the future value of income. To predict the precise values of indexation that will occur is difficult when the future is uncertain. However, it is unreasonable to assume that in a situation with inflation that tax rates should be fixed over time. The assessment is that comparative analysis is more reliable if an inflation-proof tax scale exists. A complete index adjustment is done by using the CPI (Andersson, 1978). Indexation is the natural way to show how taxation of income has an impact over time (Matthiessen, 1973).

### 2.4.3 Social security contributions

For individuals who report business income, a distinction is made between those actively involved in the business and those who enjoy business income without active participation. The former pay social security contributions as self-employed persons at the rate of 28.97 percent, while the latter pay a special wage tax at 24.26 percent. Persons over 65 always pay the special wage tax (Skatteverket, 2015).

## 2.5 Legal terms

This chapter will present the legal terms according to the Swedish law and provide examples of how the laws are practiced.

### 2.5.1 Forest account

According to the big difference in income from cuttings, the forest owners have the facility to use a forest account. The forest account is formed so the savings on the account permits deferred taxation on the income until the day when the savings are removed from the account. Forest accounts can be used by any physical person in Sweden (Björne, 1967).

A discount on tax  for a deposit on forest account for a cutting is maximum allowed to:

- 60% of the payment for selling a permission to cut
- 40% of the payment for directly selling the forest

There are special rules when incomes are caused by damages in the forest. In case of fire, storm or insect damages which lead to earlier incomes than planned the forest owner is eligible for additional capacity for taxation discount. Which amounts to:

- 80% of the payment for selling a permission to cut
- 50% of the payment for directly selling the forest

Every time a deposit to a forest account is made a new account has to be opened. The lowest level for an investment in the forest account is 5 000 SEK annually.

A withdrawal from a forest account has to be a minimum of 1 000 SEK and is permitted at the earliest of four months after a deposit. After ten years a deposit must be withdrawn and taxed. Forest account could be transferred from one person to another (Rydin, 2009).

## 2.5.2 Interest adjustment for self-employment

For private owned firms, interest adjustment for self-employment is an available and optional taxation possibility. This possibility in the law was instituted to eliminate differences in taxation between private owned firms and shareholding firms. Different types of incomes are taxed by different systems. Work income is in general taxed higher than capital income. The interest adjustment for self-employment system is formed so that some of the work income could be taxed as capital income. The magnitude of the interest adjustment for self-employment is given by the capital structure of the firm (Rabe, 2002).

When the capital structure in the firm is positive, interest adjustment for self-employment is optional but when the capital structure is negative the interest adjustment for self-employment is required. There is information on the tax return how much of the income that could be taxed as capital. The amount that is available one year can be saved to the next year, which leads to a compound interest effect. The yearly interest rate amounts to the capital backing times the government borrowing rate the 30th of November previous year, plus 5,5 percent units. 2014 the percentage amounted to 8, 09. An income of 1 000 000 SEK generates that (1 000 000*0, 0809) =80 900 SEK could be deducted from taxation on work income and transferred to capital taxation. To withdraw 80 900 SEK from the firm with a capital taxation makes a result over 80 900 SEK that has been required so interest distribution does not causes a deficit in the firm (Rydin, 2009).

The negative interest adjustment for self-employment is binding. An interest expense has to be deducted in the income category where they belong. It is hard for the tax agency to prove where the loan belongs, that's why the negative interest distribution is binding. The underlying factors that motivate the owner to declare the private loans in the firm is that private interest expenses are deductible up to 30% but in the firm they are deductible up to 100%. With a negative capital backing in the firm a certain amount has to be transferred from income in capital to work income. That's how the tax agency prevents the firm owner to declare private loans in the firm. There are limits as to when the interest adjustment for self-employment are binding or optional. When the amount is below 50 000 SEK no interest adjustment for self-employment is required (Lunden, 2006).

## 2.5.3 Forest deduction

Forest deduction was introduced in 1980. In order to provide the forest owners with increased possibilities to invest in silvicultural measures and spur the forest owners to increase their sales of timber (RP 206/2008 rd). The base in forest taxation is that the forest manager should be taxed on the part of a cutting that represent forest revenue and not on th part that represent capital withdrawals. Revenues from a cutting are declared as income from private firm but the forest deduction describes how much that represents tax-free capital withdrawal. Forest deduction is a capital allowance that will be reversed when the estate is sold. The maximum deduction space a manager can have on an estate depends on the purchase value for the estate, the commodity value on the forest and the taxation value on the estate (Rydin, 2009).

The maximum deduction space for a private person is 50% of the purchase value for the forest and for legal entities 25% which is illustrated in figure 4. When the acquisition is not a purchase, the new owner enter the former owner's tax situation (ibid).

As deductible forest income are following rules applied:
- 100 % of incomes from selling a permission to cut
- 60 % of incomes from directly sales of wood

An example how to calculate forest deduction:

A person buys a forest estate for 12 000 000 sek and the commodity value for the forest amounts to 6 000 000 sek. The taxation value for the forest amounts to 10 000 000 sek.

Forest purchase value amounts to:
1. 12 000 000 * (6 000 000 / 10 000 000) = 7 200 000 sek
2. Deduction space is 50% = 3 600 000 sek

The person sell a permission to cut for 1 000 000 sek and timber for 200 000 sek
1. Deduction allowed revenue amounts to:
2. 50% * ( 1 000 000 + (60% * 200 000)) = 560 000 sek

**Figure 2: How forest deductions is calculated (Skatteverket, 2015).**

## 2.5.4 Funds retained for expansion

Persons with an income from a private firm are allowed to reserve part of the result stay in the firm through an expansion found. The person pays a tax of 22% when the result is put off to the funds retained for expansion and the rest of the tax is paid when the reserve fund later on are removed from the fund. When the savings are removed they are declared as income of private firm and the tax of 22% is subtracted. If the firm runs with a deficit one year, the savings from the expansion fund can be used to equalize the result and the tax of 22% are repaid to the firm. The provision cannot exceed 128% of the capital basis for the funds retained for expansion (Lodin et al., 2011).

### 2.5.5 Tax allocation fund

The tax allocation fund is a way for private firms to distribute the result over time and in that way the taxes become more evenly distributed over time. A reservation to the tax allocation fund reduces the taxable result for the firm. Private firms are allowed to reserve 30% of the result after accounting for prospective interest adjustment for self-employment. The reservations are allowed to be allocated to the tax allocation fund for six years and after those years the reservation must be added to the result (Rydin, 2009).

## 2.6 Proposed legal terms

The formulated proposal suggests that all funding assets earnings should end up in one single fund. Forest account, tax allocation fund and funds retained for expansion should be removed and be replaced by a business fund. The proposal even suggests changes in the rules that consider interest adjustment for self-employment (Regeringskansliet, 2014).

### 2.6.1 Business fund

The current way for a private firm to deposit the economic result for future use is described above. The investigators claims that the six current ways of allocate the economic result is complicated for the firm manager to handle and one single fund would be more helpful for firm owners. The business fund is based on the dispensable income for the firm. The purpose with the business fund is that only earnings that are retained in the business should be included. Therefore only earnings that are covered by the capital structure in the firm are allowed to be deposited to a business fund. There is no time limit for how long earnings could be stored in a business fund but the savings are charged by an interest. The capital backing for the business fund will be based on the closing balance for the year. The way how the disposable income from the firm should be calculated is the same as in the current system (Regeringskansliet, 2014).

### 2.6.2 Changed capital backing

The capital backing in the firm will affect the size of the business fund and interest adjustment for self-employment.  The current system holds two ways of calculating the capital backing. Funds retained for expansion and interest adjustment for self-employed requires separate and different capital backing systems. The new proposal suggests a common capital backing for interest adjustment for self-employment and the business fund. With the current system the firm manager has to adjust 15 different posts in equity to calculate the interest adjustment for self-employment for a given year, the new capital base, where the manger only has to adjust six different. Figure 5 illustrates which and how different posts affect the capital base for interest adjustment for self-employed. The left column describes which post that have to be considered while calculating the capital base in the current system. The right column describes how and which post that affect the proposed system (Regeringskansliet, 2014).

| Current system | | Proposed system | |
|---|---|---|---|
| **Post** | **Effect** | **Post** | **Effect** |
| • Unused deficit | + | • Non-durable capital supplement | - |
| • Transfer post | + | • Book value for properties | - |
| • Intergenerational transfer post | + | • Fiscally value on properties | + |
| • Saved interest adjustment for self-employment space | + | • Booked taxes and fees | - |
| • Non-durable capital supplement | - | • Booked value on liabilities that doesn't belong to the firm | + |
| • Tax allocation fund | - | • Booked value on assets, according to Swedish legalization, not belong to the firm | - |
| • 78% of funds retained for exp. | - | | |
| • Book value for properties | - | | |
| • Fiscally value on properties | + | | |
| • Half of value on forest account | + | | |
| • Booked value on assets as according to Swedish legalisation that does not belong to the firm | + | | |
| • Booked taxes and fees that are adjusted | - | | |
| • Booked liabilities as fiscally does not belong to the firm | + | | |
| • Deposition to compensation funds and future costs | - | | |

**Figure 3: Illustration of which posts that affect the capital base in the current and proposed tax system (Regeringskansliet 2014)**

## 2.6.3 Proposed interest adjustment for self-employment

The proposal suggests to change the rules for interest adjustment for self-employment as illustrated in figure 6. Two new models for interest adjustment for self-employment will be introduced according to the proposal; absolute and simplified interest adjustment for self-employment. The absolute interest adjustment for self-employment will be based on the current system for interest adjustment for self-employment but less posts to account for in the capital backing. The simplified interest adjustment for self-employment cannot exceed a half price base amount. If the simplified interest adjustment for self-employment system is applied it is not possible to use the business fund. The negative interest adjustment for self-employment will be dropped according to the proposal but there will be more clear rules on which loans that are related to the business activities. For the absolute interest adjustment for self-employment a rate of 4,8 percent units plus the government borrowing rate suggested (Regeringskansliet, 2014).

```
┌─────────────────────────────┐                    ┌─────────────────────────────┐
│ Positive interest adjustment │                    │ Negative interest adjustment│
│ for self-employment          │                    │ for self-employment         │
└─────────────────────────────┘                    └─────────────────────────────┘
        ╱          ╲                                              │
┌──────────────────────┐  ┌──────────────────────┐  ┌──────────────────────────────┐
│ Simplified interest  │  │ Absolute interest    │  │ Will be dropped              │
│ adjustment for       │  │ adjustment           │  │ More clearer rules concerning│
│ self-employment      │  │ for self-employment  │  │ which loans belongs to the   │
│ (1/2 Price base      │  └──────────────────────┘  │ firm                         │
│ amount)              │            │               └──────────────────────────────┘
└──────────────────────┘            ▼
                          ┌──────────────────────┐
                          │ Business fund        │
                          └──────────────────────┘
```
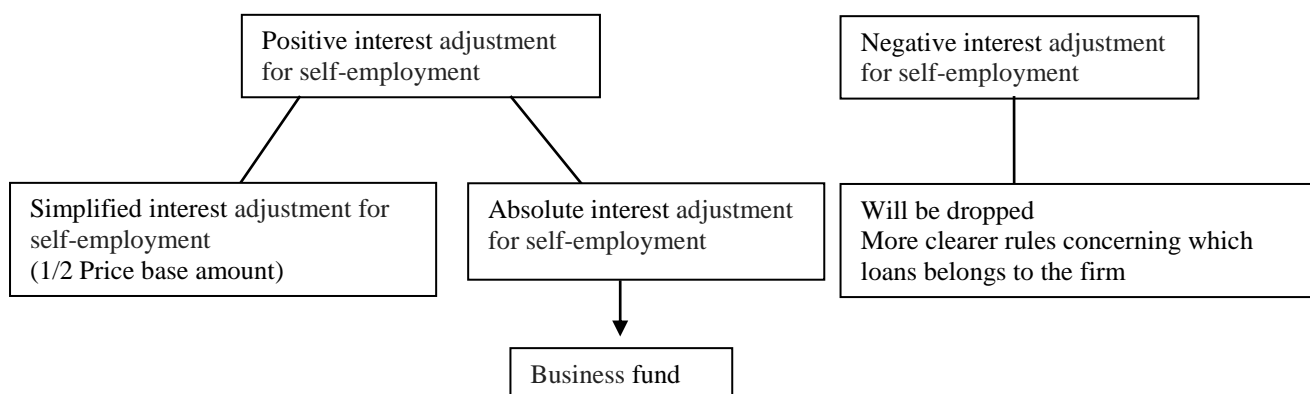
**Figure 4: The proposed interest adjustment for self-employment system  (Regeringskansliet 2014)**

# 3 Method

The chapter describes the choosen method in order to perform this study. A method is described as a tool to reach an objective for an investigation. Method is a necessary condition for finding answers to subordinated issues and in that way you are able to get a better and more truthful idea of the surveyed conditions of the earth (Holme & Solvang, 1997).

## 3.1 Research approach

The values that concern forest production originate from real forest management plans. The data about produce from forest production have been collected from *Skogforsk* and *Lennart Samuelsson*. Data about property valuation comes from *LRF Konsult* and the forest management plans comes from *Skogsservice*.

The model is based on historical data from price changes in the forest sector in order to draw conclusions on future conditions. From *Statistiska Centralbyrån* index prices for timber have been obtained.

To follow out this thesis an information collection, relevant to the topic, have been made to get an overview about to problematization around forest taxation and the forest owners' relationship to forest economics. The base of the information collection is the literature review presented in chapter 2. In the literature review different taxation rules have been studied to give the author understanding of the taxation rules and how they affect an investment. The literature studies about Swedish forest owners' behavior and relationship have been made to estimate taxation strategy for the fictive owners in the case study. The fictive owners situation and how they choose to act in the simulation model are based on the literature study about forest owners relationship to taxation and economics.

In order to develop a model a spreadsheet in Microsoft Excel has been created to calculate the effects of different taxation system for an investment in a forest property. A schematic picture of the model that is used is presented in Figure 11.

Two fictitious owners that face an investment in a forest property have been created. The forest property used in the study is a real forest property situated in the southern parts of Östergötland. Information about the property is from a newly updated forest management plan for the property. For each owner two different cutting strategies have been assumed in the calculation. The same cutting strategies are applied for both owners as illustrated in Figure 12. Calculations are made for the two owners over a twenty year period. In the first year the investment is made and the following years financial results are calculated where positive results are deposited to financial accounts in combing with fiscal reserves and negative results are covered by short term borrowing. The model is based on an investment at t=0 where annual surpluses or deficits occur at t=1, t=2,…, t=20. The value at each year is discounted to a present value at year zero. The owner seeks to declare as low taxable income as possible, with consideration to the defined tax strategy in this study. This in order to avoid a high tax rate since a progressive tax system is practiced in this study. The owner uses deposition and reservation instruments to obtain lowest possible taxable income. The deposition and reservation instruments that are used in the study are forest account, tax allocation fund and fund retained for expansion, named in order for depositions in the current system. To cover negative results the instruments are used in the opposite order. In the proposed system the business fund is used with same methodology as the forest account, since it is the only way to

deposit surpluses. The last year the available financial accounts and the property represent a fortune for the owner that calculated at present value at year zero with a discount rate to draw conclusions if the investment is profitable. Outline represents the approach in the model as illustrated in Figure 12. Finally a sensitivity analysis has been made where the input variables are changed, and synchronized with aim of the study. The model is flexible to account for cases with different initial conditions. The method enables us to examine the effects of changing taxation system over time for different investors (Sweeney, Williams, & Anderson, 2000), which is illustrated in figure 10.

$$\text{Controllable input values} \rightrightarrows \quad \text{Model} \longrightarrow \quad \text{Result}$$
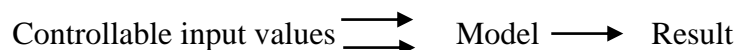
**Figure 8: Illustration of simulating model (Sweeney, et al., 2000).**

The result from the cases and the results from sensitivity analyses are connected with presented literature and analyzed in the end of the study. In summary, the approach considers a number of general steps. First a literature review is made, which was then used as a basis for creating an empirical model using in Microsoft Excel. Thereafter four fictitious cases were constructed, the two owners and their two different cutting strategies. The cases were calculated in the spreadsheet, then the sensitivity analysis. The results were presented and followed by analysis and discussion.

## 3.1.1 Case studies

A case in a study can be studied when there is a specific situation, individual, group, organization are parts in a phenomenon that is of interest to learn more about (Robson, 2011). It has been discussed whether case studies are science or social science. However, historically, case studies can be traced from social science (Hamel, 1993). Common for all case studies is that they may suggest different thing like legal phenomena to medical phenomena. In opposite to methodologies which are based on a generalizing form. Case studies can result in useful lessons and suggest solutions to problems (Gerring, 2006). In some situations the author has to be aware that the term case study is being used, especially when the author tries to relate the case study to reality. The intention with case studies is to provide guidance to a problem by using some related case studies (Robson, 2011). Another angle of incidence with case studies is that risk emerges that the results are a consequence of the actual study. There is a risk that modeling of the study creates the results. This is called examination effect. A historical example of this phenomenon comes from the scientist Elton Mayo. He was trying to analyze if factor workers were able to work better if the brightness was increased in the factory. The result was yes. But after a while the employee's efficiency decreased. After further studies the scientists noted that the increase in efficiency was due to a change, in this case an investigation, and not the fact that brightness had increased (Mayo, 1933).
A case study can be defined as;
*Case study is a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence* (Yin, 2003).

Where the author to the statement provides some important points

- A strategy is a stance or approach rather than a method such as observations or interviews

- Is empirical in the way that the study is relying on collection of evidence about what is going on.
- The case study can only focus on a phenomenon in a context, typical is when the boundaries between the context and phenomenon are not clear.
- Using multiple methods of evidence or data collection

(Yin, 2003)

Case studies in the literature have been discussed whether they are scientific or not. Case studies have been questioned about their capacity to reflect reality, although many case studies linger in social research and represent the base in many scientific statements (Robson, 2011). The study of a particular phenomenon is not excluded from being scientific, it is the aims, intentions and the methods that are used in a study that concern us (Robson, 2011). *What distinguishes scientific knowledge is not so much its logical status, as the fact that it is the outcome of a process of enquiry which is governed by critical norms and standards of rationality* (Carr & Kemmis, 1986).

This study will be based on a case study for a specific forest estate. The complexity in the Swedish taxation system enables dozens of options for the owner. This study is based on a taxation strategy which is based on a multiple method of evidence. The two categories of owners that are applied to the specific forest property are created from the literature review which is made. The results do not attempt to provide general answer concerning effects for the Swedish forest owners but the result will give answers to the economic effects for a Swedish forest owner with specific preferences and conditions.

## 3.2 Literature review

The literature tells what is already known and written about the subject. A traditional literature review should systematically locate, analyze and identify documents and information that are related to the subject and research problem. The information about the research problem could be obtained from books, articles, abstracts, other research reports and electronic media (Gay & Airasian, 2003). The processes of the literature review develop the original research questions towards the finally formulated ones (Bryman & Bell, 2013). Literature about the theory, method and conclusions in the study have been obtained from previous studies from SLU, relevant literature and SLU databases like epsilon and Jstor. Keywords for searching has been, forest taxation, investments in forest, forest account and taxation in private firm. The relevant literature consists of books and articles that consider net present value, taxation and investment calculation with forest economics as main topic.

The literature review has been used to get a picture of how forest taxation is applied and its effects. Information is extracted from the literature review about how the Swedish forest owners relay to taxation used to reflect the reality when the fictive owners in the model are defined. The literature is based on mostly Swedish reports due to the taxation system is taxation system in Sweden. Swedish report are also used because of the fact that the forest in other boreal countries in general are owned by the government.

## 3.3 Empirical data

### 3.3.1 Fictive owners

The characteristics of the owners are based on literature review. The forest farm given different types of owners are simulated in the model. Owner 1 doesn't earn any income beside the forest business and Owner 2 has an income of 900 000 SEK beside the forest business. The fictive owners are simulated both for the previous system and the proposed system.

According to the literature the Swedish non-industrial forest owners are a heterogenic group of people (Holmgren, 2005). Therefore, two types of forest owners have been identified in the case scenario, as illustrated in Figure 9. One owner will represent the owner who has no alternative income and the other owner is assumed to have an alternative income which is illustrated in Figure 9 (Lönnstedt & Rosenqvist, 2001). The two owners will be analyzed from the existing tax system and the proposed tax system which is showed the figure. They will use the same tax planning strategy in all cases and the basis for the forest production is obtained from the forest farm with a new forest management plan.

Owner 1 is in this study a person that buys this forest estate year 0 and has the intention from year 0 to sell the property year 20. Owner 1 does not obtain income from any other activities than the forest that effects the person's taxation situation. Swedish forest owners do have different reasons for owning forest for example increasing the standing volume, increasing the value of firm by increasing equity and decreasing dept. (Lönnstedt, 1997). Owner 1 has been defined to reflect an owner's goal of increasing the equity by reinvest the profits in the firm (Lunden, 2006).

Owner 2 in this study is a person that buys this forest estate year 0 and has the intention from year 0 to sell the property year 20. Owner 2 has a work income of 900 000sek every year to reflect the fact that interest increases among non-residential owners of investing in forest (Lönnstedt & Rosenqvist, 2001). Owner 2 has also been defined because of the changes in how the capital structure in the firm are calculated (Regeringskansliet, 2014), to see which effects that would have on high income persons who invest in forest.
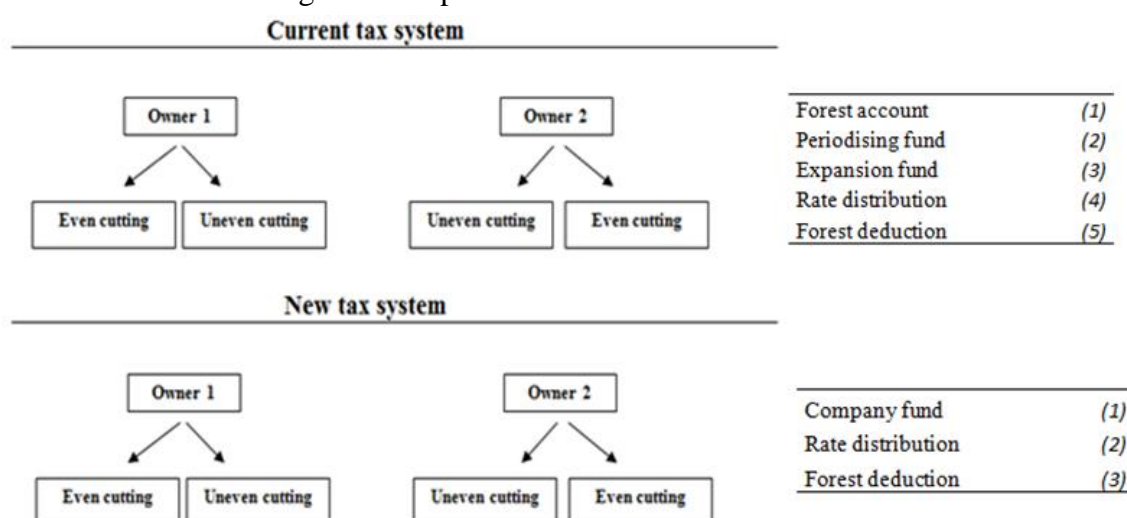


**Figure 5: The two fictive owners**

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## 3.3.2 Model for calculations

To accomplish this study has a collection, based on the literature review, of information about the Swedish forest owner's and the Swedish taxation system has been made. Different taxation rules that affect an investment in forest property have been studied. Sweden is facing a new taxation proposal and to compare the proposal with the current system two case studies have been developed where each case farm practises two separate cutting strategies. The two cases will be analysed by an empirical model. The model aim is to calculate different investor's fortune net worth after twenty years in relation to different taxation systems. This is done with the following formulas in this chapter. The investment will be made at t=0 and every year will generate a surplus or a deficit that will be discounted to year zero. The investor will allocate as much as possible to saving funds. At t=20 the property will be sold and the funds will be dissolved.

The model is calculated in a spread sheet in Microsoft Excel where it is possible to connect different input values in the calculations. It is also possible to define restrictions for alternative calculations which vary in different scenarios, which is used when calculating the progressive tax level. In the schematic figure 10 it is illustrated how the annual activities affect the final net worth that affects the profitability for the investment. Every year starts with forest activities, (cuttings, clearings, planting etc), which causes either a negative or positive result. If a negative result is received one year it is covered by available liquid assets which affects the equity in a negative direction. A positive result is saved for future to the extent possible due to the legislation (1.). The surplus from the firm which is not possible to deposit or reserved is declared for taxation. After taxation the surplus is reinvested in the firm (2.). The model for the whole investment period is illustrated in figure 11.
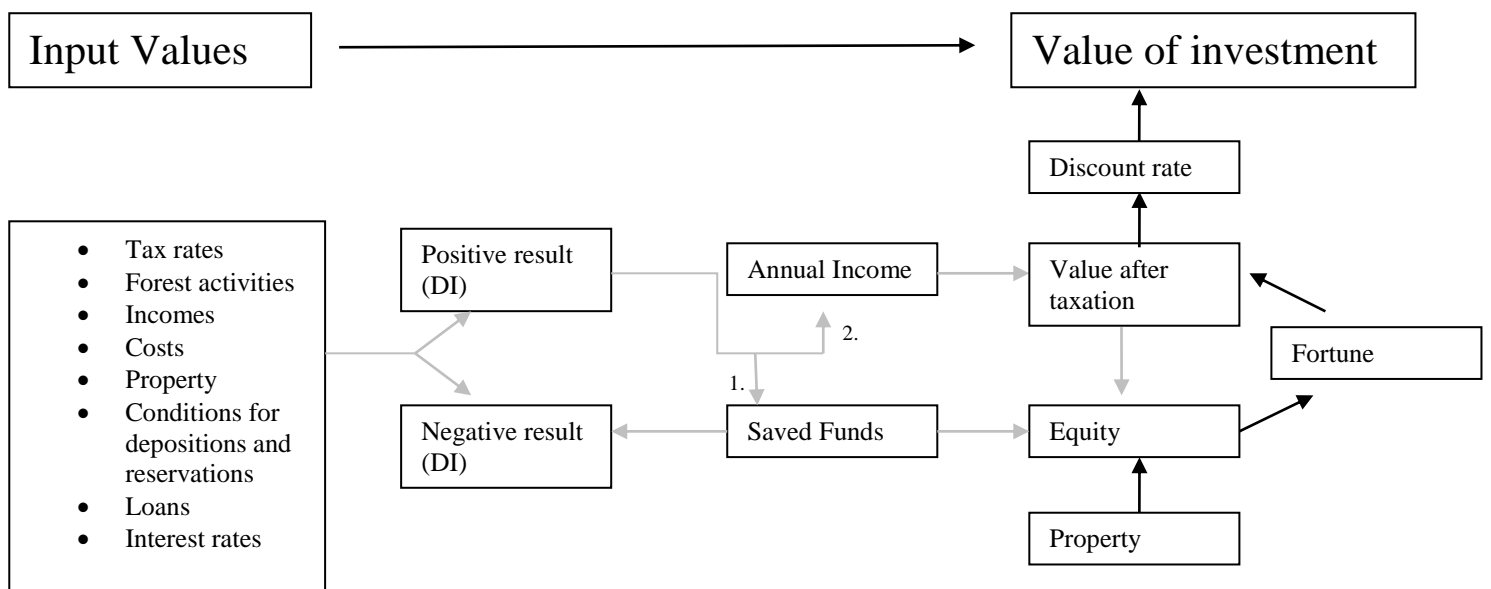


**Figure 6: Simulating model for annual surpluses**

**Figure 7: Simulating model for the investment.**

The equation box in the figure contains:

$$NV_0 = (DI - T)_{T=1} + (DI - T)_{T=2} + (DI - T)_{T=3}$$
$$,,,,,, + (DI - T)_{T=20} + (E - T)_{T=20}$$

*Equation (18)*

$T$ = Tax

$DI$ = Taxable income

$$NPV = NV_0 - (Forest\ investment_{T=0} + Borrowed\ capital_{T=0})$$

*Equation (19)*

Input values for the model:

The model that is used is based on several amounts of input values. The input values are presented below.

- Forest activities that causes a financial result (DI)
  *Cutting incomes*
  *Clearing incomes*
  *Cleaning costs*
  *Planting costs*
- Tax rates
- Deposition and reservation possibilities
  *Forest account*
  *Tax allocation fund*
  *Funds retained for expansion*
  *Interest adjustment for self-employed*
  *Forest deduction*
  *Social security contributions*
  *Business fund (Proposed system)*
- Discount rate
- Annual increment of properties
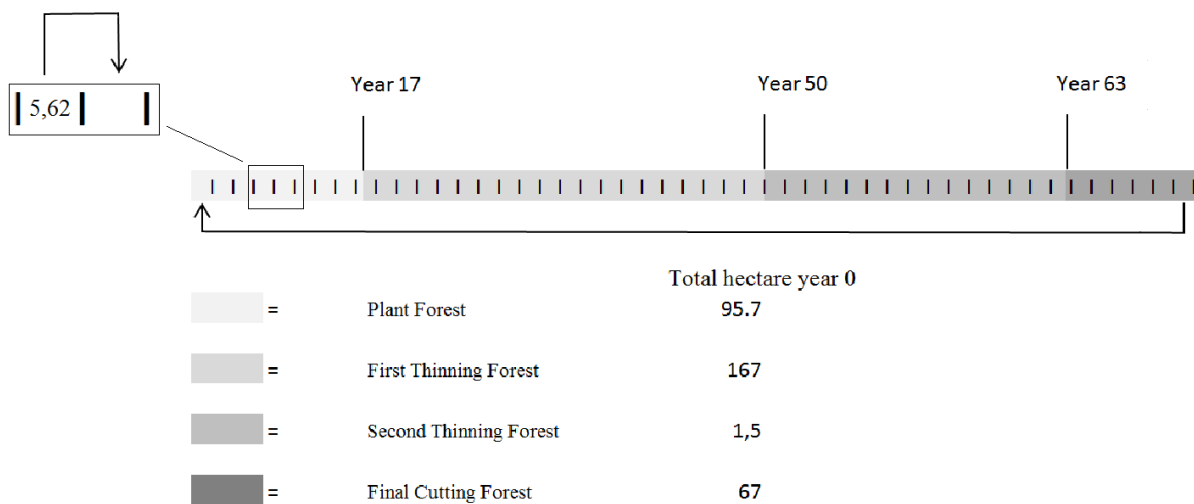- Property data

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*Assessed value*
*Purchase value*
*Level of loans*
*Standing volume of forest*

### 3.3.3 Equations that are used in the model

This chapter will present the equations that are used to calculate the value of the investment.

### 3.6.1 Annual profitability from forest

The yearly production from the forest is based on a real forest management plan. From the forest management plan it is given that the property comprises 366 hectare of productive forest land with a theoretical yearly production of 8 m3 / hectare. That gives one hectare a life cycle of 65 years (Hallsby, 2007). From the forest management plan the amount of every type of forest is given. Every amount of forest type is divided by the amount of years the forest type is in the specific stage which is illustrated in figure 13. For example: The forest is composed of 95,7 hectares of plant forest in year zero. The trees are classified as plant forest in 17 years after plantation, defined from yearly production (*ibid*). The 95, 7 hectares are divided in 17 blocks to simplify the the annual activities in the forest. For plant forest is the size of one block calculated by divide the total hectare plant forest with the time the forest is classified as plant forest, which gives 95, 7 / 17 = 5, 62 hectares of plant forest in one block. The same procedure is done for the other three classifications. Each block moves one step forward every year, which means that 5, 62 hectares of plant forest year 17 will be 5, 62 hectares of first thinning the next year. The last block is removed to the first place in the simulation as showed in figure 10.



| | | Total hectare year 0 |
|---|---|---|
| = | Plant Forest | 95.7 |
| = | First Thinning Forest | 167 |
| = | Second Thinning Forest | 1,5 |
| = | Final Cutting Forest | 67 |

**Figure 8: The appearance of the forest management model**

The simulation starts with 65 blocks where the appearance of the activities in the forest is illustrated in figure 10. When a block hits an activity year will the activity affect the annual result for the firm. The values of trees in different age classes come from the forest management plan and empirical approaches are explained in the empirical chapter. The

annual hectares of forest in a specific age class where an activity is conducted are calculated with equation (5). Equation (5) is a processing from equation (1) and (2).

$$X_n^{PF,FT,ST,FC} = \sum_n^{PF} \frac{PF}{LC^{PF}} + \sum_n^{FT} \frac{FT}{LC^{FT}} + \sum_n^{ST} \frac{ST}{LC^{ST}} + \sum_n^{FC} \frac{FC}{LC^{FC}}$$

*Equation (5)*

$X_n$      = Annual hectares of forest in a specific age class

$PF$      = Plant forest

$FT$      = First thinning forest

$ST$      = Second thinning forest

$FC$      = Final cutting forest

$LC$      = Life cycle of the specific age class for the trees

The annual total income or costs from the forest are calculated based on equation (6).

$$A_n = (X_n^{PF} * P^{PF} + X_n^{FT} * P^{FT} + X_n^{ST} * P^{ST} + X_n^{FC} * P^{FC})$$

*Equation (6)*

$A_n$      = Annual incomes or costs from the forest

$X_n$      = Annual hectare of trees in a specific age class

$P$      = Price

### 3.6.2 Annual disposable income

The annual disposable incomes are reinvested in the firm by a deposit to a bank account. The annual disposable income from the firm in the existing system are calculated with equation (7)

$$DI_n = A_n - DP_n^{FA} + DP_{n-10}^{FA} - DP_n^{P} + DP_{n-6}^{P} - DP_n^{EF} + W - T$$

*Equation (7)*

$DI_n$      = Disposable income

$DP_n^{FA}$      = Depositions to forest account

$DP_n^{P}$      = Reservation for tax allocation fund

$DP_n^{EF}$      = Reservation for funds retained for expansion

$W$            = Withdrawals from deposition instruments

$T$            = Taxes where interest adjustment for self-employment are considered

For the proposed system the disposable income is calculated with equation (8).

$$DI_n = A_n - DP_n^{CF} + W - T$$

<div align="right"><em>Equation (8)</em></div>

$DP_n^{CF}$       = Depositions to business fund

### 3.6.3 Forest account

The annual deposition possibilities to forest account are restricted by equation (9) due to the Swedish legislation:

$$DP_n^{FA} = DP_n^{FA} < (0,6 * CS) + (0,4 * OS)$$

<div align="right"><em>Equation (9)</em></div>

$CS$         = Contract sales
$OS$         = Own sales

The deposition is only allowed to remain on the account for ten years. After that the deposition has to be withdrawn and declared for taxation. The final annual value for the forest account is calculated buy equation (10).

$$RV_n = \sum_{t=1}^{n} (DP_t - DP_{t-10}) * R$$

<div align="right"><em>Equation (10)</em></div>

$RV$        = Annual rest value forest account
$DP$        = Annual deposition
$R$         = Interest rate of forest account

### 3.6.4 Tax allocation fund

Reservation for tax allocation fund is made if there is still a surplus from the forest when the possibilities to deposit to forest account are fully exploited. The annual reservations for the tax allocation fund are calculated with equation (11).

If   $A_n - DP_n^{FA} + DP_{n-10} > 0$ then:

$$FR_n * 0,3 = DP_n^{P}$$

<div align="right"><em>Equation (11)</em></div>

$FR_n$          = Result when deposition to forest account is made

Since a reservation to a tax allocation fund only is allowed to remain there for six years, the declared income from forest is affected by equation (10).

$$FR^{n1} = FR^{n2} - DP_n^P + DP_{n-6}^P$$

$FR^{n1}$          = Result when reservation to tax allocation fund, and deposition to forest
           account fund are made
$FR^{n2}$          = Result before reservation to tax allocation fund are made

The rest value year 20 for the reservations to the tax allocation fund is the sum of $FR^{n1}$.

### 3.6.5 Funds retained for expansion

Reservation to funds retained for expansion is made if there is still a surplus from the forest when the possibilities to deposit to forest account and reservations to tax allocation fund are fully exploited. A reservation to fund is followed by a tax of 22% of the reserved amounts. The tax is repaid to the firm with the same rate as withdrawals from the fund. The annual reservations to funds retained for expansion are calculated with equation (13).

$$\text{If} \quad A_n\text{-} DP_n^{FA} + DP_{n-10} - DP_n^P + DP_{n-6}^P > 0 \text{ then:}$$

$$FR^{n3} = FR^{n1} - DP_n^{EF} - T_n^{EF}$$

Where the formula got following restrictions:

1. $DP_n^{EF} + T_n^{EF} = FR^{n1}$
2. $DP_n^{EF} < CB^{EF}$


$FR^{n3}$          = Taxable income when deposition to forest account, and reservations for tax
           allocation fund and fund retained for expansion are made

$FR^{n1}$          = Result when deposition to forest account and reservations to tax allocation
           fund are made

$T_n^{EF}$          = Tax for reservations to fund retained for expansion

$CB^{EF}$          = Capital base for funds retained for expansion

The rest value year 20 for the reservations to funds retained for expansion is the sum of $FR^{n3}$.

### 3.6.6 Interest adjustment for self-employment

The interest adjustment for self-employment system is different for the two systems. The current system allows calculation of the saved interest adjustment for self-employment space as an asset while calculating the capital backing base. In the formula assets for calculating the annual interest adjustment for self-employment space are defined as assets in terms of the legislation of interest adjustment for self-employment that are illustrated in figure 5. For the current system equation (14) is used to calculate the annual rate.

$$DS_n = ( A_n + DS_{n-1}) * R + DS_{n-1}$$

*Equation (14)*

$DS_n$        = Annual distribution space
$A_n$        = Assets
$R$        = Rate for annual distribution space

For the proposed system is equation (15) used.

$$DS_n = A_n * R + DS_{n-1}$$

*Equation (15)*

### 3.6.7 Business fund

For the proposed system, forest account, tax allocation fund and funds retained for expansion are not possible instruments to reduce the annual disposable income. A deposit to the business fund can remain for an endless time period. In the proposed system a business fund is used where equation (16) are used.

If $A_n > 0$ then:

$$DP_n^{CF} = A_n * 0{,}4$$

*Equation (16)*

The final annual value for the business fund is calculated by equation (17).

$$RV_n = \sum_{t=1}^{n} DP_t^{CF} * R$$

*Equation (17)*

### 3.6.8 Equity

The equity in the firm is the fortune which is sold when the investment period is ending. The annual equity for the previous system is calculated with equation (18).

$$E_n = RV_n^{FA} + DI_n + BA_n + PV - L$$

*Equation (18)*

For the proposed system the annual equity is calculated with equation (19).

$$E_n = RV_n^{CF} + DI_n + BA_n + PV - L$$

<div align="right"><em>Equation (19)</em></div>

| | |
|---|---|
| $E_n$ | = Annual value of equity in the firm |
| $RV_n^{CF}$ | = Annual rest value of business fund |
| $RV_n^{FA}$ | = Annual rest value of forest account |
| $DI_n$ | = Annual disposable income |
| $BA_n$ | = Saving on bank account |
| $PV$ | = Purchase value of property |
| $L$ | = Loans |

## 3.2 Two different methods

The literature distinguishes two basic approaches when it comes to the choice of method. The quantitative method and the qualitative method, as illustrated in figure 9. When it comes to the choice of method there are two main issues, how to collect the information, and how the problem is to be formulated. An explanatory problem often requires a method which takes nuanced data, as well as the relation between different data, into account. This implies the need to concentrate the study to a small amount of investigated units. In general, when facing an explanatory problem it is of importance to extract a lot of different nuances which cause a concentration of a few targets (Jacobsen, 2002).

The qualitative method is designed to identify and analyze or explain a specific area in terms of variables and quantitative conditions. Hence the qualitative method is not focusing on examining the general validity of the information. The strength in qualitative method is that it provides an overall picture which can provide greater understanding of the social processes and contexts (Holme & Solvang, 1997).

When the study is formed as a problem the purpose is often to find a range, frequency or an extent of a phenomenon (Jacobsen, 2002). The quantitative method is more formalized and structured where measurable results are obtained by analyses of measurable variables. An advantage with the quantitative method is that opportunity is given to make statistical generalizations based on smaller selection. The disadvantage may therefore be that the structured form does not allow flexibility and the information about social processes never turns up (Holme & Solvang, 1997).

People have a tendency to have an excessive confidence in what can be described with numbers. Like the qualitative method the quantitative method is also based on the author's assumptions and knowledge. Just because something is described by numbers that does not mean it is an objective truth. For this reason it is important as an author to make it clear to the

reader what the prerequisites and the boundaries are and what this means for how the results can be interpreted.
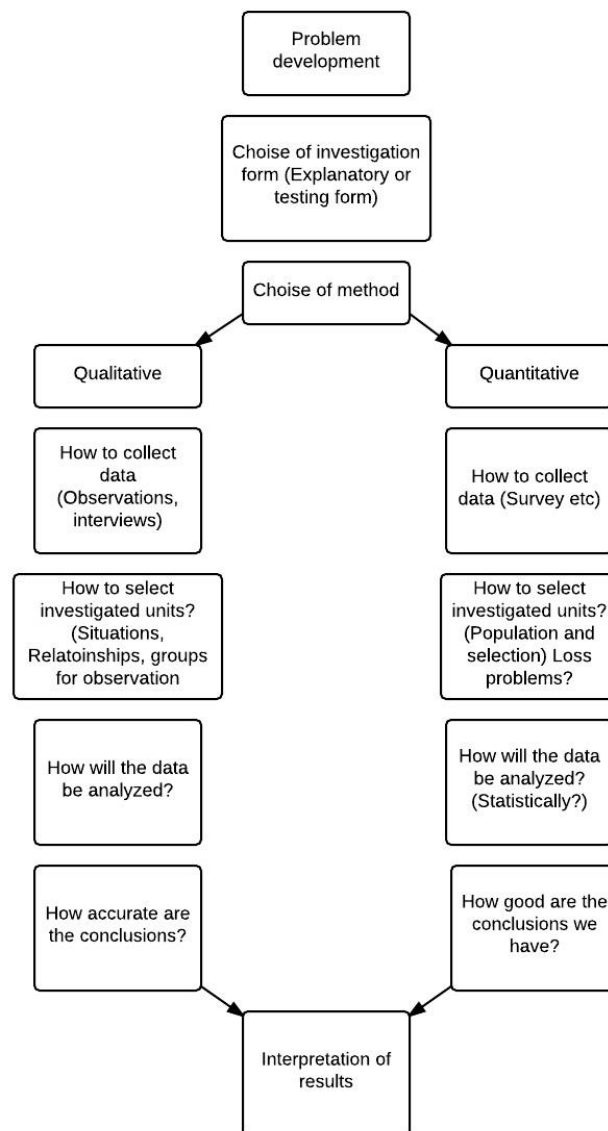


**Figure 9: The Difference between the two types of methods, own processing  (Holme & Solvang, 1997).**

## 3.2.1 Explanatory and understanding knowledge

The method describes how to approach the reality in the study.  The method of investigation can produce direct effects on the result and to distinguish these methodical explanations and substantive explanations caused by reality requires knowledge of methodological choices. The choice of method will help the author to ask critical questions in a systematic way about the choices made and the consequences elections have (Jacobsen, 2002).

Due to the literature that considers choice of method a distinction is made between explanatory and understanding method which is illustrated in Figure 7. The explanatory method is in the literature known as positivism and the understanding method is known in the literature as hermeneutics (Arbnor & Bjerke, 1994). An explanatory person means that there is no difference between natural science and social science and therefore consider methods

that could be used in natural science also could be used in the social science. The hermeneutic persons however, reject their reasoning and argue for their statement. There is a big difference to explain the nature and understand a culture phenomenon. With that contention the hermeneutic person means that analyses that are based on statistical regularity only could be explanatory in a scenario where all actors are objective. Due to the hermeneutic perspective every case is unique and is therefore impossible to quantify and objectify so that understanding of the phenomenon is achieved. By the explanatory perspective it is possible to consider social contexts as facts and objects why it is possible to make explanatory models of the reality which can be seen as general. Through quantitative science and statistic models the explanatory perspective analyzes a phenomenon and the general models could be applied in different contexts (Robson, 2011). According to this method an object can be split in different parts and the sum of the ingredients can generate an overall result (Arbnor & Bjerke, 1994).

The major difference between the two types of method is how they observe complexity in the social world. The explanatory perspective argues that the social world is to complex which is why the science has to do some simplifications. The hermeneutic perspective on the other hand means that that the social world has already been simplified by the operators, in terms of standards and schematizations, why the science have to problematize to get understanding.
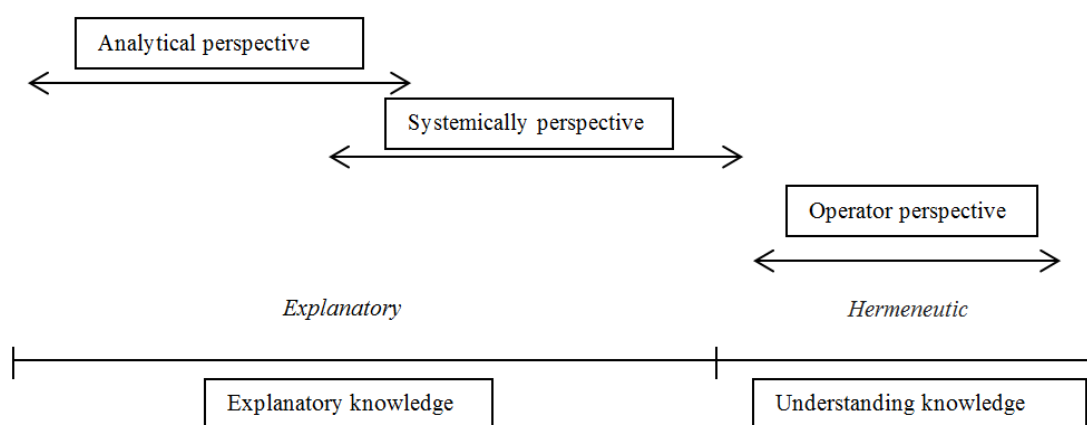


**Figure 10: Understanding and explaining approach, own processing (Arbnor & Bjerke, 1994).**

In the Figure 7 above are the two perspectives of how knowledge could be interpreted. The figure points out that the two perspectives are not two different ways of how to approach knowledge, they overlap each other in some aspects. For the explanatories, the hermeneutical way of problematizing could be essential, especially in a first stage of a study. The scientist can from a hermeneutical problem do general models.

This study about a proposed new taxation system and the consequences is firstly in order of a hermeneutic character. Every private firm has their own strategy for how to deal with the revenues in the firm. This special case is analyzed by the equations 1-19 to try to get understanding of what happens when the taxation laws are changed. The initial chapters of the study are of hermeneutical character where the aim is to get an understanding point of view of which factors that affects the result in a private firm.

The problems that are analyzed would be possible to do out of an explanatory perspective and standardize the collected data. But that is not the aim with the study because of the

complexity in the taxation system. The forest owners also have different objectives of forest ownership; in combination with the complexity in the taxation system a general model would be too simplified. That would result in an invalid result.

## 3.3 Reliability and validity

Irrespective of what kind of empirical material investigated in a study. The researcher seeks to perform a trustworthy study. There are two basic requirements consider in order to establish trustworthiness (Jacobsen, 2002);

1. **Reliability:** The empirical material has to be reliable and the author is always responsible to be aware of the reliability of the study.
2. **Validity:** The empirical material has to be both relevant and valid. The author has to be aware if the study measures what is intended to be measured.

If a study should be accepted as reliable and credible the collected empirical material has to be as correct as possible (Jacobsen, 2002). This statement in literature implies that if another author would do a study of the same type and use the same method he or she should reach the same result. It should therefore be possible to repeat the study and obtain the same result.

Method is a broad concept with many definitions. One way to express the concept is "Social science methodology covers both the organization and interpretation of information and helps us gain better understanding of society". Based on this definition method can be interpreted as a tool that helps us solve stated problems. Under way method could also help us to come up with new knowledge on the subject (Holme & Solvang, 1997).

Holme & Solvang (1997) formulates a number of basic requirements that a method must satisfy:

- There must be consistency with the reality that's being investigated
- The researcher must be able to make a systematic sample of information
- The researcher should be able to use the information in the best way
- The method should be presented in such way that others can check and review the results
- The results will enable new knowledge and awareness for the social conditions that are faced, to make continued research and development possible

There is no study concerning optimal taxation strategy for a general forest owner. Previous studies evaluate different effects of a change in the taxation system assuming a fixed tax rate. The Swedish taxation system is complex and how the forest owner relate to different personal advantages in the system vary with every single person's preferences (Rydin, 2009). Trough the litteruture study it is possible to identify different factors that effects the economic result for a forest owner and how to achieve validity level for the study. Furthermore, focusing on interpreting the Swedish taxation law, given different forest owners characteristics, is of importance to recive a valid result.

The significant difference between what we briefly call the world of thought and an empirical investigation is that an empirical investigation is based on fai empirical data. Regardless of investigation model used is that all investigations go through the following phases, as shown in figure 11 (Jacobsen, 2002).

## 3.4 Ethical aspects

A delicate question for a researcher is the question of ethical aspects of the work conducted, especially when it comes to collecting data from different kinds of people. (Oliver, 2010)When conducting a research project, it is important to recognize and take into account certain ethical considerations (Robson, 2011; Bryman 2011). Something a researcher writes may seem offensive or cause harm, and should therefore be prevented (Oliver, 2010). Ethical aspects that often arise are; confidentiality, informed word of consent, the role of the researcher and consequences of the work (Kvale &Brinkmann, 2009). Central to the collection of data is to treat all sources of information with equal worthiness and respect (Oliver, 2003).

# 4 Empirical study

This chapter will present the empirical bases for the model and in the end of the chapter will the results be presented.

## 4.1 Tax strategy

Tax planning is of importance for a firm to succeed in the long run (Andersson, 1982). Therefore, a taxation strategy has been set up for the two different taxation systems. To make the two systems and the two Owners comparable it is important to work along the same pattern and use the same strategy in both cases (Gerring, 2006).

In the current system the tax strategy will be based on the literature regarding profitable tax management strategies for private firm and on the Swedish forest owner's relationship to taxation and economics. The average taxable income from forest firms is low as the forest owners have a desire to reinvest their profits in the firm (Holmgren & Lidestav, 2005). In accordance with the previous statement and the fact that Swedish forest owners generally use the forest account to deposit profits from the firm, the forest account will be used as much as possible in the model (Seth & Wålstedt, 1984). The tax allocation fund has the same function as the forest account but the owner does not get any interest rate (Rydin, 2009), therfore the tax allocation fund will be prioritized second. The funds retained for expansion is able to allow larger reservations if the capital backing allows it, (Lunden, 2006) and will be third priority. The interest adjustment for self-employed will be the forth in priority. The interest adjustment for self employed will especially be used the last year when dissolved reserves generate large operating profits. This because of the advantages to turn working income into capital income (Håkansson, 2002). Owner 2 who has a work income beside the forest firm uses the interest adjustment for self-employment every year (Lönnstedt & Rosenqvist, 2001). The tax strategies are illustrated in table 6.

Since there are two scenarios that will be compared is it of importance to use the same intial conditions to make them comparable (Gerring, 2006). There is not any literature written about the proposed system but the proposed business fund will be acting as a replacement for forest account, tax allocation fund and funds retained for expansion (Regeringskansliet, 2014). According to the previous chapter the owners will use the business fund in first order and interest adjustment for self-employment in second order. Owner 2 will also use the interest adjustment for self-employment system every year to tax some of the forest income as capital which is profitable (Lönnstedt & Rosenqvist, 2001). The tax strategy for the proposed system is illustrated in table 7.

## 4.2 Forest incomes and costs

The prices for the forest activities are illustrated in Table 6 (Skogsstyrelsen, 2014). The prices of cost for establishing new forest are an average for the cost ten years back in time where every year been corrected with index to be comparable (Barnett & William, 2001). The prices for cutting the different forest types are avear of what the forest industries has been paying per m3 over the last 20 years, where every value is index corrected to todays value (Skogstyrelsen, 2014). From the payments has the cost of cutting been subtractive (Skogstyrelsen, 2012). The time when the different activities are performed in the forest are a

custom set up for the specific property conditions. The time and prices for activities are illustrated in Table 6.

**Table 6: The cost and revenues from forest activities and when they occur  (Skogsstyrelsen, 2014)**

| Year | Scarification 2360 SEK/ha | Plantation 4673 SEK/ha | Cleaning 1 3544 SEK/ha | Cleaning 2 2544 SEK/ha | Thinning 1 329 SEK/m3 | Thinning 2 367 SEK/m3 | Cutting 449 SEK/m3 |
|---|---|---|---|---|---|---|---|
| 1 | x | x | | | | | |
| 7 | | | x | | | | |
| 16 | | | x | | | | |
| 26 | | | | x | | | |
| 27 | | | | | x | | |
| 51 | | | | | | x | |
| 62 | | | | x | | | |
| 65 | | | | | | | x |

## 4.3 Empirical calculation bases

The price of the properties in the study is based on the historical price development from 1998. In Chart 3 the price changes for properties are presented and the average price increase is 5,02 %  (Skogsstyrelsen, 2014).
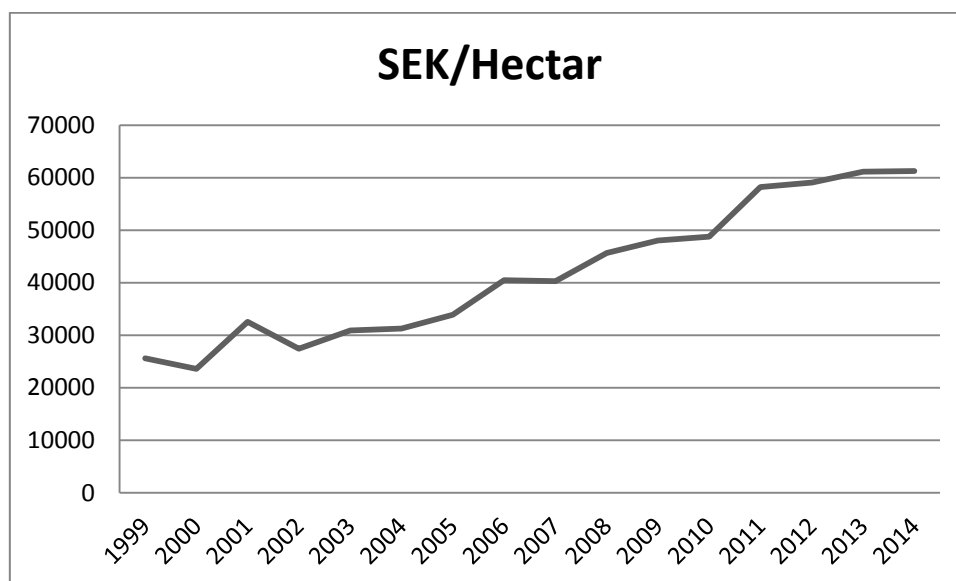


**Chart 3: The price development for forest properties (Skogsstyrelsen, 2014).**

The NIER's long term investigation predictions, and average rates from the last twelve years are used as a base for current interest rate in the model.  The NIER have forecasted a repurchase rate of 4 % and an inflation level of 2 % in a long term investigation from 2011 (Konjukturinstitutet, 2014). As Chart 4 illustrates the average lending rate is 2,8% the last twelve years.
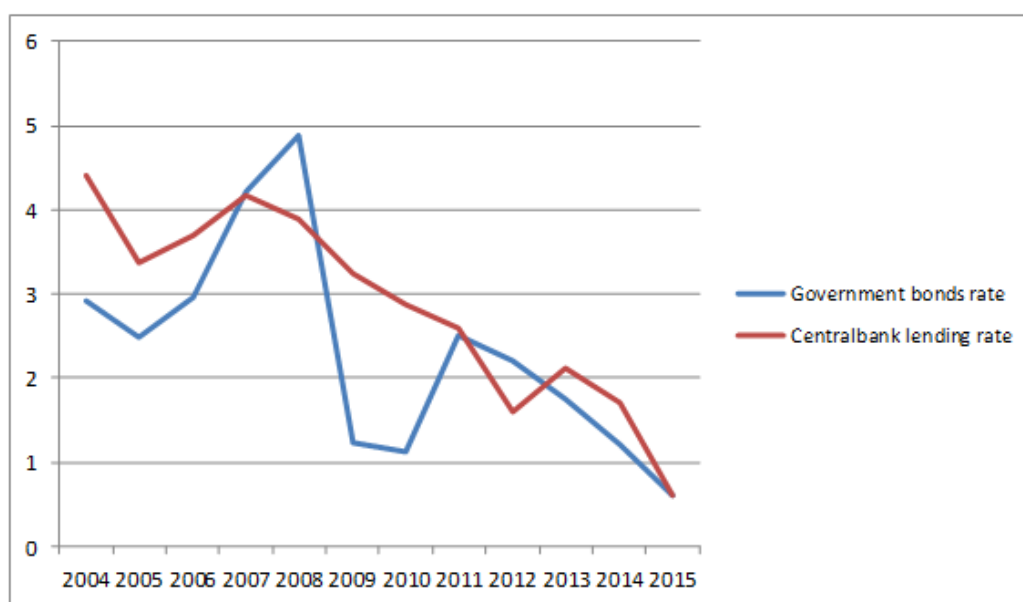
**Chart 4: Goverment bonds and Central bank lending rate (Centralbanken, 2015)**

With the information from the central bank and the long term investigation from NIER the following rate levels are estimated in the study:

- Depositing rate 3%
- Lending rate 6%
- Government borrowing 3,84 %

In a present value calculation the chosen discount rate should amount to a reasonable level for the results to be relevant. In this study an interest rate that is equivalent with the nominal cost of capital has been calculated (Andersson & Lagerqvist, 1994). Chart 4 illustrates the rate from government bonds that are tied up for a ten year period. The average rate for the period is 2,34%, for the same period the yearly yield from the Swedish stock market has been 7,27 % (Stockholm, 2015). To use the stock market as an indicator of cost for capital is to calculate with big risks in the investment (Ross, 2008). With informaton from the central bank, OMX and NIER's long term investigation a nominal discaunt rate has been estimated to 5% before taxes been taken into account.

**Table 7: Input values for the model**

| Input values for the model | |
| --- | --- |
| Yearly ivalue increasing of properties | 5,01% |
| Social security contributions | 28,97% |
| Interest rate of forest account | 3,25% |
| Inflation level | 2% |
| Discount rate | 3% |
| Tax over inflection point 1 | 20% |
| Tax over inflection point 2 | 25% |
| Municipal tax | 32% |
| Capital income tax | 30,27% |
| Loan to value ratio | 50% |
| Interest rate of business fund | 3,25% |

# 4.4 Results

In the following chapter the results from equation (19) are presented. Firstly, the effects of how another income source and choice of cutting strategy affects the present value for the investment will be presented. In the end the development of the equity for the owners with same conditions will be presented.

## 4.4.1 Owner 1 Even cutting strategy

For Owner 1 with even cutting strategy, the property is sold year 20. Chart 5 describes the final result of the investment for Owner 1 with even cutting strategy. The simulating model gives a higher net present value for the current tax system then the proposed system. The current tax strategy gives a net present value of *5 037 158 SEK* while the proposed system yield a net present value of *4 076 861 SEK*. Owner 1 with even cutting strategy does not have any work income beside the forest business why Owner 1 has the possibility to use the interest adjustment for self-employment system the last year and avoid the progressive taxation. The total tax level for the current system over the investment period is 27% while it is 28 % for the proposed system.

## 4.4.2 Owner 1 Uneven cutting strategy

For Owner 1 with uneven cutting strategy, the property is sold year 20. Chart 5 describes the final result of the investment for Owner 1 with uneven cutting strategy. The simulating model gives a higher net present value for the current system than the proposed system. The current tax strategy yields a net present value of *5 375 549 SEK* while the proposed system gives a net present value of *3 230 194 SEK*. Owner 1 doesn't get any work income beside the forest business why owner 1 has the possibility to use the interest adjustment for self-employment system the last year and avoid the progressive taxation. The total tax level for the current system over the investment period is 27% while it is 29% for the proposed system. Chart 5 illustrates the results and due to the large incomes from the forest the first three years and the following paid tax affect the result negative compared to the even cutting system.

## 4.4.3 Owner 2 Even cutting strategy

For Owner 2 with even cutting strategy, the property is sold year 20. Chart 5 describes the final result of the investment for Owner 2 with even cutting strategy. The simulating model gives a higher net present value for the current system than the proposed system. The current tax strategy yields a net present value of *4 996 389 SEK* while the proposed system gives a net present value of *3 806 458 SEK*. The total tax level for the current system over the investment period is 28% while it is 29% for the proposed system. Since Owner 2 receive an income from work of 900 00 SEK and uses the interest adjustment for self-employment does the owner get highly taxed the last year in the progressive taxation system with the current system.

## 4.4.4 Owner 2 Uneven cutting strategy

For Owner 2 with uneven cutting strategy, the property is sold year 20. Chart 5 describes the final result of the investment for Owner 2 with uneven cutting strategy. The simulating model gives a higher net present value for the current system than the proposed system. The current tax strategy yields a net present value of *5 375 549 SEK* while the proposed system gives a net

present value of *2 560 933 SEK.* The total tax level for the current system over the investment period is 28% while it is 31% for the proposed system. Since Owner 2 gets an income from work of 900 000 SEK and uses the interest adjustment for self-employment the owner gets highly taxed the last year in the progressive taxation system with the current system.
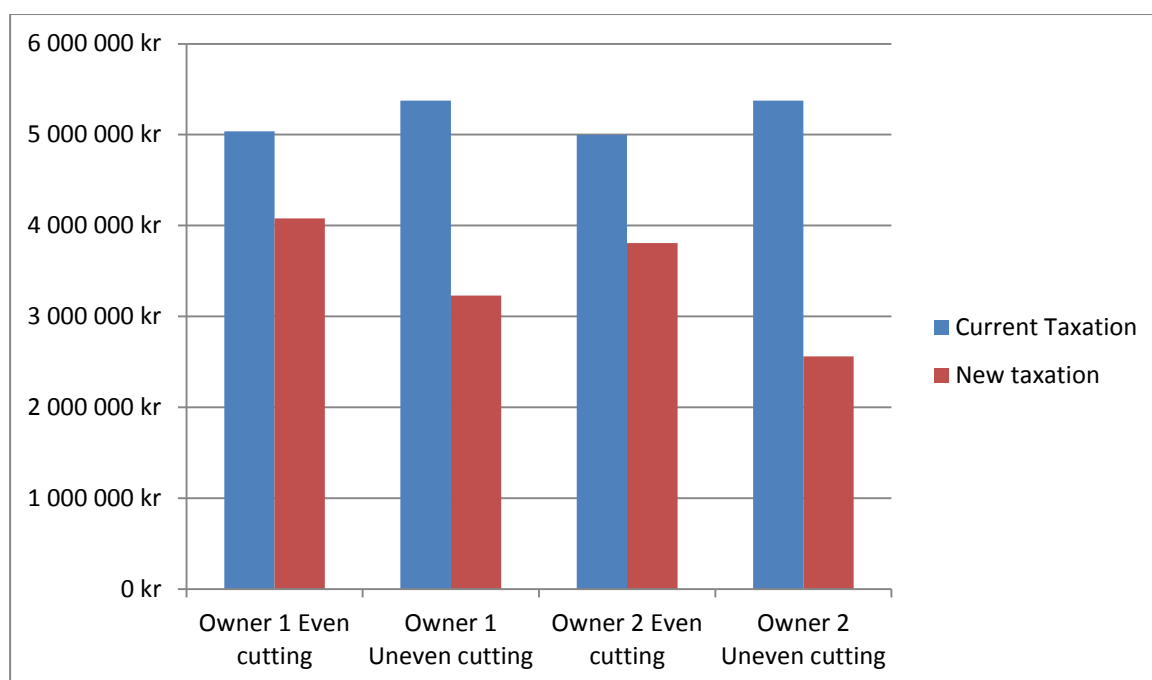


**Chart 5: Results for the different owners.**

## 4.4.5 Equity Owner 1

As Chart 6 illustrates the proposed taxation system affects the possibility of Owner 1 to build up equity in the firm. As the results shows it is harder for the owner to build up equity in the proposed system since the deposition and reservation possibilities of the result are limited compared with the current system. In the proposed system the owner has to declare a taxable income every year and pay taxes which lower the equity. When Owner 1 practises the uneven cutting strategy in the proposed tax system, does the owner suffer liquidity problems some years. This because the owners has not the opportunity to allocate incomes from cutting for years with costs, as planting and cleaning.
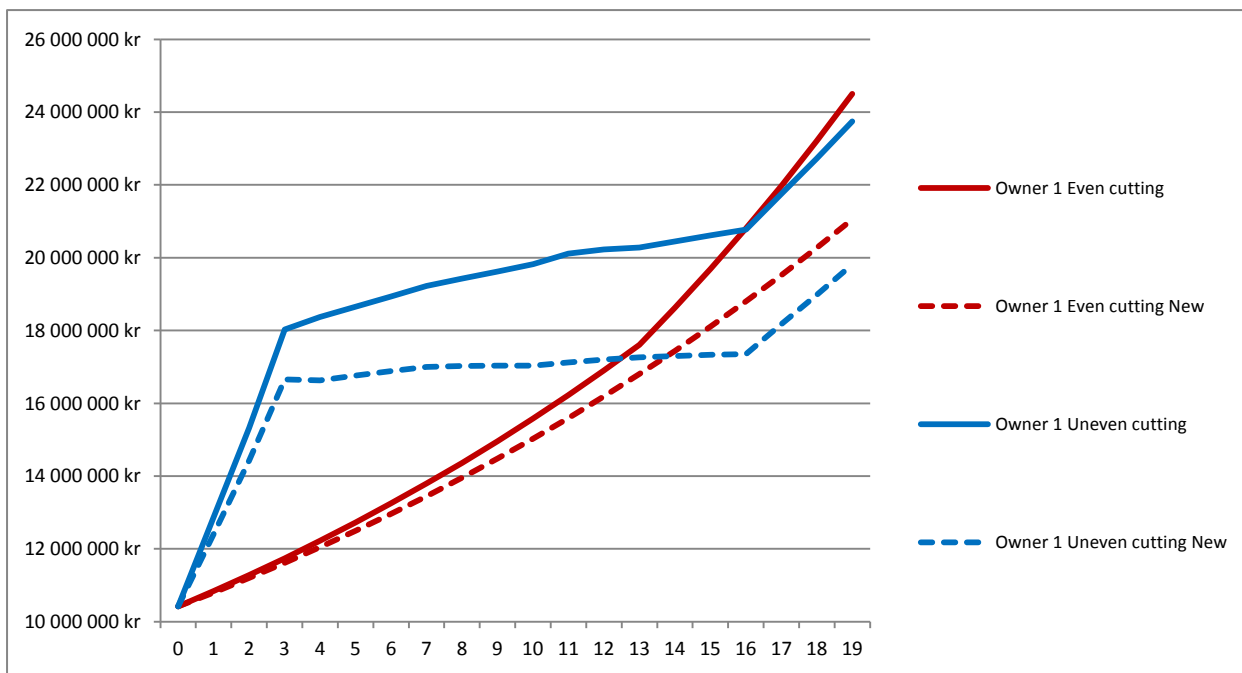
**Chart 6: Equity development for Owner 1**

## 4.4.6 Equity owner 2

As Chart 7 illustrates, Owner 2 also has a better development on equity in the current system than the proposed system. Since Owner 2 uses the interest adjustment for self-employment system, some of the profits get highly taxed in the progressive taxation scale. In the current taxation system the owner avoids that scenario because of the opportunities to reserve the result. When Owner 2 practises the uneven cutting strategy in the proposed tax system, does the owner suffer liquidity problems some years. This because the owner has not the opportunity to allocate incomes from cutting for years with costs, as planting and cleaning.
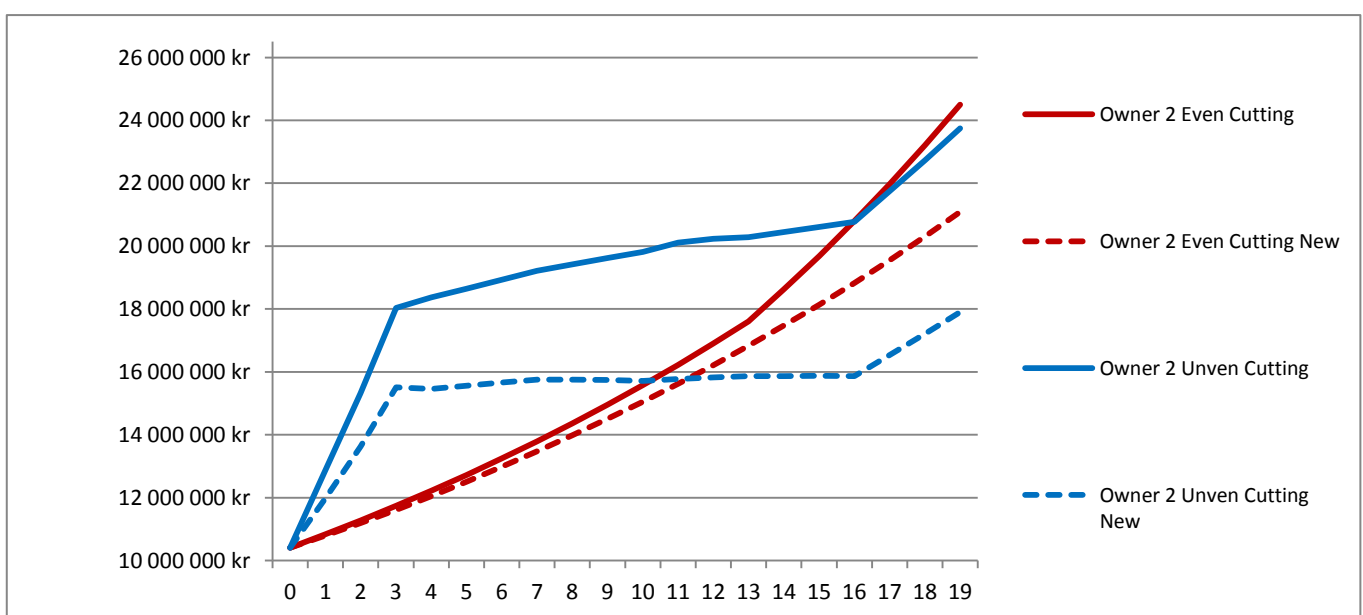


**Chart 7: Development of equity for Owner 2**

# 5 Analysis and discussion

In chapter five, the empirical results are compared, analyzed and discussed by using the basis of selected data and theory. The results reported and analyzed, apply to the specific circumstances set up in this study.

## 5.1 Taxation amount for the two owners

For both Owner 1 and Owner 2 the application of the proposed tax system has a negative impact both on the equity and the total tax level for the period. For Owner 1 is the difference in the total amount of tax level more remarkable. The total tax amount for Owner 1 with uneven annual cutting are 27% and 30% for the current respective the proposed system. When Owner 1 practises an even annual cutting in the forest the average tax rate is of 27 respectively 29% for the current and proposed system. The reason why the tax levels are below 30% is probably because a larger share of Owner 1's taxable income is based on the capital gains of the property where the tax rate is 27%. The total tax rate for Owner 2 with even annual cutting is 28% of the existing system, while tax rate increases to 29% in the proposed system in terms of all payments and tax payments over the period. When Owner 2 practices uneven annual cutting in the forest are the total tax rate 28% for the existing system and 29% with the proposed system in terms of all payments and tax payments over the period. This despite the fact that the starting points for business income and capital is exactly the same for the different owners.

Since the municipal tax is over 30% and the state tax is even higher, it is always beneficial in the model to declare income, as far as possible as capital income where the tax rate is 30%, it reveals the outcome (Eriksson, 2014). For Owner 1 is a large share of the assets untaxed year 20. In the end of the investment period do both owners have the opportunity to declare the dissolved assets as capital income. That is because of capital structure in the firm. Since the investment is by half financed by own capital is larger share declared as capital income year 20. This strategy is of advantage in the study and has also been proved before (Håkansson, 2002). Given this finding it appears that tax planning is essential for a business (Andersson, 1982).

The differences between the current and proposed tax system are most obvious when the annual cutting vary over years. With irregular payments from the forest the possibilities to reserve profits in the proposed system is limited, which affects the results.

## 5.2 Effects of a new tax system

Since Swedish forest owners in general have income beside the forest and reinvest the profits from the forest back in the business (Holmgren & Lidestav, 2005), they have to declare a substantial income the last year if the property is sold. For both of the owners, taxation due to selling the property is of greatest impact for the total amount of taxes paid over the period. The interest adjustment for self-employment system was instituted to give the firm owner an opportunity to reinvest money in the firm and withdraw the money in the future to avoid progressive taxation (Håkansson, 2002). Owner 2 uses the interest adjustment for self-employment system consistently every year to declare forestry income as capital.

The work income beside the forest business is not attributable to the forest business. The study does not focus on their personal finances but if a consistent use of interest adjustment for self-employment has an impact on the taxation opportunities for the forest firm.

The opportunities to own forest land in a share holding company are restricted in Sweden (Rydin, 2009). Therefore the majority of the privatly owned forest land in Sweden is declared in private firms. The new proposal states that taxation should be neutral between different forms of firm (Regeringskansliet, 2014). A criteria for a neutral taxation system is neutrality between different owners (Connolly, 1999). Shareholding is taxed at a level of 22% which means profits can be reinvested after a tax of 22% (Rydin, 2009). In the current system the owner of a private firm has the same opportunity with funds retained for expansion. Chart 5 shows that Owner 1 in the proposed system is forced to declare some of the profits as work-income taxation in the progressive system at a tax level of 57%.

The optimal taxation of forest from a fiscal point of view has been discussed (Holmgren, 2005). If the proposed taxation system is to prefer from a fiscal point of view is difficult to determine based on the results in this study. The results in Chart 5 indicate that an even cutting strategy generates a higher present value of a forestry investment than uneven cutting when the proposed taxation proposal is applied. The current tax system gives the business many options to postpone taxation of the surpluses from the firm (Lunden, 2006). Therefore the results indicate that the current taxation system is to prefer when the cuttings in the forest are irregular over time. Depending on the owner's goal with the property the reservation options vary. The goals with forest owning could be for example: generating a positive cash flow for the owner, build up capital for succession of ownership or achieving a certain increase of standing volume (Lönnstedt, 1997). The different goals require different strategies for how to deal and deposit the annual results from the forest (Lönnstedt & Rosenqvist, 2001). In the proposed system the options to deposit and allocate profits are limited. The two owners have to declare a share of in the work-income taxation system if the capital structure for interest adjustment for self-employment is insufficient. Regarding that statement, and the fact from the results that a strategy with even annual cutting in the forest is more beneficial for the owner in the proposed tax system. The fiscal taxation of forest will in this case be moving from taxation of timber sales to taxation based on the yearly increment in the forest value as was practiced in Finland (Koskela & Ollikainen, 2009).

## 5.3 Sensitivity analysis

This section outlines the economical impact due to hypothetical changes in the model's input variables in the model.

### 5.3.1 Annual price changes for properties

There are remarkable differences in the profitability of the investment if the price development for forestry properties would be changed in equation (19). As the total average effective tax rates presented in the results show, the tax rate for the investments are similar to the tax rate when selling properties. Given that information it is clear that the revenues from the property sale are essential for the profitability of the investment. As the sensitivity report illustrates in table 8 the net present value for the investment vary remarkably if there are changes in the value increment for the property.

**Table 8: The effect of an increment of annual value growth for the property.**

| | Uneven cutting | | | | Even cutting | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Owner 1 | | | | Owner 1 | | | |
| | | Current | | Proposed | | Current | | Proposed |
| 3% | - | 3 490 695 | - | 5 644 248 | - | 3 831 183 | - | 4 794 129 |
| 5% | | 5 375 549 | | 3 230 194 | | 5 037 158 | | 4 076 861 |
| 7% | | 18 357 312 | | 16 216 845 | | 18 020 223 | | 17 061 484 |
| | Owner 2 | | | | Owner 2 | | | |
| | | Current | | Proposed | | Current | | Proposed |
| 3% | - | 3 490 695 | - | 6 316 032 | - | 3 855 853 | - | 5 058 833 |
| 5% | | 5 375 544 | | 2 560 933 | | 4 996 389 | | 3 806 485 |
| 7% | | 18 357 312 | | 15 549 087 | | 17 970 579 | | 16 793 524 |

## 5.3.2 Changed discount rate

The discount rate for the investment is the yield requirement in the capital market. A theoretically correct discount rate should reflect a capital market where it is possible to both procure and place capital to the given interest rate (Andersson , 1997). Since the investment is financed by 50% loans and 50% equity capital, the annual surpluses are affected by the interest expenditure in the loans. As table 9 illustrates, the investor obtain to a negative result when the uneven cutting strategy is applied in the proposed tax system in equation (19). That is a result of the high annual cost of capital which leads to liquidity problems some years. The liquidity problems reduce the equity which causes a low net present value year zero.

**Table 9: The effect if the interest rate would be changed**

| | Uneven cutting | | | | Even cutting | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Owner 1 | | | | Owner 1 | | | |
| | | Current | | Proposed | | Current | | Proposed |
| 3% | - | 3 490 695 | - | 5 644 248 | - | 3 831 183 | - | 4 794 129 |
| 5% | | 5 375 549 | | 3 230 194 | | 5 037 158 | | 4 076 861 |
| 7% | | 18 357 312 | | 16 216 845 | | 18 020 223 | | 17 061 484 |
| | Owner 2 | | | | Owner 2 | | | |
| | | Current | | Proposed | | Current | | Proposed |
| 3% | - | 3 490 695 | - | 6 316 032 | - | 3 855 853 | - | 5 058 833 |
| 5% | | 5 375 544 | | 2 560 933 | | 4 996 389 | | 3 806 485 |
| 7% | | 18 357 312 | | 15 549 087 | | 17 970 579 | | 16 793 524 |

# 6 Conclusions

This chapter contains the conclusions of this study. The aim of this study has been to understand the economic implications of a new taxation system on a forest investment. In order reach the aim, answers to the following research questions have been sought:

- What is the effect in the net present value of a forest investment when a new taxation system is applied?

- What is the effect on the equity development due to different reservations and depositions possibilities of the result for a private firm?

The study compares two different owners with specific conditions and the economic result when they invest in a specific forest property where two different tax systems are considered. The new taxation system implies limited possibilities to reserve and deposit annual surpluses. When cutting in the forest occurs irregularly over the years, the owner obtains fluctuating incomes. The year with large cuttings gives the owner a high income. The new taxation system entails a possibility to allocate 40 % of the profit to the following years. This implicates a higher taxable income which results in a higher annual tax payment for the firm. Moreover, the owner suffers of liquidity problems during the years with high costs for planting and cleaning, that the owner does not face when the existing tax system is applied.

High annual tax payments have negative effect on the net present value for the investment. When calculating the net present value of a forest investment it is clear that the annual price increment of properties is central if the investment is profitable. Applying two different tax systems have an effect on the baseline result for an investment in forestry business. However, the effect of taxation is not as influential on the profitability of the investment as the annual price increment.

The study reveals that there are benefits due to the reservation and deposition possibilities with the current tax system compared to the proposed system given a forest investment. An even cutting strategy in the forest is to be preferred in case the proposed system is applied since it gives the owner an even income during the years.

The equity can be seen as the company's ability to survive over time, and to cover losses in difficult times. In the scenario where the proposed tax system is applied it is difficult for the owner to build up equity in the company because the surpluses that are to be reinvested are taxed progressively to a greater extent than they are with the existing system.

Further studies within this research area regarding forest investments and taxation are necessary. Studies regarding optimal loan level for a forest investment would be interesting since the income from the forest are irregular but the cost for capital has to be paid every year.

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# Appendix 1

Model of how taxes and reductions are calculated.

| År 1 | |
|---|---|
| **Förvärvsinkomster** | |
| *NRV* | 261 364 |
| *Tjänst* | - |
| *Fastställd förvärvsinkomst* | 261 364 |
| *Grundavdrag* | 23 912 |
| **Beskattningsbar förvärvs inkomst** | **237 452** |
| **Kapital inkomster** | |
| *Räntefördelning* | 37 386 |
| *Kapitalvins/förlust* | |
| *Övriga kapital inkomster* | |
| **Överskott kapital** | **38 134** |
| **Skatteuträkning** | |
| Kommunalskatt | 75 985 |
| Statlig skatt på förvärvsinkomst | FALSKT |
| Brytpunkt 1 | - |
| Brytpunkt 2 | - |
| Förvärvsinkomstskatt | 75 985 |
| Statligskatt på kapital | 11 440 |
| *Egenavgifter* | |
| Underlag | 261 364 |
| Underlag slutgiltig | 64 616 |
| Återförda | |
| Slutgiltiga | 64 616 |
| Jobbskatteavdrag | 18 111 |
| **Slutlig debitering** | **133 930** |
| **Slutlig inkomst** | **165 568** |
| **Skattesats** | **56%** |
| Nuvärde skatt | 128 497 |
| Nuvärde inkomst | 158 851 |
| Total inkomst | 299 498 |
| Brytpunkt 1 | 429 216 |
| Brytpunkt 2 | 614 652 |

| Tax.Inkomst | 261 364 |
|---|---|
| Inkomst NRV | 261 364 |
| Inkomst Tjänst | - |
| Komm.skatt | 0,32 |
| Prisbasbelopp | 46 298 |
| Avsättning pens. | 81 023 |
| Inflationstakt | 1,04 |
| Kapitalskatt | 0,30 |
| Pensionsavgift | 0,07 |

| *Grundavdrag* | |
|---|---|
| **Inkomst:** | **Avdrag** |
| - | |
| 45 835 | 19 584 |
| 45 835 | |
| 125 930 | 53 430 |
| 125 930 | |
| 143 986 | 35 649 |
| 143 986 | |
| 364 827 | 23 912 |
| 364 827 | |
| Högre | 13 565 |
| **Grundavdrag** | **23 912** |

| *Jobbskatteavdrag* | |
|---|---|
| **Inkomst:** | **Avdrag** |
| - | |
| 42 131 | 75 985 |
| 42 131 | |
| 125 930 | 27 157 |
| 125 930 | |
| 324 085 | 18 111 |
| 324 085 | |
| Högre | 20 023 |
| **Jobbskatteavdrag** | **18 111** |

# Appendix 2

Model of how annual equity is calculated

| År 1 | | | | | |
|---|---|---|---|---|---|
| **Anläggningstilgångar** | | | **Eget Kapital** | | |
| **Immatriella tillgångar** | | | **Tillgångar - Skulder** | | 10 627 994 |
| **Byggnader markanläggning** | | | *IB* | | 10 415 400 |
| **Mark och tillgångar, ej avskr** | 20 830 800 | | *Förändring* | | 212 594 |
| *IB* | *20 830 800* | | *UB* | | 10 627 994 |
| *Förändring* | | | **Obeskattade reserver** | | - |
| *UB* | *20 830 800* | | *IB* | | 212 594 |
| **Maskiner** | | | *Förändring* | | |
| **Övrigt** | | | *UB* | | |
| *Totalt* | *20 830 800* | | **Skogskonto** | | |
| **Omsättningstillgångar** | | | *IB* | | 212 594 |
| **Lager** | | | *Förändring* | | |
| **Kundfodringar** | | | *UB* | | 212 594 |
| *Skattefodringar* | - | | **Avsättningar** | | |
| | | | **Förbetald skatt** | | - |
| **Övriga fodringar** | | | *IB* | | - |
| **Kassa bank** | 212 594 | | *Förändring* | | |
| *IB* | | | *UB* | | - |
| *Förändring* | 212 594 | | **Årets resultat** | | - |
| *UB* | 212 594 | | *Totalt* | | *10 627 994* |
| *Skogskonto* | 212 594 | | **Skulder** | | |
| *IB* | - | | **Låneskulder** | | 10 415 400 |
| *Förändring* | 212 594 | | *IB* | | *10 415 400* |
| *UB* | 212 594 | | *Förändring* | | |
| *Årets resultat* | - | | *UB* | | *10 415 400* |
| | | | **Skatteskulder** | | |
| *Totalt* | 212 594 | | *IB* | | |
| | | | *Förändring* | | |
| **Balans** | **21 043 394** | | *UB* | | |
| | | | **Lev skulder** | | |
| | | | **Övriga skulder** | | |
| | | | *Totalt* | | *10 415 400* |
| | | | | | |
| | | | **Balans** | | **21 043 394** |

# Appendix 3

Model of how annual taxable income is calculated.

| Intäkter | Kr |
|---|---|
| **Averkningsrätt** | |
| *Gallring 1:a* | 61 906 |
| *Gallring 2:a* | 103 693 |
| *Slutaverkning* | 658 715 |
| **Summa** | **824 313** |
| *Skogskonto* | *205 902* |
| *Max* | *494 588* |
| *Skogsavdrag* | *-* |
| *Max för året* | *412 157* |
| *Max utrymme* | *10 415 400* |
| **Intäkter** | **618 411** |
| **Kostnader** | |
| **Röjning 1** | |
| Antal | 5 |
| Kostnad/antal | 3 544 |
| Kostnad | 17 517 |
| **Röjning 2** | |
| Antal | 2 |
| Kostnad/antal | 2 544 |
| Kostnad | 4 856 |
| **Markberedning** | |
| Antal | 4 |
| Kostnad antal | 2 360 |
| Kostnad | 10 251 |
| **Plantering** | |
| Antal | 4 |
| Kostnad antal | 4 673 |
| Kostnad | 20 297 |
| **Drivningskostnader 1:a Gallring** | 46 094 |
| **Drivningskostnader 2:a Gallring** | 48 249 |
| **Drivningskostnader Averkning** | 158 684 |
| **Summa** | **305 949** |
| **Rörelse resultat** | **312 462** |
| **Skogskonto** | |
| Uttag från skogskonto | - |
| Krav återföring från skogskonto | - |
| *Max uttag* | *-* |
| Ränteintäkter | |
| Räntekostnader | 312 462 |
| **Resultat efter finansiella poster** | **0** |
| | |
| **Räntefördelning** | |
| *Möjlihet att räntefördela* | *936 344* |
| *Inkomst Tjänst* | *-* |
| *UttagTjänst räntefördelning* | *-* |
| Uttag räntefördelning | - |
| **Resultat efter räntefördelning** | **0** |
| | |
| **P-Fond** | |
| Avsättning P-Fond | - |
| *Max* | *0* |
| Uttag P-Fond | |
| *Max* | *-* |
| Krav Återeföring P-Fond | |
| **Resultat efter P-Fond** | **0** |
| | |
| **E-fond** | |
| Avsättning E-Fond | - |
| *Max* | *13 353 584* |
| *För ett noll resultat* | *0* |
| Återföring E-Fond | |
| *Max* | *-* |
| Skatt E-fond | - |
| Återfördskatt | - |
| **Resultat efter E-fond** | **0** |

# Appendix 4

The forest management plan that are used in the study.
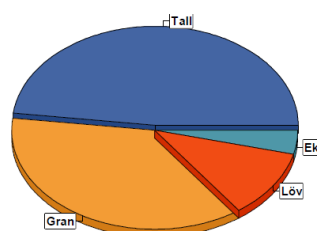
## Sammanställning över fastigheten

### Arealer

| | hektar | % |
|---|---|---|
| Produktiv skogsmark | 366,2 | 71 |
| Myr/kärr/mosse | 2,0 | <1 |
| Berg/Hällmark | 19,7 | 4 |
| Inäga/åker | 105,9 | 20 |
| Väg och kraftledning (linjeavdrag) | 9,1 | 2 |
| Annat | 14,2 | 3 |
| Summa landareal | 517,1 | |
| Vatten | 0,0 | |
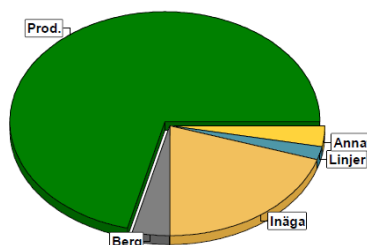
### Virkesförråd

| | m³sk | % |
|---|---|---|
| Tall | 25073 | 48 |
| Gran | 19147 | 37 |
| Löv | 5898 | 11 |
| Ek | 1958 | 4 |

Totalt
m³sk
52077

Medeltal
m³sk per hektar
142

### Bonitet

Fastighetens medelbonitet är beräknad till

m³sk per ha
7

### Tillväxt

Tillväxt för perioden 2015 - 2024 beräknad med hänsyn till föreslagna åtgärder

m³sk per år
2142

## Skogens fördelning på åldersklasser

| Åldersklass | Areal | | Virkesförråd | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ha | % | Totalt m³sk | m³sk /ha | Tall % | Gran % | Löv % | Ek % |
| Kalmark | 10,3 | 3 | | | | | | |
| - 9 år | 20,4 | 6 | 36 | 2 | | 98 | 2 | |
| 10 - 19 | 63,6 | 17 | 2290 | 36 | 32 | 56 | 12 | |
| 20 - 29 | 53,5 | 15 | 6708 | 125 | 24 | 59 | 17 | |
| 30 - 39 | 54,3 | 15 | 7023 | 129 | 56 | 31 | 14 | |
| 40 - 49 | 45,7 | 12 | 9063 | 198 | 38 | 52 | 10 | |
| 50 - 59 | 12,9 | 4 | 3136 | 243 | 56 | 39 | 4 | |
| 60 - 69 | 9,8 | 3 | 2548 | 260 | 20 | 62 | 11 | 7 |
| 70 - 79 | 10,7 | 3 | 2060 | 193 | 25 | 14 | 39 | 22 |
| 80 - 89 | 8,2 | 2 | 1917 | 234 | 50 | 34 | 16 | |
| 90 - 99 | 26,1 | 7 | 5925 | 227 | 67 | 26 | 4 | 3 |
| 100 - 109 | 2,3 | 1 | 496 | 216 | 22 | 37 | 22 | 19 |
| 110 - 119 | 8,9 | 2 | 1785 | 201 | 68 | 14 | 8 | 10 |
| 120 + | 38,2 | 10 | 8576 | 225 | 69 | 16 | 6 | 9 |
| Lågprodskog(E) | 1,3 | | 117 | 90 | | | 40 | 60 |
| ÖF/Skikt | [10,6] | | 397 | 37 | 100 | | | |
| Summa/Medel | 366,2 | 100 | 52077 | 142 | 48 | 37 | 11 | 4 |