

UNIVERSITY OF SOUTHERN DENMARK

MASTER THESIS

Danish Dairy Farms Optimal Target Ratio

Danske Mælkeproducenters Optimale Mål for Gældsprocent

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Declaration of Authorship

I, Mikkel Mortensen, declare that this thesis titled, “Danish Dairy Farms Optimal Target Ratio” and the work presented in it are my own. I confirm that:

- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Signed: *mikkel mortensen*

Date: 02-01-2017

“It turns out that advancing equal opportunity and economic empowerment is both morally right and good economics, because discrimination, poverty and ignorance restrict growth, while investments in education, infrastructure and scientific and technological research increase it, creating more good jobs and new wealth for all of us.”

Bill Clinton

“Most of the people in the world are poor, so if we knew the economics of being poor, we would know much of the economics that really matters. Most of the world’s poor people earn their living from agriculture, so if we knew the economics of agriculture, we would know much of the economics of being poor.”

Theodore W. Schultz

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Abstract

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Danish Dairy Farms Optimal Target Ratio

by Mikkel Mortensen

The Danish agriculture has for many years mainly been financed with debt. This is not in it self problematic. Though, when one tends to keep getting debt and not necessarily focussing on gaining equity, bankruptcy comes closer and closer. Focusing on a target leverage ratio, may help farmers to gain a better economy. This thesis focuses on dairy farms thought the tests and ideas are easily applicable to the rest of the agriculture. The tests applied in this thesis shows that farmers tend to be around 5.3 to 28.3 percentage points above their target leverage ratio. A way to get closer to the target ratio is by looking at the average costs per cow. In this thesis we find that there is a potential of saving around 10,000 DKK per cow on average. This thesis also seeks to propose a new way of financing the Danish agriculture in order to run the farms more as businesses rather than lifestyles. The perfect result would perhaps be a combination of business and the lifestyle of farming.

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Chapter 1

The Danish Agriculture

1.1 Introduction

Denmark has a long and proud history and tradition when it comes to the agricultural industry. Today the Danish agriculture exports more than 152 billion DKR. a year and employs more than 170.000 workers (Danish Agriculture & Food Council, 2016). With this being 24 % of the total export, and thereby almost 1/4 of the total export, the agricultural industry is perhaps the largest industry in Denmark.

With this "pressure" on its shoulders, the agricultural industry needs to be a front runner, not only with the products it provides but also financially. Most of the Danish farms are personally owned. This means that equity is perhaps not what there is most of, when starting a farm. As a result hereof many farms today has a lot of debt. Having a lot of debt could result in bankruptcy. New ways of financing the farms, could lead to avoiding financial distress, bankruptcy, and possible takeovers.

Farms are usually, financed with mortgage loans. The average farm costs around 40 million Dkr. (The Danish Growth Fund, 2013). This is just the amount you would need to start a new farm. What this means is, that a young man who wants to start his own farm, needs a way of financing 40 million Dkr., today after the financial crisis this has become more difficult. There is a need for the younger generation to takeover for the older generation. Surely this is difficult since the mortgage providers and banks is not that fond of lending young men or women this much money, when they practically do not have any compared to the amount they need.

New ways of financing or rather new ways of helping the farmers financially would have a great impact on this problem. How can this problem be solved, when in fact many farmers and newly educated farmers have an idea of being independent, which in this case would mean having a lot of money or actually getting the loans needed to start a farm. A possible way of doing this is by private equity financing, like the AP-model (see section 2.2) does it. Perhaps another way of private equity financing will be of great help and use, not only to the new farmers but also the current farmers.

1.2 Problem Statement

This thesis seeks, to enlighten new opportunities for Danish farmers to strengthen their capital structure, their bargaining power, when the need of external financing occurs, and lastly for new ways of financing their lives work.

To do this, the thesis will work around certain areas of corporate finance. In section 2.1 the thesis will have a look at the capital structure of the personal owned farms. The section will also describe the trade-off theory. It is assumed before hand that the trade-off theory is dominant, since most personal owned firms are heavily relying on external financing. Section 2.2 describes the basics of private equity. Also, this section will describe the AP-model, which has opened up farming to private equity financing. Section 2.2.2 will define private equity in a different way, which will be used later on in the empirical part of this thesis. This different way of defining private equity, will let the thesis work around the pecking order theory which will be described in section 2.2.3.

The more empirical part of this thesis will be in chapter 3. Section 3.1 will have a look at the changes of the capital structure, which private equity might incur. Section 3.2-3.3 will then have look at the probabilities of takeovers and financial distress with and without private equity. The hope with this section, is to see whether or not private equity has a positive effect on the probabilities of takeovers and financial distress. If these probabilities or risks of takeovers and financial distress is lowered, it would imply that the farmers or the owners would have greater bargaining power, when on the look for external financing.

Chapter 4 will be a discussion of the results. More specific, section 4.1 will discuss the results of the empirical part of the AP-model versus the re-defined private equity model. Section 4.2 will discuss the possibilities of implementing these tests on other parts of the agriculture. And lastly chapter 5 will be the conclusion.

1.2.1 Scope

The thesis will consist of two parts. The first part will focus mainly on theory. The theoretical part will explain what is being looked at and how the theories can be implemented on the agriculture, some minor empirical tests will also be made in order to prove some early hypothesis.

The second part will mainly focus on empirical tests, in order to see if there is some challenges. Also, the empirical part will look to see if these challenges can be solved with the ideas stated throughout the thesis.

To do the empirical part, certain data is needed. The data, which will be provided by SEGES P/S, will consist of financial statements and balance sheets.

As stated above, section 4.2 will discuss the possibilities of implementing these tests on other parts of the agriculture. The reason for this is that the thesis will limit its analysis to focus on the dairy farms. In July 2015, 86 % (snapshot, may need to rephrase or find new source) of the Danish dairy farms had a liquidity deficit (Jyllands Posten, 2015). This is a combination of lower income and a high debt. This scenario is also relevant when it comes to pig farmers. A part of it being an interesting part of the agriculture, the thesis will focus on the dairy farms as to accommodate SEGES P/S wish.

Chapter 2

The Capital Structure

2.1 Capital Structure

Personal owned farms is the preferred way of ownership, within the Danish agriculture, as can be seen below in figure 2.1. For many years, the access to farm land has been limited through law. This law has prevented certain company forms, from owning farm land. This changed not so long ago.

In 2014¹ the law in this area was liberalized. This meant that farmers has the possibility of changing the company form. The law change has given the farmers an opportunity to become attractive for the investors. Also, by becoming attractive to the investors, new opportunities arise in terms of debt and the companies net worth and thereby perhaps even work towards a healthier economy.

Farm land is a unique economic good. The reason for this is that first of all you can not move the farm land from England to Denmark, neither is it sure you can grow the same crop, in other words farm land is not a perfect substitute. This is one reason for which the demand for farm land is relative low, even after the law changes.

One thing to keep in mind, is the fact that most farm owners has only been able to obtain debt, whenever a new investment had or has to be made. This fact is perhaps the most important part of this section.

¹For more on this law change visit the ministry of environments and food of Denamrks website (<http://naturerhverv.dk/landbrug/arealer-og-ejendomme/landbrugsloven/aendring-af-landbrugsloven-pr-1-januar-2015/>)

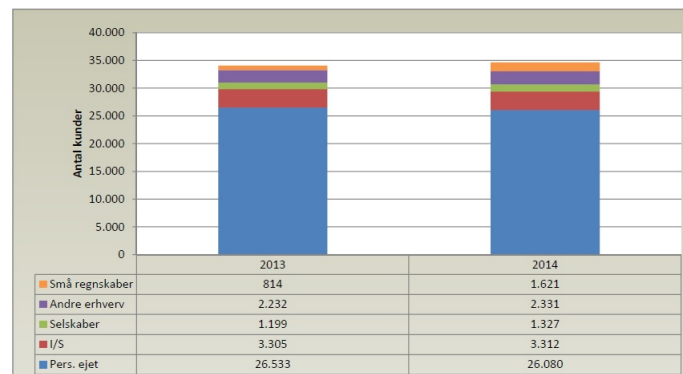


FIGURE 2.1: Development of amount of customers in Ø90 for DLBR companies, which have had an extract in the last 2 years. The analysis is organized according to company type, which is represented in the Ø90 database.

2.1.1 Market Analysis

Before looking into the optimal capital structure, an analysis of the agricultural market is in place. The analysis will of course focus on dairy farms since this is the branch of the agriculture this thesis focus on.

For this analysis the PESTEL model will be applied. For this market analysis Andersen, (2016b) Gade et al., (2013) and Andersen, (2016a) has been applied to give an overview of the situation the Danish farmers are facing.

2.1.1.0.1 Political The political decisions effect the agriculture either for the better or for the worse. In 2015 the milk quotas was phased out, which meant that overproduction was now possible, and as it goes with supply and demand, the effect hereof has been falling milking prices. This has had a negative effect and of course will take some time to adapt to.

There is constantly new regulations when it comes to the environment, nature and the welfare of animals. Regulations which farmers has to accommodate to in order to not break any laws. These regulations of course also affects the farms and what they are able to produce and their costs.

There is also a increasing political focus on livestock production, such as the distance requirements. The politics is of course very much made in Denmark, though many of the regulations are made in the EU which the Danish state then incorporate into Danish law in order to live up to the demands made by the EU. One could say that many of the regulations are not always in the best interest of the Danish farmers, but rather in the interest of other EU farmers.

2.1.1.0.2 Economy In Denmark there is a very high price on farming soil, the price has of course fallen after the financial crisis, which has had negative impact on the farmers. In contrast to the high farm soil prices in Denmark, one can mention the lower farm soil prices in eastern Europe, which leads to the higher competition which is a factor that comes from eastern Europe. In general high costs seems to effect the Danish agriculture. It would seem as though the Danish farmers has trouble limiting the costs. A reason for this may be that farmers in Denmark tend to do farming as a lifestyle not necessarily a business. This means that costs are not of high focus as long as the farmer can get by.

2.1.1.0.3 Socio-cultural The socio-cultural factors are of high importance to farmers as to what they should focus on. Organic foods are of very high demand in the society. Workers will have an influence, since they will demand a better working environment in order to keep their motivation for working high. Ones image and values are perhaps of great importance to the society, here the thought is the welfare of the livestock is of greater importance to customers, so higher quality demands from the society to the farmers.

2.1.1.0.4 Technology Highly specialized technology is being or is developed, these machines could be bigger and highly effective milking machines for one. These machines will help the farms becoming more automated which in the long run should decrease the costs for workers though costs maintenance will increase at the same time. The maintenance cost should not be as big as the cost for a worker, otherwise it would not make sense to invest in the technology. New technology is for the most part of very high value to farmers.

2.1.1.0.5 Environment Denmark has one of the lowest carbon dioxide emissions when it comes to the milk production, therefore it would be of value to the environment to keep the production in Denmark. As stated earlier customers seems to focus more and more on quality, which environment friendly milk is a good example of. The milk production has increased over the last twenty years though the environmental impact has been reduced.

2.1.1.0.6 Law An unexploited potential market for bio-energy from cattle fertilizer is a possibility in the future, though this has been curbed since the law is not yet open to this kind of usage.

2.1.2 The Optimal Debt Ratio

When thinking of capital structure, one should already be thinking of the Modigliani-Miller theorems. In a perfect world, having debt or not having debt does not make a difference. But as many knows our world is not perfect. The question which we will be focusing on is, what is the optimal debt ratio?

The trade-off theory has its roots in the Modigliani and Miller theorem. This theorem states that when in a perfect market, that is with no frictions, debt pays no role at all. However, as stated earlier our world is not perfect, which means that we have an imperfect market. As Myers, (1977) and Modigliani and Miller intuitively explains when taxes exists, a tax advantage will exist. Now Myers asks the question, if there is a tax advantage to having debt, then why does one not just keep borrowing money?

Myers does in fact answer this question, but before returning to this question let us have a short look at the Danish dairy farms. One big issue of the Danish dairy farms is that their company is self owned. As stated earlier this means that the farmers, especially when starting the company, is highly dependent on debt. The farmers will therefore borrow as much as possible, in order to start their company and run it. The limit of what they can borrow is mainly set by the bank and mortgage providers. In other words there is a lack of economic perspective with corporate eyes. This is of course not meant as an insult, but merely as a statement of the obvious, a farmer does not have the equity, unless one were a millionaire, to self-finance the whole or part of the company when starting. The lack of a corporate view may have a negative influence on the farms overall value and thereby also the income, which is needed in order to strengthen ones position and ones equity. This thesis will later on try and explain that the term "borrow as much as one can" has been, in the agriculture, used perhaps a bit too directly.

Myers, (1977) explains that there is a trade-off of debt, but only to a certain point. The idea of Myers' theory is that one can borrow as much as one can to maximize the firm value, to this certain point. If one borrows more than this point the firm value will decrease, even though there is a tax advantage. This decrease will at some point lead to financial distress and perhaps even to bankruptcy. In short there is a trade-off but this trade-off advantage will decrease at some point. Of course this is a short overview of the theory, but it should suffice as to understand the basics of the theory.

Though this theory by Myers, (1977) is likely to be the one that farmers in Denmark is following, though not knowingly, it is very difficult to calculate empirically. Therefore this thesis will find an optimal debt-ratio by looking at another theory, which is in balance with the trade-off theory,

though perhaps not as precise. This thesis will concentrate on the theory of target capital structure by Hovakimian et al., (2004)

According to Hovakimian et al., (2004) there exists some target debt-equity ratio. What Hovakimian et al., (2004) explains is that, a firm operates under certain circumstances. Under these circumstances a firm either issues debt, equity or both. A firm will then operate towards a target capital structure. Though, it's important to know that the firm is not always at level with this target, due to different circumstances. Hovakimian et al., (2004) tries through regressions to determine these targets. This thesis will concentrate on debt issued, since this for many years has been perhaps the only possibility, and to many farmers today is the only possibility of financing.

This thesis will focus on the equation below, which is the same as in Hovakimian et al., (2004). This equation has proven eligible in determining the target ratio in the corporate world. We need to try and implement this corporate model into the agriculture.

$$Leverage_t = \alpha + \beta Z_{t-1} + \xi_t \quad (2.1)$$

The dependent variable in Hovakimian et al., (2004) is post issue leverage and is calculated as $(pre-issue\ debt + net\ debt\ issued) / (pre-issue\ assets + net\ debt\ issued + net\ equity)$. In this thesis the dependent variable will be leverage which is calculated as $(Debt\ this\ year) / (assets\ from\ year\ before + debt\ issued\ this\ year + net\ equity)$.

The explaining variables will be as follows. Market-to-book ratio will be set to 1. The reason for this is that it is assumed that $marketvalue = Bookvalue$. Now why assume this? First, assets are being set as fair value, more and more often, which is why one can conclude that a farm is perhaps not worth more than the components in the company. By setting the ratio equal to 1, one relies on the annual report being trustworthy. The next variable is the return on farming assets. We use the firm size, which is set as 4 groups. These 4 groups is, "Tiny" which consists of a livestock lower than 100. "Small" which has a livestock between 100 and 200. "Medium" which has a livestock between 200 and 300 and "Large" which consists of a livestock above 300. Now, one could have taken the lagged value of the livestock, though to make this analysis more comparable to what SEGES provides the choice has fallen on making these dummy variable which represents intervals of livestock. Also being used in the regression is the tangible assets ratio, selling expenses which only consists of the administrative fees over total sales, the reason for this is that most of the dairy farms are part of a co-operative dairy and therefore the costs of selling is already taken care of in the price which is given for the milk and therefore not observable. Net debt issued and issue size are the two last variables which is

included in the regression.

Before going on let us have a look at how some of these variables are calculated:

$$\begin{aligned} \text{Return on farming assets} \\ (\text{roc_farm}) \end{aligned} = \frac{\text{Result of Main Activities} + \text{Disconnected} \\ \text{EU} - \text{subsidy} + \text{Owner Salary} + \text{Net Leasehold}}{\text{Average Farming Assets}} * 100$$

$$\begin{aligned} \text{Tangible Assets Ratio} \\ (\text{tang_ass_ratio}) \end{aligned} = \frac{\text{Property, Plant and Equipment}}{\text{Total Assets}}$$

$$\begin{aligned} \text{Selling Expenses} \\ (\text{sell_exp}) \end{aligned} = \frac{\text{Selling (not used in our calculation, since already} \\ \text{incorporated in the selling price) and Administrative fees}}{\text{Total Sales}}$$

$$\begin{aligned} \text{Net Debt Issued} \\ (\text{net_debt_iss}) \end{aligned} = \frac{\text{Change in Book Value of Total Debt}}{\text{Total Assets}}$$

$$\begin{aligned} \text{Issue Size} \\ (\text{issue_size}) \end{aligned} = \frac{\text{Net Debt}}{\text{Net Equity}}$$

2.1.2.1 Financial Distress

As explained earlier, there is a trade-off of debt to a certain point. Stretching beyond this point can lead to financial distress which again can lead to bankruptcy. A currently ongoing study about bankruptcies called *The Art of Foreseeing Bankruptcies* by Philipp Trénel tries to find what could impact a bankruptcy and the degree of influence these variables have. As can be seen below in figure 2.2 bankruptcies became more and more common after the financial crisis, more exactly beginning in 2009. This could either mean that a lot of farms has been badly managed or perhaps the banks and mortgage providers has been very open handed about lending money or perhaps even both has been the case. Again, conjectures. Nevertheless something seems odd about the amount of bankruptcies.

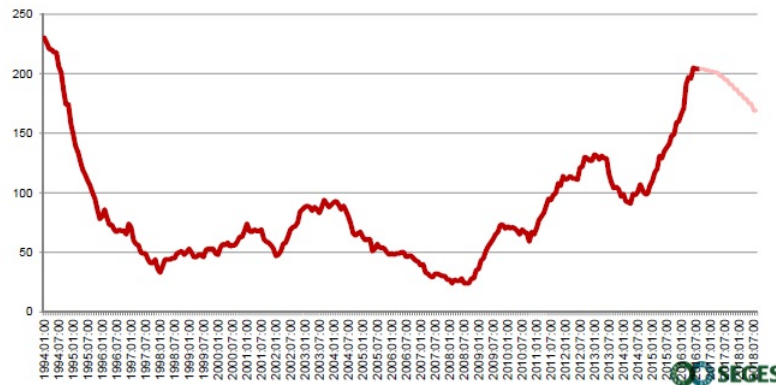


FIGURE 2.2: Farm Bankruptcies in Denmark
Source: SEGES, Economic Conference October 7. 2016

The economic conference on October 7. 2016 was the first time this project was released. Philipp Trènel walked through problems which he ran into doing this analysis and some of the results, which he has gathered up to this point. Now, one thing he found out was that the debt ratio is of very great importance to the risk of going bankrupt, which should be expected. By looking at the the debt ratio he made figure 2.3 which can be seen below.

Figure 2.3 shows 5 different windows, each representing a year. The first window shows that by having a debt ratio of 85.8% there is a 50% risk of going bankrupt in 5 years time and by looking at the second window one can see that by having a debt ratio of 90.9% there is a 50% risk of going bankrupt in 4 years and so on.

Now, figure 2.3 tells us that when the debt ratio is at 85.8% there is a risk of going bankrupt. Therefore this analysis can help to identify which farms are in, perhaps, an immediate state of needing help. But even so one could conclude that the need for help should be sooner than the point of being in risk of bankruptcy.

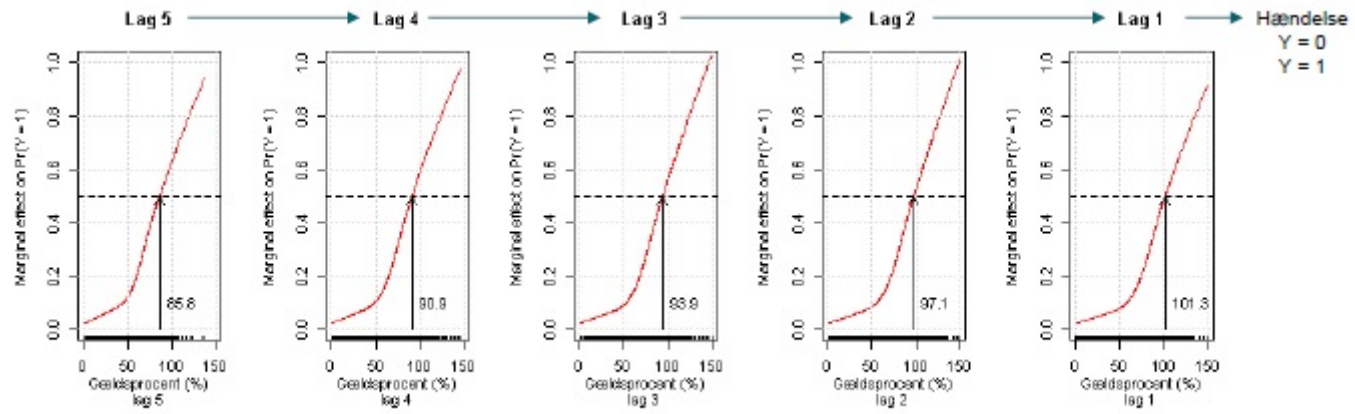


FIGURE 2.3: The Risk of Bankruptcy due to Debt Ratio
Source: AgroTech, Economic Conference October 7. 2016

With the limited information about this way of "foreseeing" bankruptcies within the agriculture, there may be some misunderstanding. Of course one would need the full article as to understand the model in its whole. The article of this project is expected to be finished in the spring of 2018.

Though the project is not done yet, it could still be a good guide as to when a farm/farmer is in financial distress. In 1986 Bultena et al., (1986) wrote an interesting article about the characteristics of farms and when they would be in financial distress. Some of the data used was collected through a survey, which also regarded psychological effects, which is why this analysis will not be tried in this thesis since such a survey has not been conducted. Back in the 70's and 80's the agriculture in the USA was in deep economic trouble, which Bultena et al., (1986) explains had its similarities with the great depression. This crisis also hit Denmark. Back in the 80's there seemed to be a lot of young farmers who wanted to go big, while still running the farm as a way of living, one could assume.

An old farmer once told, that he was approached by the banks and the mortgage providers regarding the opportunity of expanding. This farmer, whom had a part time job besides his farm, declined the offer which later resulted in the bank and mortgage providers wanting to declare him bankrupt, even though he paid his loans on time. The main belief from the banks and mortgage providers according to the farmer was that he could not run his farm without expanding. As a result of this story one could assume that there was a belief from the financial world that bigger is better, or in other words signs of the empire-building theory being tried to be implemented. This story does not stand alone though some did not decline the offer from banks and mortgage providers in expanding, something which many later has regretted. Another example of what happened back then was the counsel of investing in the dollar. This investment turned out to be a very poor choice considering that the dollar started falling because of the economic trouble in the USA. This and of course falling prices on farmland turned out to be of big consequences of the Danish farmers. A solution to this problem, which basically was to the advantage of the young and those whom had been the most aggressive about expansion and investments, was to remit some of their debt. Now this meant that many farmers was not punished for their adolescent use of debt. Though, the fault is perhaps not only the farmers which perhaps tend to have some blind trust to their advisers from the bank and the agricultural association. A more recent example from 2014 is a farmer which had 5.5 million DKK remitted from a debt of 7.2 million DKK. The agricultural associations accountant advised to go bankrupt, but instead the farmer sought help from an independent economic advisor which helped him get this remit. This story was posted in the agricultural newspaper (Iversen, 2016). Yes, it is very good for the farmer to get most

of his debt remitted, but it is only some farmers which get to have this option and perhaps it could give some wrong idea of how one should behave when it comes to debt.

In the USA many of these farmers wanting to have these very big farms tended to be very young and Bultena et al., (1986) refers to them as "young tigers". In the 80's these "young tigers" was those whom was in the biggest economic trouble. Reasons for this was the high interest rates, the foreign markets started to reduce and then the decline in the value of the farmland, which may have been the worst effect hereof. According to Bultena et al., (1986) those who seemed to be better off and perhaps not as effected of the crisis was those farmers who tended to be older, having part time or perhaps even full time jobs on the side, lower debt and in relation to their age having established their farm "solidly in the ground".

The U.S. Department of Agriculture, (1985) released an article where they define the financial situation of farms in three categories. These categories was and still is, farms with a debt ratio above 70% tend to have extreme financial problems, farms with debt ratios between 40% and 70% tend to have serious financial problems and farms with debt ratios less than 40% tend to have excellent to good financial conditions. Now this would seem a proper way of dividing the Danish farms into, though one would have to realize that there are some differences between the agriculture in the USA and in Denmark. Perhaps the biggest difference is the fact that the Danish banks and mortgage providers has seemed to have a more liberal loan policy than most. This could imply that, in Denmark, the farmers with extreme financial problems should be in a perhaps higher category. The earlier discussed study "The Art of Foreseeing Bankruptcies" is a good view of this, perhaps the limit should be set at the 85.9% since it would seem appropriate to conclude that a farmer is in an extreme financial situation at this point. In this thesis though the focus will be on the USDA categories with references to this higher limit set by the "Foreseeing" project.

As should be clear by now most of the farms in Denmark and perhaps in other countries are personal owned companies. This gives incentives to assume that family life changes and personal characteristics such as age and education has some kind of effect on the financial situation in which a farmer is in. The article by Bultena et al., (1986) finds that these characteristics has a positive correlation with the debt ratio, which of course means that farmers are affected by their personal life, one could assume that this is not the case with larger companies since there usually are more whom are capable of running the business then.

As stated earlier this thesis will not focus on these personal characteristics and will leave these for others to look into. Though, they are of somewhat importance this thesis will focus on giving an example as to what can

be done different in order to perhaps avoid these big crisis having such big an effect as they seem to have.

2.1.3 A Different Approach to the Target Optimal Debt Ratio

The model this thesis adapts and fits to the agriculture is perhaps not meant to be used in describing the capital structure of the agriculture. Perhaps it is more applicable in a corporate scenario, though it can still give an idea of what direction one perhaps should be going towards and how far. Wu et al., (2014) states that the financial crisis which erupted late in 2007 has given much debate to what an appropriate level of debt for farms is. While this being true in the Netherlands, this is of course also true in Denmark, which is why this thesis is all the more relevant. Wu et al., (2014) states that a quantile regression should be able to work around the issue of determinants of leverage having different effects regarding the farms leverage, which a comparable model shows. Therefore Wu et al., (2014) propose the use of a quantile regression which allows one to examine the importance of different variables across the quantiles instead of only a single measure of tendencies of a distribution. In addition Wu et al., (2014) argues that a quantile regression should give a more robust estimation.

This thesis will also run a quantile regression in order to see if there is a difference and thereby make unified conclusion from both models. For the quantile regression I will use the variables defined by Wu et al., (2014). The first variable is the dependent variable which is leverage, leverage here is defined as the debt to equity ratio, in addition to this lag1, will be the lagged of the leverage variable. GDP is the national GDP growth rates in Denmark in the period of 2006-2015, this variable is called MAC by Wu et al., (2014). Since no data has been available on education this will be left out. Prof is the ratio of EBIT to total assets. Vol which in this thesis is sd, is the standard deviation of prof. Tangible assets ratio, which is FIX in the article, is called *tang_ass_ratio*. Size is the natural logarithm of the livestock on the farm. Grow2 is the growth indicator of the farm and is calculated as one plus the percentage change in total assets. The natural logarithm is taken from the non-farm income, nfi. Since the main legal status of the farms in Denmark is personal owned companies and this is the only farms we are focusing on the variable form is left out. Tenure is represented by a dummy variable corresponding whether the land the farmer works with is owned or leased in the article by Wu et al., (2014), though here it will be defined as the size groups of the farms and take the value of 1 if the farm is tiny, which again consists of a livestock lower than 100, 2 if the farm is small, which consist of a livestock between 100 and 200, 3 if the farm is medium, which consist of a livestock between 200 and 300, and takes on the value 4 if the farm is large, which consists of a livestock larger than 300.

2.2 Financing the Farm Business

Now, as explained earlier the main way of financing farms in Denmark is through debt. It perhaps goes without saying that debt from mortgage providers and banks are the cheapest type of financing. The company form, personal owned companies, and the culture/ideology the farming business has has made the agriculture somewhat unappealing to investors. It seems as though farmers tend to do farming as a lifestyle and not so much as a business. Farmers seems to want their independence. By running the farm as a lifestyle and insisting on independence, I believe that many farmers are headed for some tough years, economically speaking of course. Why not combine the lifestyle with the business?

Through the next sections an explanation of private equity and venture capital will be presented. Private equity is more or less already in use in the Danish agriculture, which is explained under the section the AP-model, which is a model conducted by the pension fund AP Pension. Agency conflicts will be presented through this section, in order to explain some of the problems a farmer might face when suddenly facing the opportunity in gaining external equity.

2.2.1 Private Equity

Private equity consists of funds and investors that invests directly in a private company, that is not through a public trade desk. Now Kaplan and Strömberg, (2009) states that most private equity firms usually invests with some equity but most of the amount invested is debt which they have obtained. This is why many also describes private equity investments as leveraged buyouts. The main idea of a leveraged buyout is to take the majority control of a company, maximize the value of the firm and sell at as high a price as possible.

Though, the focus of this thesis is not on leveraged buyouts, Kaplan and Strömberg, (2009) has some views on private equity which are of somewhat importance to this thesis. Kaplan and Strömberg, (2009) explains that the private equity capital is set up as a fund, which will run, usually, for ten years, with an opportunity to extend it with up to three years. This will be important in the section below, since the model which will be explained has some of its roots in private equity.

One thing to keep in mind, at least for Danish farmers, is that farmers in general has a very specific mindset, perhaps a bit old school, nevertheless it is important to know that farm owners likes the idea of owning their own farm. Perhaps a fair assumption to make, is that farmers in general are quite against the idea of co-owning their farms. This is of course, an assumption made on basis of figure 2.1.

Private equity funds need to invest the money they have within five years, usually. This means that in theory, if the private equity fund can takeover the majority of a company with for example 70% of their total fund, they could save the last 30% for new investments later on in the company which they have taken over. However, this may not be true in practice.

This fact is important to know. It gives a possibility of financing the company on-wards internally rather than with external financing.

Jensen, (1989) states that leveraged buyouts would dominate the corporate world, though Strömberg, (2007) states that only a few years later the statement seemed to be very untimely.

Through the article Jensen, (1989) says whom these private equity investors could be in the 80's. These investors would include leveraged buy-out partnerships, entrepreneurs such as Carl Icahn and Warren Buffet, and Wall Street banks such as Merrill Lynch. Now, Jensen, (1989) also states that these investors does not invest with an intent of increasing the earnings per share but rather with the intention of maximizing the value. This will of course, eventually mean a profit in the end.

Before the 1930's it was not unusual to see big investment companies closely monitoring different companies. In fact JP Morgan owned a lot of firms which they profited from. This way of owning a company and monitoring it is comparable to insider trading, which today is illegal, according to Jensen, (1989). However, this was not illegal before the great depression. As an effect of the great depression the U.S. government executed different acts which prevented or made insider trading illegal.

These new laws affected the monitoring of companies. Jensen, (1989) explains that managers prefers to have passive investors whom cannot sell their shares. Effective monitoring was absent from companies. To overcome this, investors started buying the majority of a company's stocks, in order to be able to gain the lost value from these firms. This means that private equity investors arose from the ashes of the great depression, and started a new trend among new investors.

2.2.1.1 The AP-Model

The AP-model is not the asset pricing model in this context. AP Pension is, as one would think, a pension fund. They have shown their good faith in the Danish agriculture by supplying an alternative for financing the farms. The model is in its nature fairly simple. A farmer, either one who wants to start his/her own farm or a farmer who already owns a farm, seeks to find an alternate way of financing. First the farmer needs to show the company, Dansk Farmland K/S which is governed by AP Pension, that their business will be healthy. In other words show the company that they intend to and will use good management. The next step is that Dansk Farmland

K/S buys the whole farm, the soil and the buildings. At the same time a leasehold agreement is signed, where the farmer commits to paying AP Pension 5.2% of the invested amount in the soil and 10.5% of the invested amount in the buildings. This means that the "only" financing needed is for the operation. This leasehold agreement has a 10 year running period, this means that after 10 years the farmer has a n option of buying the farm, at a discount price though only if the price of the buildings and soil has increased. The price for buying the farm is the invested amount plus 80% of the increased value. Of course the farmer can try and re-negotiate the leasehold agreement in order to keep it this way, but it is not the intention of AP Pension to keep the farm in their books forever.

This model is a good way for younger farmers whom wants to start for themselves to get financing, though it is expensive. Financing from banks or mortgage providers, which is cheaper, is perhaps most of the time out of reach for the young farmers. Below, table 2.1 shows how much a farmer engaging in the AP-model would be expected to make just to make payments needed.

TABLE 2.1: The AP-Model

	DKK	Interest	Interest in DKK
Farm Land	20.000.000	5.2%	1.040.000
Operational Building	15.000.000	10.5%	1.575.000
Livestock	4.000.000	7%	280.000
Buyers Equity	1.000.000		
Total	40.000.000		2.895.000

Source: Økonomidatabase, SEGES

Assuming that a farmer makes around 2.5 million DKK, we can see from table 2.1 that he will come up short when he needs to pay the leasehold. Now, it is fairly easy to see that the pension fund is making money from this deal if the farmer can pay. Though, one thing that pops into ones mind is the arrangement of selling back the farm to the farmer or a new farmer in about 10 years. The pension fund would of course not sell at any price, they work for their customers and therefore they would want to maximize the return for the customers, in other words they would try and maximize the value of the buildings and the soil in order to make a profit, still remembering that the pension fund actually is paid annually for their investment. The AP-model is in many ways private equity investments, just with a new name.

2.2.2 Venture Capital

A venture capital firm, according to Kaplan and Strömberg, (2009), is a firm which usually invests in young companies but not to take majority control

of the company, rather it is to invest in companies which one believes to have a long-term growth potential. Venture capital will have some influence later on when proposing an alternative way of financing the Danish agriculture.

One of the hypothesis of this thesis is that the younger the farmer the more debt they would tend to have. Now this should not come as a surprise as one cannot expect a young man to have an average of 40 million DKK., the expected amount of money one would need in order to start a farm. Neither can one expect the young man or in anyway someone whom is not a millionaire to have even half in cash. This of course implies that the farmer would have to find the capital needed by going to the bank or/and the mortgage provider in order to get the money. Numerous articles states that this is perhaps the cheapest way of gaining capital. The Danish Growth Fund states that a farm costs on average around 40 million DKK. It is normal that the mortgage banks can provide around 70% of the total amount needed, in addition the bank may be able to provide 20% of the amount needed. Here the Danish Growth Fond can provide the last 10% since the likelihood of the farmer having 4 million DKK. is very unlikely. Now if this scenario is the case the farmer will be financed 100% through debt, which would result in, if not being held accountable for the age of the farm(er), a negative impact in an analysis. And it may even show, after perhaps three years or so, maybe even less, that the farm(er) is technically insolvent, because the prices of the buildings and soil has fallen.

If we focus on the young farmer who wants to start his own farm, this would be categorised as a start-up. Now since many, when they start out, does not have a lot of money the willingness from banks and mortgage banks to lend these guys money is perhaps not there, which means that they basically do not have access to the capital markets. Now a way to overcome this problem is if an investor is willing to invest in a start-up company or a small company which the investor has evaluated and believes that they have long-term growth potential. This kind of investments is called venture capital. Another word for venture is gamble, hazard or even risk. These words explains, very specifically, what venture capital is. It is a gamble, someone wanting to play a game and taking a risk of losing his money or gaining a big win. So as should be clear venture capital investments are very risky which is also reflected in the investment contracts which is typically made. Kaplan and Strömberg, (2001) states that it is normal that venture capitalists receives at least 20% of the profits made in a company. This is of course up for negotiation, as is their ownership ratio.

2.2.3 What To Do? A Look at the Agency Problem

Now, as seen above the AP-model would seem as an expensive way, though perhaps the easiest way into establishing a new farm or in order to have some financial liberty. As said it is an expensive way of financing but that is not all one should worry about when entering a leasehold agreement like the AP-model. Private equity is an investment type which is founded by investors and therefore in many ways for the investors. As should be clear by now, the AP-model originates from and is an private equity investment.

This statement should leave the farmer thinking about what to do in the long run. What happens when the leasehold agreement stops? Private equity investors seeks to maximize the value of what they buy in order to make a future profit when selling in the future. This of course meaning that the investors hope to sell the soil and buildings at a higher price than what they bought them for. It is obvious from their statement, AP-Pension seeks to help the farmers right now, as is perhaps needed for many farmers, but the idea is perhaps not the most sustainable way of financing the agriculture. In the end it could lead to the farmers being in even bigger financial problems than they already are. Though, the idea of the farmer concentrating on what he/she is good at, farming of course, is very attractive.

Though, in the end of a possible leasehold agreement would this not lead to a wrongful image of how well the farmer does if he does well? Well it should not, since the pension fund wants to find someone who is efficient from the beginning, but let us say that the farmer perhaps can do well when only focusing on the farming, though when their focus has to be split between farming and managing the business some problems might occur, and perhaps this is the reason why some farmers who already has their own farm seeks to the AP-model. Then this would or rather should influence the possibilities of financing a buy back later on. Though, the first hand impressions right now does not lead to one believing this is the case, and therefore a fear of postponing the financial problems from now till later should be taken seriously or this could perhaps lead to an agricultural bubble bursting.

The fear of such a bubble growing and bursting is why this thesis also focuses on giving ideas for alternate financing. Printure capital, which is explained later, focuses on the idea of the farmer being able to focus on what he/she is good at and leaving some of the management in the hands of someone who is more capable of this. Why not co-own a business if this can help one out of or even away from financial distress?

This way of financing should lead to an optimization of the farms, since the investors soul purpose is to increase the return which they put in their own pockets rather than just maximizing the value and then leave. In other words it gives an incentive to care of what happens to their investment,

which also should have a positive affect on the farmers wealth. Though, this could lead to the farms growing bigger and perhaps seeing less small farms, which is perhaps not a bad thing, but nevertheless a very big change in how it is today. One could even see that different grains of the agriculture merge in order to grow their business. One could call this very hopeful change in the agriculture the industrialization of the agriculture, in lack of a better description.

2.2.3.1 The Agency Problem

Now private equity, venture capital and other investment solutions will lead to other problems which may and perhaps will come at a cost, though not necessarily a big cost. Jensen and Meckling, (1976) describes some of the problems which might occur when a privately owned company (a farmer) suddenly has the opportunity of not only having debt but also has access to external financing.

Jensen and Meckling, (1976) wants to explain the effects of having access to outside equity. They do this by comparing the behaviour of the manager when he owns the whole company and when a portion of the company is sold. If a manager runs the firm on his own, he would want to maximize his own utility, now this does not necessarily mean that more money is the answer, rather it means that he would want to do what makes him happy. In relation to the farmers this could mean that he would want to spend more time with the cows even though it is unnecessary or he wants to buy a new tractor not because he needs it but rather because it looks good and perhaps he believes the local community would like it and talk about it. Also, the farmer might gain some benefits from activities which are not in any way money related. All in all his utility will perhaps be fulfilled by psychological needs rather than economic needs. If the farmer was to sell of a portion of his company/farm to an investor, this would lead to a cost which the investor would want as to compensate for the difference in their interests. This cost is called the agency costs.

This agency cost can be very different from firm to firm or rather farm to farm. No man is the same and therefore no investor is the same. The investor would want to minimize these activities which maximizes the utility of the farmer, since the possibility of eliminating them entirely is perhaps not possible. A way of minimizing these activities is by monitoring. This monitoring will of course come at a cost.

Of course the market might believe that there is no such activities in the farm company, which would be reflected in the price the investors would be willing to pay for the fraction of the company. In other words the investors would then buy at a 1 to 1 price. This being unlikely, the market would anticipate there being some kind of activities which maximizes the owners

utility. These expectations will be reflected in effecting the wealth of the farmer and only the farmer. So the price at which investors intend to pay for shares in a company will reflect their view on what the monitoring costs will be and their differences in interest.

The monitoring of the farmers behaviour will increase as he sells more of his farm, since he then will take larger bits of the, now companies, resources for his perks. Also, as the farmers fractional ownership falls the costs to his wealth of the equity market rises. This is how Jensen and Meckling, (1976) characterize the agency conflict.

Though, Jensen and Meckling, (1976) explains that this is not the only conflicts which may arise and perhaps not the most important ones. Another conflict which may arise, according to Jensen and Meckling, (1976) and which certainly is important, are the farmers motivation to take on profitable projects will decrease. The owner will avoid this because the obligations might be too high. Also, the value of these projects may not be as valuable to the manager.

Perhaps one important fact too keep in mind here is that Jensen and Meckling, (1976) are focusing on the traditional companies which perhaps is more eligible in a corporate sense. One has to keep in mind that farming is a lifestyle. Therefore one could argue that the utility the farmer gets from running his farm is greater than any project, which in this context should be understood in this way: the thought of not running his farm should compensate for the loss of value in a project. In other words, it is like an ultimatum, run this project since it is in your best interest, you get to keep running your farm. It is not like there is a new farm he can just buy and start running instead. The thought here is perhaps that the farmer wants to do what it takes to keep running his farm, since he has chosen this lifestyle for a reason.

2.2.3.1.1 Selling some of the Company As described earlier, if an investor believes that the farmer does not use any perk benefits, a buyer will be willing to buy a portion of the shares at a price which is equivalent to $(1 - \alpha)V$ for a portion $(1 - \alpha)$ of the company. Here V is the market value of the company and α is the amount at which the, in this case, farmer owns the company. From the farmers point of view this means that when he consumes 1 DKK the true value of this is "only" $\alpha * 1DKK$. If the farmer would be able to choose his own level of consumption in order to make up for his loss in wealth, he would maximize his own wealth by increasing his level of consumption which would lead to a decrease in the value of the firm.

This level of consumption will be reflected in the value at which the investor will pay for $1 - \alpha$ of the company. The new value, if the investor knows the response function of the farmer, will be V^* . This decline in the

value of the firm is thereby entirely imposed on the farmer. This is his residual loss.

2.2.3.1.2 Equity as the Sole Financing When thinking of only having finance via equity, it will be assumed that the farmer has monopoly access. The farmer will only have a certain amount to work with, but wants to work on a specific project. In order to finance the project he will need external financing, this external financing could be used to increase the size of the company or perhaps to minimize the costs and thereby increasing the profits. This external financing implies that the farmer will have a lower fractional ownership. The agency costs will increase the lower the fractional ownership is. The farmers welfare will increase if the project, for which outside financing is needed, is profitable.

2.2.3.1.3 Reducing the Agency Costs If one was to incur monitoring costs, M , the investors can restrict the farmer to consume less than under circumstances where there is no monitoring costs. This means that in the case where the investors can implement monitoring costs and reduce the perks, F , for the farmer, the farmer will be prepared to enter a contract where the investors can restrict the farmers consumption. Not only will the farmer be prepared to enter such a contract it would also be appealing since this would mean an increase in the firm value. This increase will be expressed in the farmers welfare since it will increase, though by less than no monitoring since he cannot spend as much on consumption.

2.2.3.1.4 Manager Operated Firms: Pareto Optimality Pareto optimality is a state at which one is worse off if someone else is doing better. Consequently, the state at which the investors and the farmer will be doing equally well. In such a state one would be expecting to see both bonding and external monitoring activities. The levels of these activities should satisfy the conditions of efficiency, the pareto optimality. This will however not result in the farm being run, as it is with private equity, as to maximize the firm value. Rather, it would be as to maximize the profits of the firm, as to maximize the dividend payout which will be of equal satisfaction to both the investors and the farmer. The farmer would have an incentive to minimize the agency costs as to benefit hereof.

2.2.3.1.5 Divergence As stated earlier people are different, therefore agency costs will differ from farm to farm. The reasons for this are as follows. The owner has his own preferences, which can affect the agency costs. Also, the level of easiness at which the farmer can practice his own preferences will have an affect. The location at which the farmer is placed, in this case the

soil can have an influence if the farmer grows crops, it might be more beneficial for both investor and farmer to have cows, pigs or even chickens or the other way around, depending on where the location is. The appeal of the perks the farmer will be able to have is another influence of the size of the agency costs. As described earlier there is also the monitoring costs this will still be different from owner to owner. If the farmer is willing to let go of the controlling interests he has, the agency costs will also be reflected on the market for new managers. Also, the divergence of the size of the agency costs will be reflected in the cost of substituting the manager.

2.2.3.1.6 Limited Liability Until now Jensen and Meckling, (1976) focuses on what happens between the owner and the investors. Now they focuses briefly on what role limited liability plays on the company. Limited liability means that the stockholders will not be held responsible for any debt which is left in case of a bankruptcy. The stockholders will only have to give up the money which they invested in order to get the stocks they have been holding. Because of this arrangement the banks/mortgage providers will ask for a higher risk premium when debt is asked for, this would be cheaper for the stockholders.

The risk premium should not be affected much in a negative direction in the case of a farmer changing from personal ownership to a limited liability company. Already, the farmers face high risk premiums on their loans. One reason for this is the immediate risk of going bankrupt, though the bank or mortgage provider can hold the bankrupt farmer responsible for the debt which is not yet paid, one could assume that in the case of the alternative financing method, that the investor could, because of their belief in the farmer, enter an agreement in which they will be held liable in case of a bankruptcy and thereby lowering the risk premium. Of course this would increase the agency costs. Another possibility is of course the risk premium stays the same, though a third possibility is that the bank and mortgage provider sees the change from personal owned company to a company with limited liability as a "step up". This of course implying that they believe that since one invests in the company it would seem as though the company is expected to do well and thereby also reducing the risk premium or keeping it the same.

2.2.3.1.7 Modigliani & Miller: Irrelevance of Capital Structure In 1958 Modigliani & Miller stated that *"In a perfect world, value of the firm is independent of the financial structure."*

Of course everyone knows we do not live in a perfect world and therefore the financial structure is relevant. In 1963 Modigliani & Miller again

made another statement in their search for making corporate finance relevant. Here they stated that *“Existence of tax subsidies on interest payments would cause the value of the firm to rise with the amount of the capitalized value of the tax subsidy.”*

Realizing that this argument insinuates that a firm should be financed almost entirely with debt they made a comment on this: *“One would do well to remember that this tax advantage for debt financing... does not necessarily mean that corporations should at all times seek to use the maximum of debt in their capital structures... there are limitations imposed by lenders as well as other dimension to think of.”*

Of course this leads back to the trade-off theory saying that one should lend as much as one can until the value of the firm is maximized. If one borrows too much the value of the firm will decrease and the risk of bankruptcy is enlarged.

2.2.4 Jensen & Meckling set to a Farming Setting

If the investors believes that the farmer does have use of some perks, again not necessarily money related, he would want to buy the portion of the company at a lower price than what it is perhaps equivalent to. Let this benefit be described with F . This would mean that the value of the firm in the eyes of the investor would be $V^* = V - U - M$. The value of the firm minus the utility of the farmer minus the monitoring costs. Now some uncertainty has to be added to the Jensen and Meckling, (1976) story. This will be recognised as ξ . By letting someone into his way of life, one could conclude that he is not happy with his way of life. A thought that Jensen and Meckling, (1976) does not reflect is the possibility that the owner may have some negative utility. In the case of farming, one could suspect the possibility of negative utility, when it comes to the administrative part of the farm. One did not start a farm in order to do the paper works, paying bills, make money or doing the financial reports, which will be an assumption followed through this thesis. One would expect that one becomes a farmer, start this way of life, in order to be free of all this, to be around crops, cows or/and pigs. Therefore this thesis would state that the utility of a farmer would be reflected as $U = F + \xi$.

Now the equation $V^* = V - U - M$ made is not taken directly from Jensen and Meckling, (1976), rather it is very simplified, as is the rest, though it should do the trick of giving an idea as to what happens when some investor buys part of a company. The equation $V^* = V - U - M$ does reflect, simplistically, the value at which an investor would buy $(1 - \alpha)$. Though, one more addition is needed. The idea of this uncertainty or rather the idea

of the negative utility being of importance, should also be reflected in the value at which the investor is willing to obtain $(1 - \alpha)$.

The perks the farmer has from the company, once bought, would be reflected as $F(M, \alpha)$, the perks the farmer can acquire at certain levels of monitoring, M , given the amount he owns himself, α . The monitoring cost, M , should also reflect this idea of a negative utility. One way of taking care of this is by saying that the monitoring costs depends on ξ or $M(\xi)$, monitoring costs given the negative utility(uncertainty).

Now looking towards the alternative way of financing which is being elaborated later, one knows that the farmer will have to let the investor not only sit on the board as to monitor the farmer but also let the investor insert a person who could work as a consultant. This person would be set in as to of course take care of the administrative work which in theory should eliminate the negative utility, ξ , and thereby one could conclude that the monitoring cost, M , increases. Though, this is should not be the case. In fact the monitoring cost should either stay the same or even decrease. This consultant will be reflected as ϵ . The reason for this is that the farm company would be responsible for paying the consultants wage. The consultant is not limited to doing the administrative work, which the farmer in this case is happy to get rid of, he is also reporting to the investors. Remember the investors put him there in order to keep their best interests. This gives an uncertainty in the way of the consultant, since he might bond with the farmer and start working in his interest rather than the investors, this could be eliminated by giving him a bonus from the investors reflecting his work, in other words pay for performance.

Not only does the consultant inflict an uncertainty, so does the farmers behaviour towards the consultant. Does the farmer trust the consultant or does he just dislike him? This uncertainty is reflected as ϵ . Now the perks the farmer would want through the company will not be eliminated entirely. One could argue that the farmer gets these perks through the work he does by working with the livestock or crops and through driving a tractor which look a certain way, perhaps size or the interior, this could be kept high enough with a certain budget which is set by the investors (the consultant) and thereby keeping the farmer satisfied.

The idea of farming being a lifestyle would imply that the negative utility discussed earlier is not only reflected of the administrative work, but, as soon as the investors come into the picture, the farmer will have negative utility reflected on the worries of not having the farm entirely to himself. This would mean that the ξ is not entirely eliminated, though it may be in time. So the monitoring cost would still be affected by ξ , though not just that, it would also be reflected by the ϵ . So now monitoring costs is given by, $M(\xi + \epsilon)$, the negative utility plus the uncertainty of the consultant.

Also, the amount which the investor is willing to pay for $1 - \alpha$ is reflected by $V^* = V - M - \varepsilon$.

2.3 Printure Capital

There are some big differences to the two investment strategies of venture capital and private equity. Venture capital are typically focused on these start-up projects, which has high growth opportunities. A way in which these venture capitalists spread their risk is by investing in many different start-ups and expecting some to fail and others to be good and at least one to generate a very big pay-off. One would rarely see that a venture capitalist invest so much as to gain the majority control of a company. Another important fact about venture capital is that they rarely deal with anything other than equity.

Private equity funds usually invest as to gain the majority control of a company, so at least 50% of a company. They also mainly focus on companies which are mature and focuses on companies they believe to be undervalued perhaps because of poor management. Their sole focus would be on one company why they would invest all their money in this one company. The amount could be as much as \$100 million or more, which consist of both debt and equity and therefore also defined as leveraged buyouts, whereas venture capitalist perhaps would invest around \$10 million in many different companies. Though this amount of which they invest is not necessarily true, the reason for this is the fact that the two investments would reflect on the size of the company in which one invests and on the beliefs of how good a company is expected to do.

Now considering the market analysis made earlier and the two investment strategies being illuminated here, a different approach regarding the financing of a farm could be of some use. The name, printure capital, is perhaps clearly a fusion of the two investment strategies private equity and venture capital, it could have been anything else, this is just to raise the idea of the alternate financing method as a method assembled of the two, though with some alterations.

As has been stated, the Danish farms are primarily financed with debt. This is especially true for the biggest group of farms which are personally owned. The personally owned farms are deeply reliable on the opportunity of getting loans to finance their farms. A possible reason for this is perhaps that the farms has been standing still when it comes to the development of the industries. Another reason is the culture that has been developed in the agriculture, where one runs his or her farm as a way of life. Money has not mattered that much, as long as one has been able to get by. This is the phenomenon that describes the farms best. Though, many farmers

has wanted to have a certain status between one another, one way has been by becoming bigger, another that the bigger the tractor the better. But, the problem with becoming bigger and buying bigger "toys" is that you need the economy for it.

Now debt is not a bad thing, as has been explained earlier, the trade-off theory welcomes debt, but only to a certain point, since there is a limit to how much good it will do. And perhaps it goes without saying that one would need debt in order to establish ones business. The idea of this alternate financing model is that a farm should no longer be run as a "farm" but rather as a farm business.

Today when farms are in deep trouble, there would be a screening process where one figures out whether or not the farmer and his or hers family is ready for a reconstruction and also to see if the farm is effective, normally one would have to be in the top third when it comes to effectiveness².

Now this gives a problem with the farms which are not in the best third measured on effectiveness. It would seem fair that the farms which actually are effective, but just have too much debt, are helped. Though, this leaves the rest in uncertainty. As insinuated, the farms which are in trouble might be better of running their farm as a business. Therefore a proposal, which will affect the fundamental ideas of most farmers, has to be made. This proposal involves restructuring the personal owned farms to a cooperative or even a private limited company. Another thing this proposal involves is the opportunity of bringing in a sort of specialist or some kind of economist. This specialist will be of need in order to keep the farmers mind of the stuff he or she is not necessarily qualified to do or even keen on doing, like making sure to minimize the costs while still keeping the income steady or increasing the income. In other words doing the administrative work whilst the farmer does what he or she is really good at, farming.

Some would say that there are bad farmers and good farmers. I believe there are only good farmers, though some of them does need help with the business part.

By changing the company form a whole new world opens up to the farmers. They will have the opportunity of having access to external financing. The reason of this being important is the fact that both venture capital and private equity is something you can have if you can give up some of your company. This might sound unattractive at first, but the opportunity this gives is probably worth the trouble.

Now since the possibility of obtaining other capital than debt has been made possible, it is now possible to discuss the opportunity of managing the firm capital according to the pecking order theory. This theory was in

²This information can be found on the Danish agricultural financing banks website (www.lfbank.dk)

the words of Myers, (1984) already developed by Gordon Donaldson, but in fact the theory was more or less first studied by Myers, (1984). The pecking order theory serves as a kind of guideline, as there might not be a well defined target leverage ratio as the trade-off theory works more towards. Though, this is what Myers, (1984) argues is not true. Myers, (1984) argues that the pecking order theory works just as well in defining a target optimal leverage ratio. Jensen and Meckling, (1976) explains that some companies finds capital through a pecking order, internal financing is better than external financing and when looking at external financing debt is better than equity.

So what this financing model should show is that the farmer gives up his independence by letting an investor buy some part of his company. The investor then appoints a specialist to serve in the company. This specialist has two functions, the first is to work for the farmer as an administrative worker, working with optimizing the company such as the costs. The second function is as a right hand to the investors reporting to the board of directors as whether or not the farmer seems to be cooperating in order to run the company as good as possible. The board of directors will of course consist of the farmer who has the majority control of the company and some trustees of the investors or the investors themselves.

By having appointed this specialist to be the right hand of the investors some of the conflicts that may occur, which has been elaborated earlier, and the costs hereof should decrease and maybe even fade away.

The perhaps biggest problem with this financing model is actually finding investors whom are willing to invest in the farming business. A reason for this is the fact that the returns historically are lower than what they are in other industries. By looking at table 2 in the article by Andersen, (2016b), we see that the return on farm capital on average is 0.8, this is of course very low. This is where the investors come in. It is in the investors interest to maximize the profits in order to gain a return as big as possible, as we hopefully will see later in the results there are big savings to gain on the costs alone. Therefore it is both in the interest of the farmer and investors to seek this opportunity as it would seem that the results made in the agriculture is well below what is possible to make.

Now this investment could be going on as long as both the investors and farmers are happy with or perhaps to make it more acceptable for the farmers this investment could be made with a time limit. Perhaps as with private equity, the AP-model, a contract that runs ten years with the possibility of extending if both parties seems it is worth it. The idea is that the investment size is around 20% of the debt value. The investor then gains 20% of the company and perhaps receives 20% of the future profits as long as the investor owns 20% of the company.

Another way of doing this could be for the farmers to work together in cooperatives, and thereby using each others strengths in order to make a healthy company.

A third way which is similar to the first proposed is that perhaps a very big group of farmers, or even all of them, goes together in establishing a consultancy company which will own a certain amount, say again 20%, of each farm, and receives the corresponding profits. This company will then be owned by the farmers, but run by a third party. The company's task will then be to run the farms administrative work, such as minimizing costs and making sure that the farms are healthy. In this way the farmers independence is not affected. Though. this would lead the farms to still be financed solely on debt and what they have in profits. This only means that the work of optimizing the farms might take a little longer than it otherwise, perhaps would. Also, the consultancy company could be made as a non-profit company which means that if any profits are left, this will be dealt out to the farms accordingly.

These proposals should help the farmers gain what they have lost, by not focusing on running their farms as a business, as it would seem is needed.

In the following results an example of how the debt ratio and target debt ratio may be affected by an investor taking over part of the company will be shown.

Chapter 3

Results

3.1 Optimal Target Ratio

TABLE 3.1: Regression of Equation 2.1

Variable	Coefficient	(Std. Err.)
issue_size	0.000	(0.000)
net_debt_iss	-0.354**	(0.060)
debt_ratio	1.237**	(0.014)
sell_exp	0.195*	(0.079)
tang_ass_ratio	-0.462**	(0.034)
size	-0.013**	(0.002)
roc_farm	0.000	(0.001)
res_b_t	0.000 [†]	(0.000)
Intercept	0.141**	(0.028)
N	7690	
R ²	0.891	
F _(8,7681)	1959.305	

Source: Økonomidatabase, SEGES

Since market-to-book ratio is set to 1, the results for this variable in the regression are omitted which is why it is left out of the regression. In table 3.1 above, we can see that the regression explains the post issued leverage with 89.1%. If we instead take a look at table 3.2 below we see that there is really only one variable which explains a lot of the model, the debt ratio. The debt ratio explains 87.8% of the model, which is not that odd since the debt ratio is derived of leverage. The size explains around 20% of the model. There are some explanation to the other variables except issue size and selling expenses which explains nothing in this model. This is of course by itself. When looking in the above table 3.1 and the table 3.2 below we see a different story. As stated above the regression, based on equation 2.1, actually explains 89.1% of the model and it is only the issue size and the return on farming assets which has no statistically significant explanation of the model.

In an attempt to get a better explanatory power in the regression, we drop the two insignificant variables and replace them with the age of the farm.

Knowing that the model is a good fit, at explaining the leverage ratio, it is now possible to determine what the target ratio should be. As Hovakimian et al., (2004) explains, the target ratio should deviate from the real ratio, since it is almost impossible to be at the target all the time.

A fair assumption here is that a farmer perhaps does not have a certain target at which they aim their debt at. The issue at hand here is perhaps that they may not have a target or rather their debt limit is non-existing. Of course this is meant as the view of the farmer. Looking at banks and mortgage providers a debt limit may be set, though not always followed. The risk premium set by the banks and mortgage providers can be explained by the level of debt one has, of course this is just one variable to explain but nonetheless a vital variable. It is a fact that the risk premium is not that highly dependent on the results the farmers provide, in the eyes of the banks and mortgage providers. Rather, it would seem concurrently with the debt increasing so does the risk premium regardless of whether or not the farmer actually has a positive result, again with fairly high results the risk premium will stay the same or even drop a little. Most of this is of course conjectures, but that does not mean it cannot be true.

Of course a bank or a mortgage provider will look at other things such as the effectiveness of a company. The fourth largest bank in Denmark, Sydbank, has initiated a project which should help farms overcome their financial situations. Though, this project is set to help the farms, the project will only help farms which has a high effectiveness but negative firm equity. Sure, this seems like a good idea, at least for the bank. The bank is a company and needs to make money, and this is perhaps a way to even out the losses that might occur with other farms which are not doing that well. Initially the number of farms that Sydbank will help is around 60 farms. Sydbank has categorised the farms in their books into four groups which gives one the indication that, those whom are doing poorly will perhaps not get the help they might need, which gives this thesis a larger incentive as to give some idea as to try and help farmers work towards a better financial situation.

Turning back to table 3.2 column 8. We see that our net debt issued inversely correlated with dependent variable. This implies that the smaller the debt issued in a year the higher the target ratio should be. As our debt ratio rises so does the target ratio, which does make perfect sense, since the debt ratio, having a high explanation value, would indicate that there is a higher target in which one would try and aim at. Also, debt ratio and leverage are two ways of looking at the same thing. The selling expenses

is significant in the whole regression, though not on its own. It shows that when this expense rises the target ratio rises. Though, as stated earlier not all expenses are included in this variable do to the fact that much of the selling expenses is included in the sales price. This variable could perhaps be of great help to farmers, here the thought is to try and decrease the selling expenses in order to decrease the debt ratio and thereby the target ratio. The tangible assets ratio shows a negative correlation with the dependent variable, which makes sense since this would imply less tangible assets but still a high debt ratio, and thereby a higher target ratio. The size variable shows by itself a positive correlation with the dependent variable, which of course shows that bigger farms has a higher target ratio since it would need more capital than small farms. Though, in column 8 the size variable shows a negative correlation with the dependent variable, this tells us that the smaller the farm the higher the target ratio. This of course can imply different things, one being that the smaller your production the higher costs one would have. Now, for a long time now a major problem in the farming business is the fact that many farmers finances their operation with debt. This could therefore be one reason that smaller farms tend to have a higher target ratio compared to its size. As would be expected the debt of the company is affected by the age of the company. The younger the company the more debt one would have. This also implies that the younger the farmer the more debt, which is understandable since younger farms tend to have younger farmers. Young farmers do not have the money to buy a farm and therefore borrows the money needed. Lately, banks and mortgage providers have been more strict about loaning money to young farmers, which causes a problem since around 70% of the farmers today is 45 years or older. Though not significant the result before tax seems to be positively correlated with the target ratio in the whole regression. Though, on its own the result before tax is significantly negative correlated with the target ratio which makes sense, given that the more you make the more you can reduce the debt level which one has.

TABLE 3.2: Modified Regression of Equation 2.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage
net_debt_iss	-0.885*** (0.0726)							-0.354*** (0.0594)
debt_ratio		1.217*** (0.0113)						1.228*** (0.0133)
sell_exp			-0.232 (0.204)					0.222** (0.0812)
tang_ass_ratio				-0.209** (0.0732)				-0.465*** (0.0340)
size					0.214*** (0.00534)			-0.0136*** (0.00240)
age_farm						-0.0127*** (0.000396)		-0.000654*** (0.000135)
res_b_t							-0.000000136*** (8.78e-09)	4.30e-09 (2.25e-09)
Constant	0.565*** (0.00364)	-0.232*** (0.00684)	0.583*** (0.00837)	0.743*** (0.0601)	0.180*** (0.00953)	0.881*** (0.0108)	0.606*** (0.00401)	0.164*** (0.0285)
Observations	7690	7690	7690	7690	7690	7690	7690	7690
R^2	0.030	0.878	0.000	0.002	0.198	0.127	0.122	0.891
Adjusted R^2	0.030	0.877	0.000	0.002	0.197	0.127	0.121	0.891
rmse	0.317	0.113	0.322	0.322	0.289	0.301	0.302	0.106

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.1.0.1 Target vs. Debt Ratio

Below in figure 3.1 we see the current mean of the debt ratio and the mean of the predicted target ratio based on size. It is obvious that the predicted target ratio is below the current debt ratio. Considering the economic problems in the Danish agriculture which they are in, and some would say often is, this makes good sense.

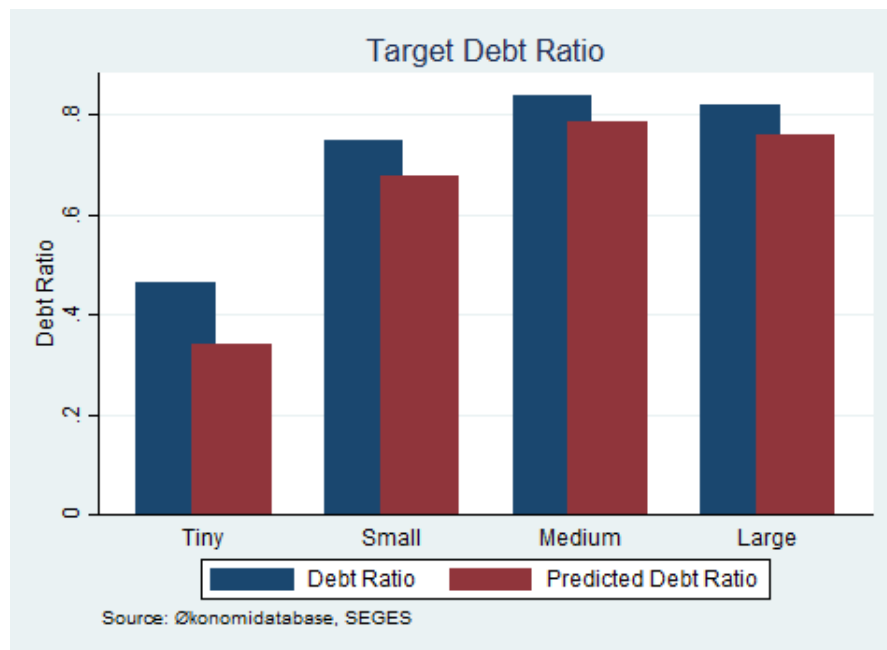


FIGURE 3.1: Target Debt Ratio Overview

Now, this of course does not necessarily indicate that the debt ratio is too high, though, neither does it indicate it is not. Remember, having a target debt ratio would indicate that one is never really at the target but either a little to low or a little to high.

Looking at table 3.3 one can see what the values of the means are and the differences. Looking at these values we see that for the smallest farms there is a 12.4 percentage points difference from the debt ratio to what the predicted is, this could indicate that the farmers are way off from their target and thereby also decreasing their opportunity for success. Though, at the same time this could indicate that it is perhaps harder to reach the optimal level of debt since you do not have the same income, and therefore indicating that it is expensive to run a farm, and as it is with other industries smaller perhaps means that you have higher overheads. The lowest difference is 5.3 percentage points which perhaps is still too big a difference to ignore. What this is perhaps telling us is that either there is a lot of fairly new farmers whom is bringing very little equity and a lot of debt to the company or that there in general is a lot of debt in the farming business

which is difficult to get rid off. Perhaps, a different approach to the agricultural business when it comes to the financing is a good thing to be consider. Now, it is not definite at which difference it is acceptable too have, in order to have an acceptable capital structure. Though, by looking at the average amount of debt one can see that 5% corresponds to 900,000 DKK, so perhaps a fair difference would be 5 percentage points, which all of the debt ratios, in table 3.3, are above on average.

TABLE 3.3: Difference in Debt Ratios Based on Size

Size	Debt Ratio	Predicted Debt Ratio	Diff in Debt Ratio
Tiny	.464733	.340865	.123868
Small	.747735	.679225	.068510
Medium	.837860	.784655	.053205
Large	.819647	.761151	.058496
Total	.672918	.589421	.083496

Source: Økonomidatabase, SEGES

3.1.1 A Look on Size Debt Ratio/Predicted

As stated earlier the U.S. Department of Agriculture, (1985) divided the debt ratio into intervals and thereby mark how severe the farmers financial condition is or were. This threshold of 70% seems to be the level at which most sets as to be were ones financial situation becomes extreme. Therefore table 3.4 below has been assembled in order to give a closer look as too how many there is in this poor financial situation, and also to see how this is seen through the different sizes of farms.

TABLE 3.4: Debt Ratios Divided into Size and USDA Ratios

size	$\geq 40\%$	$40\% < USDA \leq 70\%$	$< 70\%$	Total
Tiny	0.232112	0.545607	0.821173	0.464733
Small	0.309791	0.590833	0.877860	0.747735
Medium	0.258238	0.613410	0.911880	0.837860
Large	-	0.609022	0.863225	0.819647
Total	0.248024	0.575526	0.878027	0.672918

Source: Økonomidatabase, SEGES

If we are to look at table 3.4 with pessimistic eyes we can easily conclude that in the current state 49.3% of the farms are in a extreme financial situation. This is of course not good and tells us that there is a serious issue regarding debt in the Danish agriculture. Now knowing that changes has been made through the years and the situation in the USA is very different from the one in Denmark and different from the one in 1985, I still take this

opportunity too compare what the U.S. Department of Agriculture, (1985) found back then and what table 3.4 shows. The U.S. Department of Agriculture, (1985) found that "only" 6.6% had debt ratios which were over 70% which is far less than the 49.3% table 3.4 shows. Of course one reason is perhaps that the Danish banks and mortgage providers seems to be and have been much more liberal when it comes to lending money to farmers.

If we take a look at table 3.4 and compare it to the preliminary findings in the "Art of Foreseeing Bankruptcies" project, table 3.4 actually shows us that 16.6% of the tiny farms, 60.2% of the small farms, 77.1% of the medium farms and 82.9% of the large farms are at a 50% risk of going bankrupt in five years. This corresponds to 44.16% of all the Danish dairy farms. Of these 44.16%, 9.34% or 189 are at risk of going bankrupt in four years. Looking at the model very literally one can conclude that 22,08% or roughly 447 dairy farms will go bankrupt within five years. Of these 22,08% or roughly 447, 4.67% or roughly 95 dairy farms will go bankrupt. This is of course only in the case of which one does not change his or her behaviour quickly and tries to save his or her farm.

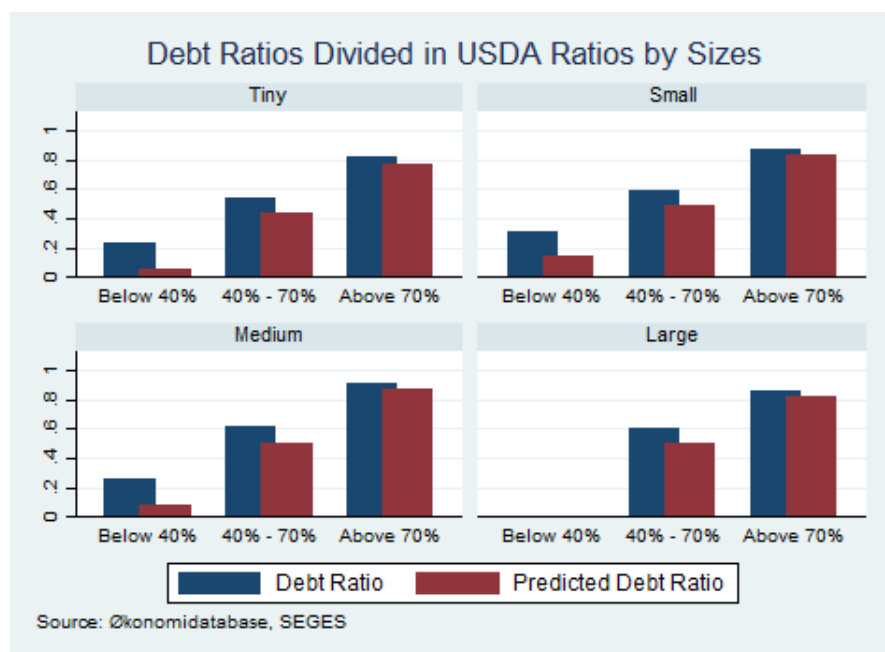


FIGURE 3.2: Target Debt Ratio Divided into Size and USDA Ratios

Figure 3.2 above shows the debt ratio and the predicted target ratio split into the intervals made by the U.S. Department of Agriculture, (1985) and again split into the four different sizes. Now by looking at the above 70% interval in all the sizes one can see that there is perhaps not that big a difference between the debt ratio and the predicted optimal ratio. This could indicate that if one has a debt ratio above 70% one is in fact very close to

the optimum. A sign of the farmers not being close enough to the optimum is to be found at the intervals of below 40% and between 40% and 70%, here there is a difference between 10 and 18 percentage points too far above the optimum debt ratio. One explanation of this, perhaps surprising, scenario is that perhaps farmers whom have a high debt ratio and a high predicted ratio would seem to have a higher result before taxes, as would be consistent with the findings in table 3.2. Still keeping an eye on table 3.2 the view in one might make a conclusion is that the predicted target ratio in the above 70% interval is this high because of selling expenses being too high. Though, as discussed earlier the variable selling expenses might be faulty. Rather, it is faulty because most of the actual costs of selling the milk to a dairy, is already accounted for in the price the farmer receives from the dairy.

Another fun fact is that as the optimal target goes up the age of the farm actually falls. This of course meaning that the younger the farm the higher the debt would be optimal. And of course this makes perfect sense, especially in this case, since debt is the only thing the farmers has access to, a farmer will have more debt when he starts his farm.

3.1.1.1 Looking at the Effect of Age

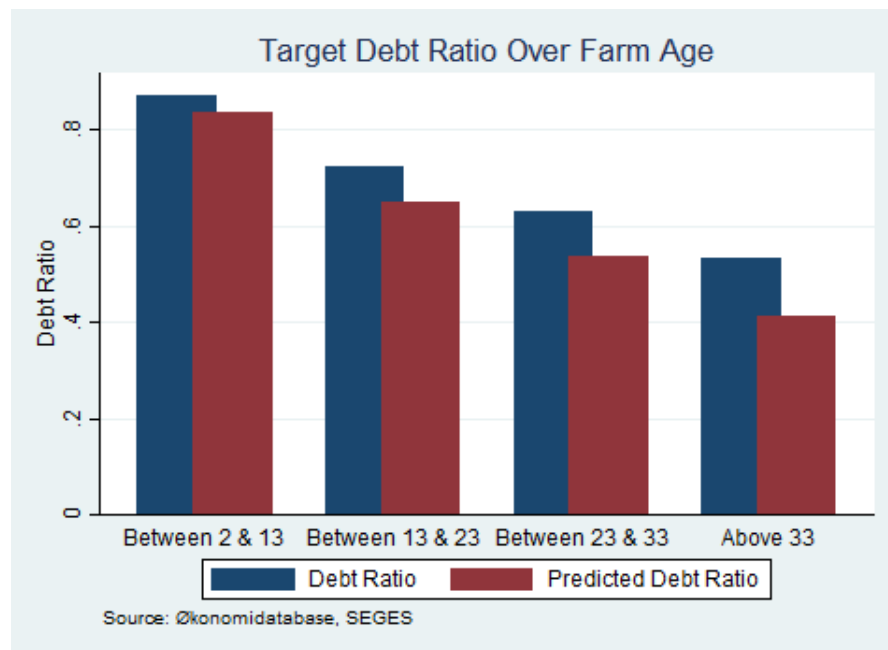


FIGURE 3.3: Target Debt Ratio over Farm Age

In figure 3.3 we see the current debt ratio and the predicted target ratio divided into the age of the farm. It shows a clear trend and well within expectations, that the younger farms have more debt as well as a higher target optimal ratio than the older farms. In that way, there is no surprise.

What is a small surprise is the fact that the older the farm gets the bigger the difference from the debt ratio to the predicted target ratio. Looking at table 3.5 we actually see that even though the younger farms has a very high debt ratio, they are within a fine limit of the target optimal ratio, on average of course. Again, this outcome can be matched with the variable results before tax. If results before tax decreases so does the target ratio, this can be consistent with the fact that as the farm becomes older, so does the farmer, and therefore one can conclude that as the farm(er) gets older, perhaps more of the farm is sold off or leased out.

TABLE 3.5: Difference in Debt Ratios Based on Farm Age

Farm Age	Debt Ratio	Predicted Debt Ratio	Diff. in Debt Ratio
2 & 13	.870991	.837145	.033846
13 & 23	.722246	.650615	.071631
23 & 33	.629742	.536379	.093362
Above 33	.531585	.411585	.120000
Total	.672918	.589421	.083496

Source: Økonomidatabase, SEGES

When looking at table 3.6 below we again see that the younger the farm the higher the debt ratio. We see that 80% of the youngest farms has a debt ratio above the 70% that the U.S. Department of Agriculture, (1985). Not only are they above the 70% but also above the "foreseeing bankruptcies" threshold of 85.9%. This should be worrisome, since there is a very high average age of the farmers, which means that the young farms, if they should go bankrupt, there might be an immediate need of younger farmers in order to keep the agricultural business running. Though, only focusing on the youngest farms, between 2 and 13 years we see that it is the only group of farms which as a whole is in fact at risk of going bankrupt in five years, if the bankruptcy theory holds. This corresponds to just around 13%. So a little more than a 10th of the dairy farms which may disappear. Though perhaps troubling this corresponds very well as to what was found by Kaiser and Oksen, (2013), here they found that 14.7% of the dairy farms which are at a potential risk of going bankrupt. So a small improvement can be seen though one could argue that, the reason for this is that when their analysis was made the Danish agriculture was doing even worse than today, and the market might adjusted and thereby made some improvement without the farmer really making any changes. Though a more likely scenario is that some of the farms from 2012 have already left the market, and thereby leaving the overall scenario looking a bit better without them.

TABLE 3.6: Debt Ratios Divided into Farm Age and USDA Ratios

Farm Age	$\geq 40\%$	$40\% < USDA \leq 70\%$	$< 70\%$	Total
2 & 13	0.306135	0.613387	0.941190	0.870991
13 & 23	0.263600	0.613386	0.874189	0.722246
23 & 33	0.251111	0.576142	0.854379	0.629741
Above 33	0.234227	0.557078	0.832048	0.531585
Total	0.248024	0.575526	0.878027	0.672918

Source: Økonomidatabase, SEGES

Figure 3.4 below we see what we were able to see in the 3.2 just based on the farm age.

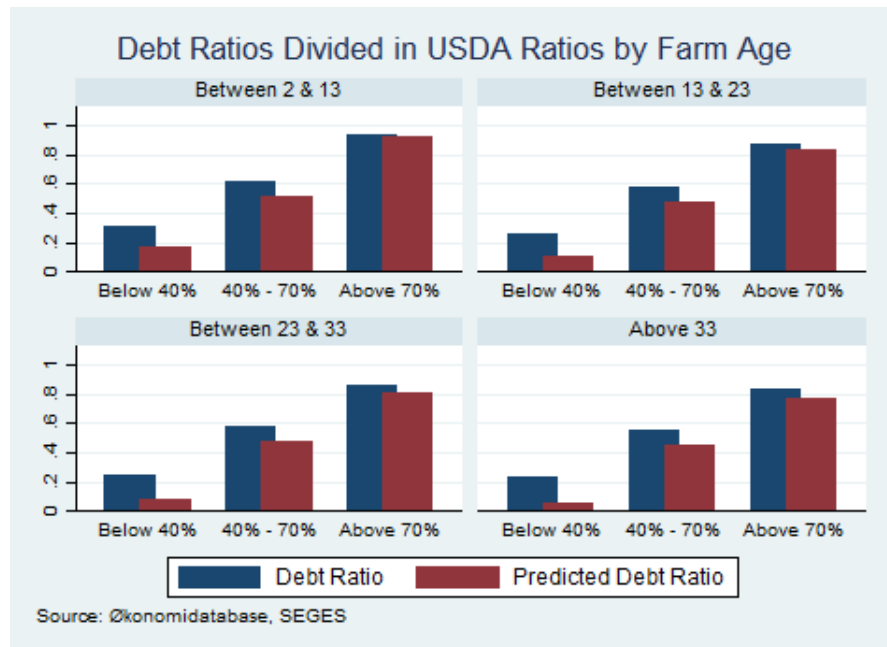


FIGURE 3.4: Target Debt Ratio Divided into Farm Age and USDA Ratios

3.1.2 Quantile Regression

TABLE 3.7: Quantile Regression Table

Variable	10th quantile		20th quantile		30th quantile	
	Estimate	<i>p</i> -value	Estimate	<i>p</i> -value	Estimate	<i>p</i> -value
lag1	0.0353	(0.546)	0.0351	(0.700)	0.0351	(0.784)
GDP	-0.0449	(0.424)	-0.0296	(0.339)	-0.0110	(0.695)
age	0.00732	(0.271)	-0.0127***	(0.000)	-0.0199***	(0.000)
prof	-5.386*	(0.026)	-5.570***	(0.000)	-6.905***	(0.000)
sd	-27.94*	(0.016)	1.301	(0.767)	15.72***	(0.001)
tang_ass_ratio	3.107***	(0.000)	2.750***	(0.000)	2.290***	(0.000)
size	0.626***	(0.000)	0.878***	(0.000)	1.005***	(0.000)
grow2	-2.825***	(0.000)	-0.705*	(0.021)	-0.105	(0.729)
nfi	0.0132*	(0.012)	0.0102*	(0.025)	0.0108*	(0.012)
tenure	-0.257	(0.073)	-0.0878	(0.195)	0.0192	(0.700)
Cons.	-1.848	(0.087)	-3.914***	(0.000)	-4.386***	(0.000)
	40th quantile		50th quantile		60th quantile	
	Estimate	<i>p</i> -value	Estimate	<i>p</i> -value	Estimate	<i>p</i> -value
lag1	0.0350	(0.826)	0.0349	(0.838)	0.115	(0.521)
GDP	0.0143	(0.698)	0.0115	(0.742)	0.0202	(0.643)
age	-0.0285***	(0.000)	-0.0370***	(0.000)	-0.0422***	(0.000)
prof	-6.755***	(0.000)	-6.712***	(0.000)	-7.586***	(0.000)
sd	27.14***	(0.000)	32.13***	(0.000)	27.50***	(0.000)
tang_ass_ratio	2.117***	(0.000)	2.083***	(0.000)	2.118***	(0.001)
size	1.033***	(0.000)	1.280***	(0.000)	1.341***	(0.000)
grow2	0.0525	(0.879)	0.677	(0.060)	1.504**	(0.001)
nfi	0.00701*	(0.049)	-0.0000232	(0.996)	0.000125	(0.983)
tenure	0.190**	(0.007)	0.230***	(0.000)	0.397***	(0.000)
Cons.	-4.203***	(0.000)	-5.250***	(0.000)	-6.051***	(0.000)
	70th quantile		80th quantile		90th quantile	
	Estimate	<i>p</i> -value	Estimate	<i>p</i> -value	Estimate	<i>p</i> -value
lag1	0.195	(0.257)	0.227	(0.144)	0.218	(0.115)
GDP	0.0189	(0.727)	-0.00733	(0.900)	0.326	(0.103)
age	-0.0502***	(0.000)	-0.0576***	(0.000)	-0.127***	(0.000)
prof	-11.38***	(0.000)	-11.98***	(0.000)	-13.36	(0.107)
sd	39.32***	(0.000)	55.31***	(0.000)	77.02*	(0.045)
tang_ass_ratio	1.446*	(0.021)	0.314	(0.713)	-3.959**	(0.004)
size	1.570***	(0.000)	1.894***	(0.000)	2.572***	(0.000)
grow2	1.629**	(0.002)	2.486***	(0.000)	7.226***	(0.000)
nfi	0.00240	(0.722)	-0.0151	(0.281)	0.00626	(0.785)
tenure	0.512***	(0.001)	0.934**	(0.001)	2.796***	(0.000)
Cons.	-6.091***	(0.000)	-7.103***	(0.000)	-8.858***	(0.000)

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.7 above reflects nine quantiles reflecting the results which have been conducted on the basis of the model by Wu et al., (2014). As stated earlier

this model should be more robust than the previous model. The first variable we see is the lagged leverage, it is positive in all the quantiles though not significant as in Wu et al., (2014), therefore we cannot make the same conclusion that farmers slowly adjust their leverage ratio in order to reach the optimal target debt ratio. The GDP variable is again different from Wu et al., (2014) and at the same time not significant, so we cannot necessarily make the same conclusion. While the MAC variable in Wu et al., (2014), which corresponds to the GDP variable here, is all negative and only decreases, the GDP variable ranges from -0.0449 to 0.326, though it does not increase from beginning to end, it actually goes from negative to positive back to negative and again back to positive. The growth rate is on average around 0.71 percent from 2006 to 2015. We cannot conclude though that the need for external capital is reduced.

The age variable is a proxy for the scope of risk aversion. The first variable which is almost identical with Wu et al., (2014). All the quantiles are negative and significant except for the first quantile which is neither negative nor significant. This of course suggests that the younger one is the more leverage. Again almost consistent with Wu et al., (2014), the effect of our profitability is negative and significant, except for in the 90th quantile. This suggests that the farms which are more leveraged and still making profits tends to use internal financing as much as possible, here suggesting that perhaps the pecking order is not that far from the farmers world as first expected. We also see that the higher the quantiles the more sensitive the leverage ratio, in fact the leverage ratio is more sensitive than in Wu et al., (2014). The volatility variable (sd) apparently has a positive, asides from the 10th quantile. The volatility variable tells us that even though it is a single-industry, specialized operations, it would seems as though there is a business risk which does have sufficient variations across the farms. This result is the complete opposite of the results in Wu et al., (2014). Besides from the 90th quantile the tangible assets ratio has a positive and significant effect. Even though the variable falls through the quantiles it stays positive until the 90th quantile. This tells us that it seems as though farmers can become very highly leveraged before it becomes a problem to borrow more money by giving guarantees on the tangible assets.

Opposite from Wu et al., (2014) I actually find that the farm size has a positive, increasing, and significant effect on the leverage. This could suggest that the more leverage a farmer has, the more cows he/she would have. Variable grow2 is positive and significant through many of the quantiles, which was to be expected. At the same time as leverage increases, this grow2 variable, suggests that it is very important that the farmers stick to increases in growth potential. An unexpected result, from the significant outcomes, of the non farm income variable suggesting that a 100% increase

in the non farm income will actually increase leverage with approximately 1 percentage point. A very unusual result. Most of the tenure variable are positive and significant. This suggest that farmers whom has smaller farms tends to have more leverage considering their size.

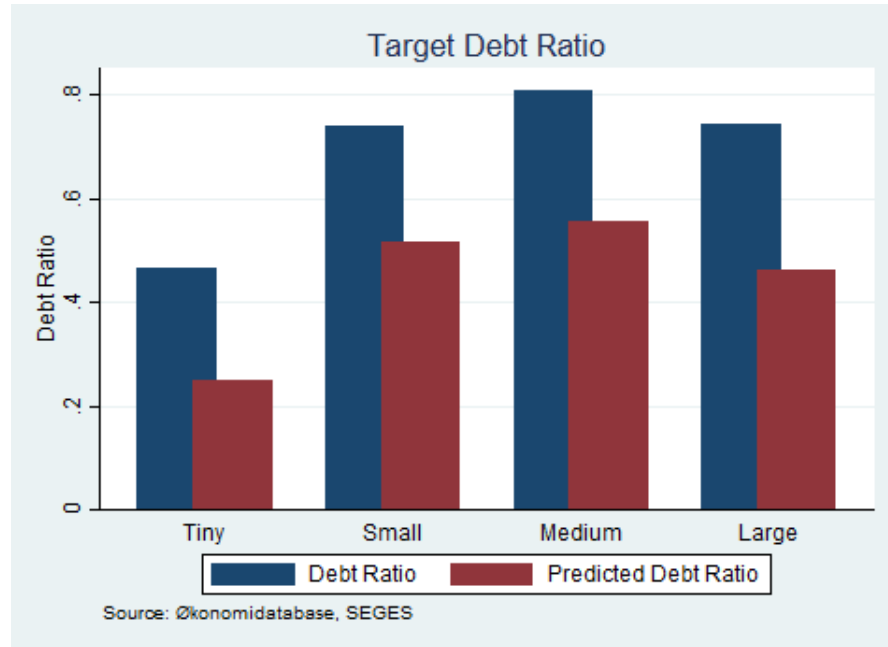


FIGURE 3.5: Target Debt Ratio Quantile Regression

Looking at figure 3.5 above we see that the the predicted leverage ratio is very much lower than the predicted in figure 3.1. Now as stated earlier it is not unexpected when considering the economic problems the Danish agriculture often finds themselves in, though seeing the big difference between the debt ratio and the predicted here it is very understandable that the Danish farms seems to be in trouble and it is obvious that they are no where near the optimal target ratio.

Turning to table 3.8 below we see the mean of the debt ratio and the predicted optimal target ratio. As stated earlier we assume that five percent, corresponding to around 900.000 DKK, is probably the limit as to how far off one should be from the optimal target ratio. Though, looking at table 3.8 we see that the difference is between 21.7 percentage points and 28.3 percentage points. This suggests that the farmers seems to be far off what the optimal level is.

TABLE 3.8: Difference in Debt Ratios Based on Size Quantile Regression

Size	Debt Ratio	Predicted Debt Ratio	Diff in Debt Ratio
Tiny	.464733	.247845	.216888
Small	.739081	.516331	.222750
Medium	.806697	.556635	.250062
Large	.743620	.460266	.283354
Total	.663860	.439047	.224813

Source: Økonomidatabase, SEGES

Now if we divide the debt ratios into the intervals defined by the U.S. Department of Agriculture, (1985) there is no major differences when it comes to the percentage of farms being in the extreme financial situation, above 70% debt ratio. Comparing these results to the preliminary results of the "Art of Foreseeing Bankruptcies" project we see that 59.73% of the small farms and 75.64% of the medium farms are at a 50% risk of going bankrupt within five years. The quantile regression actually tells us that the large farms are no longer in the risk of going bankrupt within five years as it is now. This corresponds to 87.46% of the farms with debt ratios above 70% being at risk of going bankrupt within five years. 42.40% of all dairy farms are at risk of going bankrupt within five years.

TABLE 3.9: Debt Ratios Divided into Size and USDA Ratios Quantile Regression

size	$\geq 40\%$	$40\% < USDA \leq 70\%$	$< 70\%$	Total
Tiny	0.237759	0.551698	0.813073	0.472508
Small	0.296580	0.594698	0.877147	0.747512
Medium	0.264143	0.613349	0.893232	0.816102
Large	-	0.613115	0.830271	0.761696
Total	0.249901	0.580195	0.872207	0.671111

Source: Økonomidatabase, SEGES

Turning to figure 3.6 we see the debt ratios and predicted optimal target ratio split into size and further divided in the USDA ratios. Nothing really seems out of order looking at the tiny and small farms. When looking at the large farms an interesting result is that the dairy farms with debt ratios above 70% actually should have a target which is lower than the target the dairy farms with debt ratios between 40% and 70%, which also shows that they really need to improve their debt ratios a lot. The perhaps most interesting situation that has occurred shows amongst the medium farms, the dairy farms with debt ratios below 40% actually has an optimal target ratio which is above the debt ratio they have today. It shows that they should

have a target ratio which is just below 40%. A possible reason for this could be that young farmers or newly started farms tend to have farms which is in the size group medium.

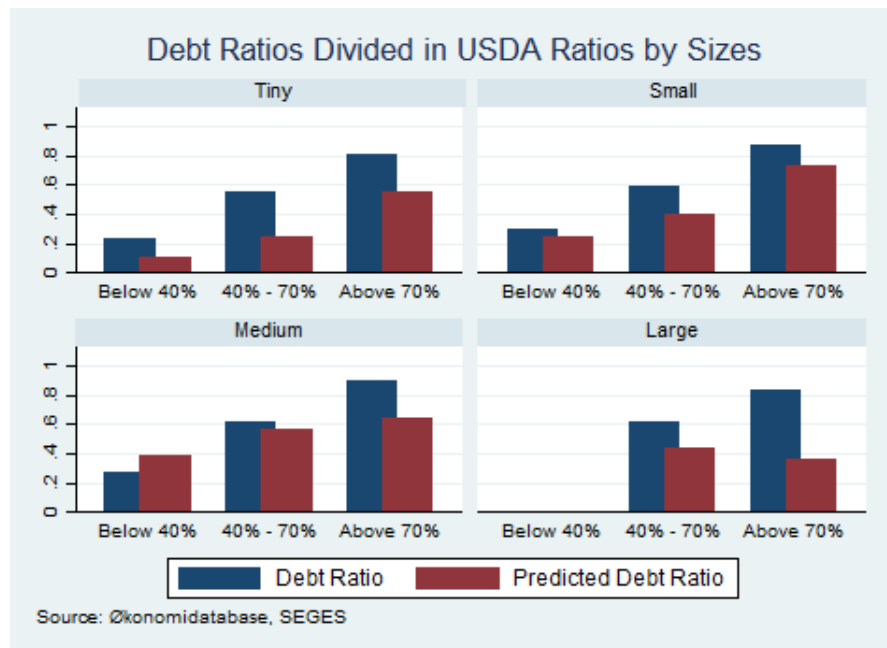


FIGURE 3.6: Target Debt Ratio Divided into Size and USDA Ratios Quantile Regression

3.2 Printure Capital Scenario

Now what happens if an investor or investors were to invest in all the dairy farms? Well an easy way too see this is to run the model once again after subtracting 20% of the debt. Of course this decrease in debt is caused of an investor and a farmer working together within the printure capital idea. The following analysis does not have the affect on the costs which is believed will be affected if printure capital would be inflicted upon the farmers. Though, already just by looking at the differences between the administrative costs plus the variable costs it would seem as though a potential of reducing the costs of around 65% is not unlikely. On average the 65% corresponds to around 113,000 DKK, and that is just for the variable and administrative costs. So this proposal of an alternative way of financing the farms in Denmark should of course be taken seriously. Back to the results. In table 3.10 below we see a regression table similar to table 3.2. At a first glance it seems as though the two are completely identical. Though at a second glance, we see some differences. The tangible assets ratio has gone from being a negatively correlated on the target optimal ratio to being positively correlated. A conclusion from this is that the new financing model actually makes it a good thing to invest in new property, plants or

machines. Also, the size variable has gone from being negatively correlated to being positively correlated with the target optimal ratio. Actually, both these variables are perhaps the first sign of there being an advantage of growing in the dairy farms industry. Or rather there is an economic advantage to being bigger. The last difference in table 3.10 from 3.2 is the result before tax variable which now shows that the target optimal ratio actually increases when the result before tax decreases.

The observant eye would of course say that the blue bar in figure 3.7 below is the same as the blue bar in 3.1, and yes almost, it certainly is an overview of the debt ratio based on size, the difference here is that we have gotten rid of 20% of the debt. This of course meaning that the average debt ratio when highest is only at 72.69%, which is around 11 percentage points lower than in the current, personal owned, situation.

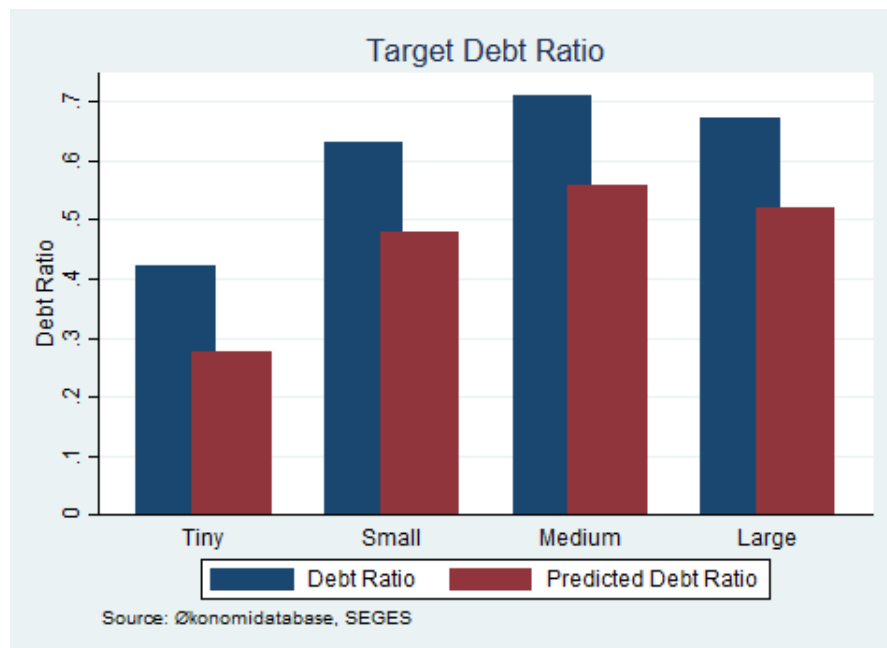


FIGURE 3.7: Target Debt Ratio Corporate Scenario

TABLE 3.10: Modified Regression Table of Equation 2.1 Corporate Scenario

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage
net_debt_iss	-0.891*** (0.0685)							-0.418*** (0.0732)
debt_ratio		0.941*** (0.0592)						0.904*** (0.0896)
sell_exp			-0.225 (0.145)					0.218 (0.136)
tang_ass_ratio				-0.586*** (0.175)				0.330 (0.288)
size					0.155*** (0.00367)			0.0124 (0.0164)
age_farm						-0.00894*** (0.000281)		-0.00104 (0.000606)
res_b_t							-9.68e-08*** (5.06e-09)	-2.70e-09 (6.67e-09)
Constant	0.426*** (0.00263)	-0.111*** (0.0333)	0.441*** (0.00598)	0.944*** (0.154)	0.145*** (0.00680)	0.648*** (0.00757)	0.454*** (0.00269)	-0.387 (0.220)
Observations	7823	7823	7823	7823	7823	7823	7823	7823
R^2	0.038	0.821	0.000	0.011	0.212	0.122	0.119	0.835
Adjusted R^2	0.038	0.821	0.000	0.010	0.212	0.122	0.119	0.835
rmse	0.227	0.0976	0.231	0.230	0.205	0.216	0.217	0.0939

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As can be seen in figure 3.7 the perhaps most obvious difference between figure 3.1 and figure 3.7 is the difference between the debt ratio and the predicted target ratio. As table 3.11 shows the difference between the average total and the average predicted is around 15 percentage points. A very big difference. Though, this analysis does not take account for changes, for example in the costs, which is likely to happen if the proposed financing model, printure capital, is actually followed in full.

TABLE 3.11: Difference in Debt Ratios Based on Size Corporate Scenario

Size	Debt Ratio	Predicted Debt Ratio	Diff in Debt Ratio
Tiny	.431767	.285178	.146589
Small	.640490	.489275	.151215
Medium	.726918	.574034	.152884
Large	.673887	.520675	.153213
Total	.589770	.439690	.150080

Source: Økonomidatabase, SEGES

Looking at table 3.12 the first positive thing to see is that there is none of the farms which are above 70% debt ratio, the extreme financial condition, which is above the 85.9% threshold of the bankruptcy project, which gives perhaps an indication that there will be more time in which to turn the "sinking ship" around. In table 3.4 we could see that 49.26% was above 70% in debt ratio, with the alternative financing model, printure capital, this is only 30,96% of the Danish dairy farmers.

TABLE 3.12: Debt Ratios Divided into Size and USDA Ratios Corporate Scenario

size	$\geq 40\%$	$40\% < USDA \leq 70\%$	$< 70\%$	Total
Tiny	0.265449	0.532268	0.815091	0.431767
Small	0.307202	0.574535	0.812432	0.640490
Medium	0.281221	0.608260	0.832552	0.726918
Large	-	0.605126	0.771299	0.673887
Total	0.275728	0.567299	0.816400	0.589770

Source: Økonomidatabase, SEGES

It is very clear, from comparing figure 3.2 and figure 3.8, that something is expected to happen, when reducing the debt with 20%. From the data used here it is obvious that when a reduction like this happens, something is expected to be done so that one can reduce the debt ratio and thereby get or maintain a healthy business.

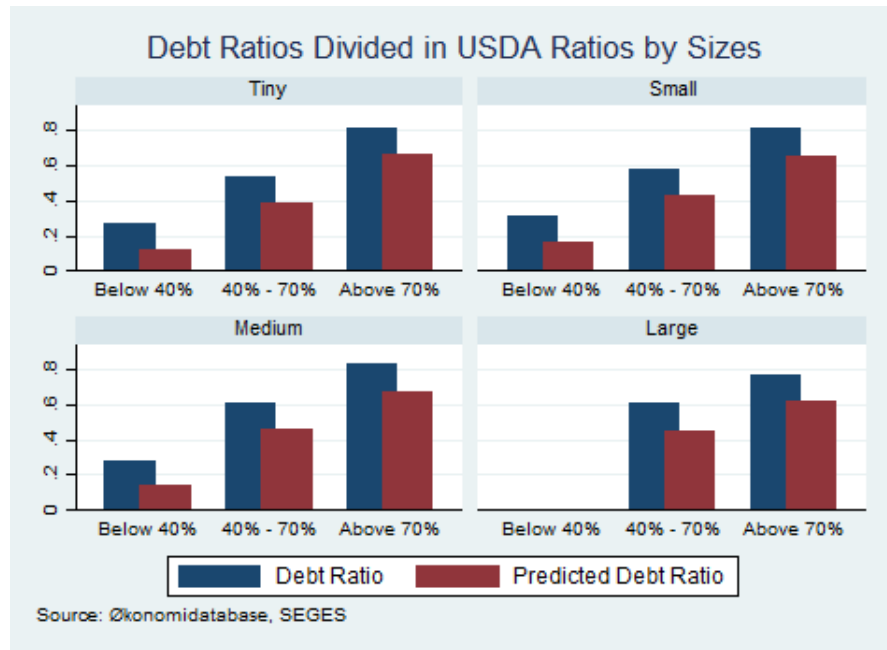


FIGURE 3.8: Target Debt Ratio Divided into Size and USDA Ratios Corporate Scenario

3.3 What Could be the Gain of Focusing on Costs

So far we have looked at what the target optimal ratio is expected to be and how far off the Danish dairy farmers seems to be in order to gain an optimal capital structure. Now something needs to be done in order to actually be able to fulfil the goal of reaching or be within reach of the target optimal ratio. The costs would seem a very good place to start looking. As stated the alternative financial model is only a proposal. It is not to be taken as a farmer in general does not no anything about economics. It very well may be that the farmer actually has a very good understanding of economics, and perhaps therefore does not need help in order to run a successful farm. The reason this alternative way of financing farms is proposed, is the assumption that farmers have a negative utility of doing the economic/administrative work which is needed in a company. It seems as though farming is a way of life, which it has been for many years. But perhaps the time has come that some started thinking of farming as a business, some has but perhaps not enough. One thing one should think about when running a business is the costs. One third of the Danish dairy farms has a serious problem regarding costs. The following tables 3.14 - 3.16 shows the average costs per cow both by the age of the farm split into the three intervals of average costs and split into the USDA ratios. Also, the tables will show the average costs per cow split into sizes and the three intervals of average costs and the USDA ratios. The costs used here are variable costs and administrative costs such as consultant fees. Also the costs include unit

costs and cash capacity costs. The financial costs have been left out, the reason for this is that the financial costs are definitely costs that is set by the for example the bank. Not something that neither the farmer nor the chosen specialist in the alternate financing model, printure capital, can do anything about, though what they do and what is influenced by what they do should influence these costs.

TABLE 3.13: Average Cost per Cow Divided into Sizes and Intervals on Avg. Costs

Size	The Best 1/3	The Middle 1/3	The Worst 1/3	Total
Tiny	21,797.26	27,791.76	33,387.14	27,154.56
Small	23,077.58	27,852.27	32,803.77	28,169.85
Medium	23,012.06	27,941.09	32,603.30	27,799.05
Large	23,791.99	27,577.4	32,192.41	27,202.56
Total	22,608.52	27,842.18	32,945.62	27,796.23

Source: Økonomidatabase, SEGES

Looking at table 3.13 above, we see that the farmers have been split into three intervals, reflecting how big their average cost per cow is based on size. One third of the farms has average costs of 32,945.62 DKK per cow which is more than 10,000 DKK per cow than the 22,608.52 DKK per cow which the best third has on average. In total this means that in that on average the farmers in the middle and worst third can save approximately 31.38%. Also we can see that the difference between the worst third and the best third is around 10,337.10 DKK. Assuming that the average farmer has around 136 cows the total in which can be expected to be saved is around 1,405,845.60 DKK. By looking at table 2 which has been conducted by Andersen, (2016b), we see that on average the result after wages to the owner is negative by 449,000 DKK. So if those farmers with the highest costs can in fact reduce their costs in practice the average result after wages to owners would be around 950,000 DKK, a positive result rather than negative.

TABLE 3.14: Average Cost per Cow Divided into Sizes and USDA Ratios

Size	$\geq 40\%$	$40\% < USDA \leq 70\%$	$< 70\%$	Total
Tiny	25,629.89	27,927.55	28,858.77	27,154.56
Small	25,691.24	28,489.71	28,223.76	28,169.85
Medium	25,862.06	27,345.50	27,964.84	27,799.05
Large	-	27,195.99	27,203.91	27,202.56
Total	25,645.11	28,181.91	28,210.62	27,796.23

Source: Økonomidatabase, SEGES

Looking towards table 3.14 we see the average costs per cow divided into the USDA ratios and size groups. Here it is very clear that there is a tendency that the farmers with the lowest debt ratio, also has the lowest costs per cow, on average. Now just to clarify, there are no financing costs included in these average costs per cow. Therefore an argument such as that the farmers which has higher debt ratios has higher costs per cow, cannot be made. The reason for which it is not included is exactly this, and by excluding it we will perhaps have a more clear view on what some farmers would need to concentrate on.

TABLE 3.15: Average Cost per Cow Divided into Farm Age and Intervals of Avg. Costs

Farm Age	The Best 1/3	The Middle 1/3	The Worst 1/3	Total
2 & 13	23,130.59	27,877.53	32,942.75	28,128.52
13 & 23	22,962.17	27,886.71	32,611.53	27,725.09
23 & 33	22,678.90	27,842.55	32,586.54	27,654.73
Above 33	22,055.54	27,787.17	33,737.12	28,026.15
Total	22,608.52	27,842.18	32,945.62	27,796.23

Source: Økonomidatabase, SEGES

In the above table 3.15 the average costs per cow has been divided into age of the farm and the three intervals made on the average costs. A perhaps surprising picture is shown. The average costs which the farmers has is very evenly split amongst the age groups, a bit surprising. Therefore it cannot be concluded that the older farms tends to have lower costs than the younger farms. This is surprising since one would perhaps expect the older farms to actually have learned through the years and perhaps optimized without actually knowing themselves. Though of course there is a difference between the older and the younger farms, the point is that the difference is not that big and perhaps one could argue that there is some costs to starting up which the older farms does not have. Neither can it be concluded that the younger farms are far off, when it comes to the costs.

A conclusion could be that the young farmers which has the highest costs, are perhaps still in a learning curve whereas the young farms which has the lowest costs, may have been in the market for some time and learned what works and what does not.

TABLE 3.16: Average Cost per Cow Divided into Farm Age and USDA Ratios

Farm Age	$\geq 40\%$	$40\% < USDA \leq 70\%$	$< 70\%$	Total
2 & 13	21,767.06	27,996.65	28,277.53	28,128.52
13 & 23	25,572.46	27,766.19	27,897.72	27,725.09
23 & 33	25,668.36	27,881.25	28,141.97	27,654.73
Above 33	25,689.47	28,914.20	28,955.06	28,026.15
Total	25,645.11	28,181.91	28,210.62	27,796.23

Source: Økonomidatabase, SEGES

Now in table 3.16 above we see the average costs split on age of the farm and the USDA ratios. Here we actually can substantiate our conclusion from before. Of course not all young farms has just been started though, it is obvious that a lot of the farms in the youngest age group with the highest debt has very high costs and hopefully this is because they have not been in the market for too long, and it is obvious that it is possible to lower your costs substantially.

TABLE 3.17: Average Cost per Cow Divided into sizes and Intervals on AVG. Costs 2015

Size	The Best 1/3	The Middle 1/3	The Worst 1/3	Total
Tiny	23,374.60	29,611.35	35,091.57	28,777.79
Small	24,596.60	29,405.56	33,867.72	29,672.83
Medium	24,632.97	29,355.67	33,364.42	28,726.03
Large	24,933.07	29,676.42	34,985.10	28,663.86
Total	24,194.37	29,457.05	34,147.78	29,266.40

Source: Økonomidatabase, SEGES

The above table 3.17 is a reflection of table 3.13. The difference here is that table 3.17 is only showing the values for one year, the year 2015. This is to give an immediate view of the situation in which the farmers are in. Table 3.13 shows how the farmers have done through years, perhaps that is not the best way of showing what they could be able to do. On Average in total the farmers which has the highest average costs per cow are actually able to or should be able to save around 29.15% on their average costs. This corresponds to 9,953.41 DKK per cow or 1,393,477.40 DKK which they are able to save on an average of 140 cows per farm. Going into sizes we can see that the tiny sized farms has an average difference between the highest average costs and the lowest average costs of 11,716.97 DKK per cow or 820,187.90 DKK for an average 70 cows per farm, this corresponds to 33.39% which one could expect to save on costs alone. The small sized farms has a possibility of saving around 27.37% or 1,344,312.40 DKK, the

medium farms has possibility of saving 26.17% or 2,051,890.75 DKK and the large farms has a possibility of saving 28.73% or 3,266,909.75 DKK on costs alone. Again, looking at table 2 conducted by Andersen, (2016b) it should be obvious that these savings will actually have very positive effect on the results and show a positive result rather than a negative result.

What these tables with the average costs per cow shows, is perhaps that many farmers do think of their work as a lifestyle, though if the farmers are willing to think of their farms as businesses, perhaps unified with their lifestyle, there are very big opportunities in which one could avoid the possibility of bankruptcies. As stated the alternative financing model, printure capital, is only a proposal made of the belief that many farmers has a negative utility when it comes to do the work which has the business aspect, and therefore the proposal is made in order to keep the farmer doing what he is good at, what he loves. Therefore, it is not stated that the farmer cannot do this minimizing of the costs himself only that he may be better off with someone who like doing the work which has the business aspect, and one could conclude that with the savings which are possible one would have money to gain this specialist and still have a positive result.

Chapter 4

Discussion

4.1 Critiques of the Models

An issue with the model which has been modified in order to be applicable for the agriculture is as with the quantile regression model a descriptive analysis. That is the model is based on historic data and describes what has happened and then based on that the model tries and predict what the target ratio should be. As said it is based on history why some might say it does not give an immediate picture of the situation as it is now. That is why the modified model has been run again both for the corporate/printure capital scenario and the current personal owned farms scenario on only the year 2015. These results can be seen in both A and B. The results shows some difference to the historic results but nothing in which is so different that it should be taken into consideration. Also, it is perhaps more correct to define the target ratio on historic data rather than one single year. Though, a single years debt ratio is perhaps what the optimal target ratio should be held up against in order to give a clearer picture as to how far off farms or companies is. Though, again the results found in both A and B is not that different from the model in the results which is why this is not done.

4.1.1 "The Art of Foreseeing Bankruptcies"

A perhaps valuable model in order to know when to have certain focus on farms. Though, a model at which some are not too happy to look at. Yes, it has its advantages in telling when one can expect someone to go bankrupt and perhaps it can even tell why the risk of going bankrupt is happening. It should be very important to keep this very close at hand since some problems can occur when telling the "world" that one can foresee if someone is at risk of going bankrupt. Telling if someone is at risk of going bankrupt is perhaps not a new big discovery, though certain problems do arise. If say the banks or other creditors gets their hands on these calculations they will of course use them to their advantage. A problem which is ongoing is the mortgage banks and banks increasing the risk premium on loans, with a tool like this there might be some incentive to increase the risk premium

even more in order to gain some of the losses in which they are at risk of having, since some farmers are in risk of going bankrupt because of too much debt. The biggest problem seems to be that in general there is a very big focus on how much debt a farmer has and how effective a farmer is. It seems that a focus on solutions to the problems of which many already are aware of is neglected for the most part. To some this model seems like a "hammer" to the face. It could seem as though some are trying to point out which farms are doing worst and not wanting to do anything about it. Though, the project is not yet done and will not be before the spring of 2017, so the use of the project is still unclear, but one could think of the model as a tool in order to locate those whom are in an immediate threat of going bankrupt and try and help them out of the situation. Making solutions that is focused on the farm rather than making a whole solution which might help some but not all. In other words it might be a tool that is made to actually try and prevent farms from going bankrupt and take action when there is still time. For that the model would be really good, though some still have reservations as to what the model is going to be used for.

4.1.2 Target Optimal Debt Ratio

The two models gives the idea that something should be done in order to be within an acceptable limit of the target debt ratio. The quantile regression model shows that the dairy farms are very far of the target which of course is not good. Though, by knowing that the Danish banks and mortgage banks has in general been much more liberal when it comes to lending money to farmers compared to many other countries. With that in mind one could conclude that the optimal target ratio is perhaps likely to be where the modified model predicts it should. Though, knowing that the quantile regression model has been made in order to be able to apply it directly on the agriculture, a conclusion could be that neither are more correct than the other and therefore the target ratio is perhaps somewhere in between the two predicted target ratios.

Of course this analysis has focused on dairy farmers, but both the modified model and the quantile regression model are both applicable to all the other branch's of farming. Though, perhaps the best way to get a good result is to do the analysis on each branch on its own, in order to get the best picture of each branch.

4.2 AP-Model vs. Printure Capital

The AP-model seems like a good tool in order to enter the farming market. The model gives new farmers the opportunity to access the market without

a whole lot of cash on hand. Though, I see some problems regarding the end of the lease period. What happens when the 10 years are up. The farmer would either need to buy back the farm if he can get the loans, what my mind leads towards then is that the farmer ends in the same situation as the farmers are in now, the biggest problem being that the farmer then has less years in which he can pay back the loans obtained in order to buy the farm. Another solution is that the farmer stops farming because he cannot find enough money to buy the farm from the owners of the buildings and soil.

The printure capital proposes a few different alternative ways of running the farms. The perhaps most frightening, for the farmers, is the proposal of selling some of the company to an investor. Though, the farmer gives up part of his independence there should be a good chance that if or when the investor and the farmer decides to stop the corporation the farmer should be equipped with a healthy economy and perhaps even hire someone to keep doing what the investors did, because hopefully now the farmer has the economy to hire a worker for this, and still be independent. The pipe dream would be that the investors helped the farmers see the potential in the agriculture and that the farmers starts to develop their industry so that it would be an industry which is very much like the other industries we see.

If one wants to run a big farm it should run as a business, not a way of life. Throughout the work of this thesis, many has nodded approvingly of this statement. Even though, it seems as though that there is a non-cooperativeness as to enlighten this. It seems that perhaps some have tried once or twice to propose something like this and the proposal has been knocked down, which have led to the idea of just letting it be as it is. As stated earlier a focus on minimizing costs have seem to be neglected rather than been taken care of, and it would seem that this is perhaps one reason the agriculture seems to be in economic trouble most of the time.

Chapter 5

Conclusion

This thesis has focused on giving farmers and interested parties an idea of how the capital structure in the agriculture, focusing solely on the Danish Dairy farms, looks. The Danish agriculture has been and in many ways still are in very big financial problems. Perhaps the only opportunity for Danish farmers to obtain financing in order to do investments or buy a farm or even in some cases finance the operation of their firm, is by obtaining debt. As has been explained through the thesis debt is not a bad thing. Debt can even be a very good thing, but only to a certain point. This point is where the tax advantages of obtaining debt evens out but also the point at which the value of a firm starts to decrease when one obtains more debt.

This thesis proposes an alternative way of financing. The proposal is somewhat similar to both private equity and venture capital. The main idea of this alternative financing, which has been given the very inventive name printure capital, is that an investor not only provides capital for the farmer but also engages in helping the farmer stepping out of his or her lifestyle and working with the farm as business. This thesis has found that there is a very big potential in decreasing the costs, which perhaps is not within the farmers abilities to do, and therefore the proposal of the investor engaging in daily business by focusing on optimizing the farm business.

When looking at the capital structure on the personal owned farms a modified model has been applied in order to predict the target ratio. The model by Hovakimian et al., (2004) has been modified in order to make it a better fit for the agriculture.

The modified model shows that the Danish farms debt ratio are well above the predicted optimal target ratio. This of course is not an immediate sign that the farms are in big trouble, this is indicating that something perhaps should be changed in order to be within an acceptable limit of the target ratio. Having a target ratio does not mean one has to be at the target. Hovakimian et al., (2004) explains that it is nearly impossible to be at the target, rather it is common that one is either a little too high or a little too low of the target. The debt ratios has been split up in a table into sizes and USDA ratios. These USDA ratios was defined back in 1986 in order to define when a farm had an extreme financial situation and when a farm

was in good financial conditions. Though some regards to these intervals should be taken. The perhaps most important regard to take into account is the age of the farm. Younger farms tend to have a higher debt ratio on average, which makes sense since the youngest farmers enters the market with almost no cash and mostly debt.

Another model has been applied in order to make it clear that the current debt ratios are too high. The quantile regression which has been proposed by Wu et al., (2014) should be a more robust estimate of the effects different variables has on the target ratio. This model shows that the farmers are very far off from the target, around 22 percentage points off, which is a lot. The thesis makes the assumption that the limit off the target should be at 5 percentage points, which is very clear the farms are not even near. A conclusion based on these two models is that something should be done in order to reduce the debt ratios as they are now.

A problem with reducing the debt ratios is that there needs to be money in order to pay some of the debt. Money which, by looking at table 2 in the article by Andersen, (2016b), is not there. But where are the money then going to come from? One way could be by trying and find investors willing too engage in the printure capital model. Another is that the farmer takes himself or herself by the neck and starts running their farm as a real business.

By engaging in the printure capital model, the modified model shows that many of the farms will be "saved" from being in deep trouble. Even though a lot of farms still would have a debt ratio above 70% it is clear it definitely helps. But getting an investor is only the first step of reducing the debt ratio and turning the farm into a business. The idea of the investor is to help the farmer optimizing the farm, one way is to minimize the costs. A surprising scenario occurs when looking at the average cost per cows split into the four sizes made and split into three groups. It is seen that the "tiny" farms which have the lowest costs actually have the lowest average costs per cow overall, which suggests that the bigger farms should look towards what they do. Now there is of course some differences from farm to farm which might make it more costly per cow. Still the farmers which has the highest costs can potentially save around 31% on costs alone, which on average is around 1.400.000 DKK. Returning to the article by Andersen, (2016b) we see that the average farm has result which is -449.000 DKK. This could be changed by focusing on the costs to a positive result, a very nice one even.

Appendix A

Single year results

In the below there are corresponding tables and figures as to the ones which are presented in section 3.1. The only difference here is that the following tables and figures are made on only a single year as to see whether or not the regressions, tables and figures made in section 3.1 gives a rightful estimate as to the state at which the farmers are currently in.

A.1 Single Year View

TABLE A.1: Modified Regression of Equation 2.1 Single Year

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage
net_debt_iss	-0.819*** (0.167)							-0.356** (0.111)
debt_ratio		1.295*** (0.0417)						1.309*** (0.0471)
sell_exp			0.601 (0.706)					0.647* (0.310)
tang_ass_ratio				-0.121 (0.182)				-0.568*** (0.0799)
size					0.194*** (0.0134)			-0.0178** (0.00592)
age_farm						-0.0129*** (0.00110)		-0.00113** (0.000394)
res_b_t							-9.25e-08*** (2.60e-08)	3.29e-09 (4.54e-09)
_cons	0.609*** (0.0101)	-0.271*** (0.0259)	0.587*** (0.0275)	0.712*** (0.153)	0.242*** (0.0248)	0.911*** (0.0297)	0.651*** (0.0151)	0.219*** (0.0534)
<i>N</i>	1176	1176	1176	1176	1176	1176	1176	1176
<i>R</i> ²	0.022	0.843	0.001	0.000	0.157	0.110	0.044	0.859
adj. <i>R</i> ²	0.022	0.843	-0.000	-0.000	0.156	0.110	0.043	0.858
rmse	0.347	0.139	0.351	0.351	0.322	0.331	0.343	0.132

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A.1.0.1 Target vs. Debt Ratio in a Single Year Perspective

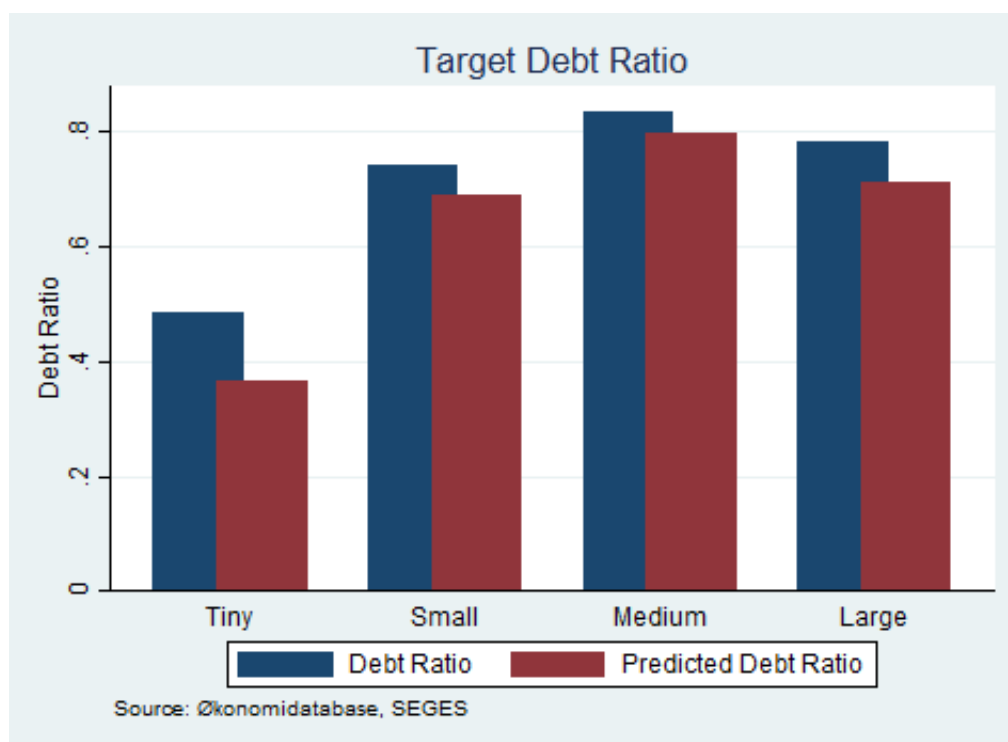


FIGURE A.1: Target Debt Ratio Single Year

TABLE A.2: Difference in Debt Ratios Based on Size Single Year

Size	Debt Ratio	Predicted Debt Ratio	Diff in Debt Ratio
Tiny	.483211	.365879	.117332
Small	.741987	.688061	.053926
Medium	.832802	.794887	.037915
Large	.779771	.708958	.070812
Total	.682174	.612081	.070093

Source: Økonomidatabase, SEGES

TABLE A.3: Debt Ratios Divided into Size and USDA Ratios
Single Year

size	$\geq 40\%$	$40\% < USDA \leq 70\%$	$< 70\%$	Total
Tiny	0.212721	0.545831	0.811250	0.483211
Obs.	-	-	-	-
Small	0.280306	0.587034	0.872388	0.741987
Obs.	-	-	-	-
Medium	0.282722	0.616039	0.909141	0.832802
Obs.	-	-	-	-
Large	-	0.609563	0.841664	0.779770
Obs.	-	-	-	-
Total	0.228192	0.575318	0.871947	0.682174
Obs.	-	-	-	-

Source: Økonomidatabase, SEGES

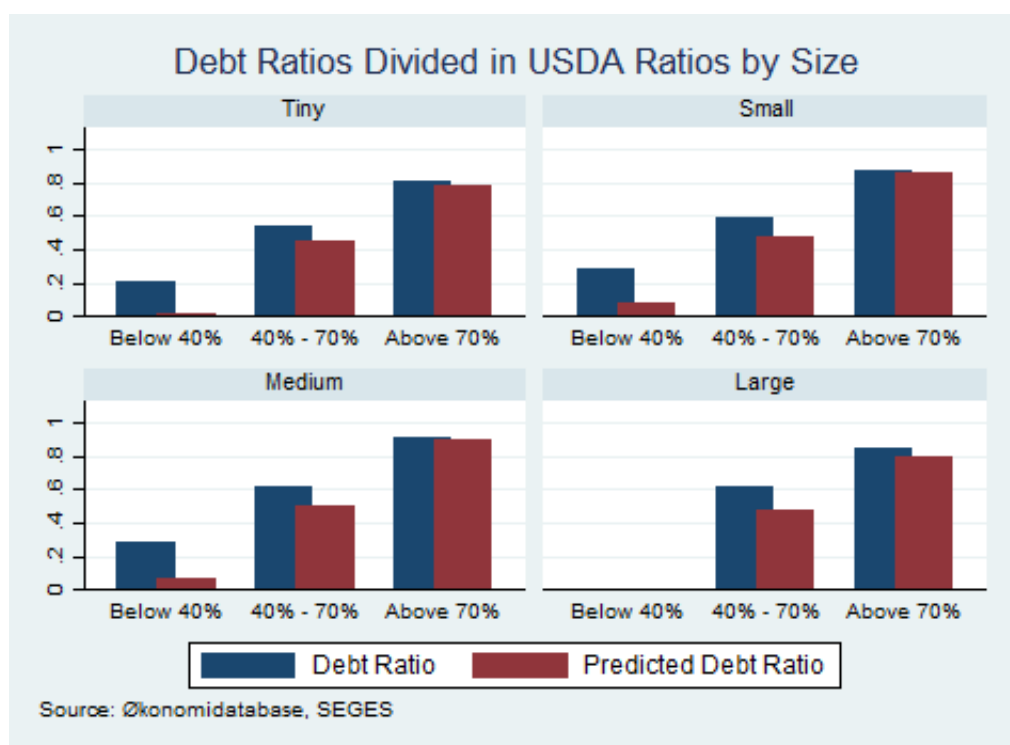


FIGURE A.2: Target Debt Ratio over Size Single Year

A.1.0.2 Age

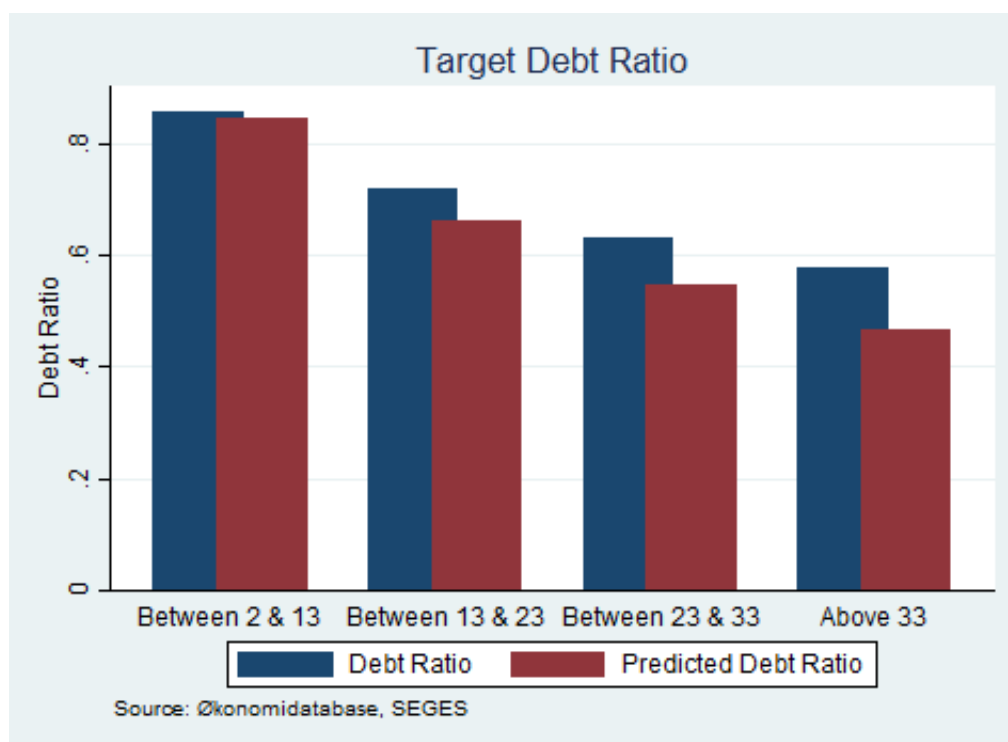


FIGURE A.3: Target Debt Ratio over Farm Age Single Year

TABLE A.4: Difference in Debt Ratios Based on Farm Age Single Year

Farm Age	Debt Ratio	Predicted Debt Ratio	Diff. in Debt Ratio
2 & 13	.855258	.844374	.010884
13 & 23	.718280	.660813	.057466
23 & 33	.631506	.545191	.086315
Above 33	.577433	.467845	.109588
Total	.682174	.612081	.070093

Source: Økonomidatabase, SEGES

TABLE A.5: Debt Ratios Divided into Farm Age and USDA Ratios Single Year

Age Group	$\geq 40\%$	$40\% < USDA \leq 70\%$	$< 70\%$	Total
2 & 13	0.302384	0.603536	0.930982	0.855258
Obs.	-	-	-	-
13 & 23	0.249620	0.577399	0.866722	0.718279
Obs.	-	-	-	-
23 & 33	0.223702	0.575525	0.845491	0.631506
Obs.	-	-	-	-
Above 33	0.217412	0.559008	0.862329	0.577433
Obs.	-	-	-	-
Total	0.228192	0.575318	0.871947	0.682174
Obs.	-	-	-	-

Source: Økonomidatabase, SEGES

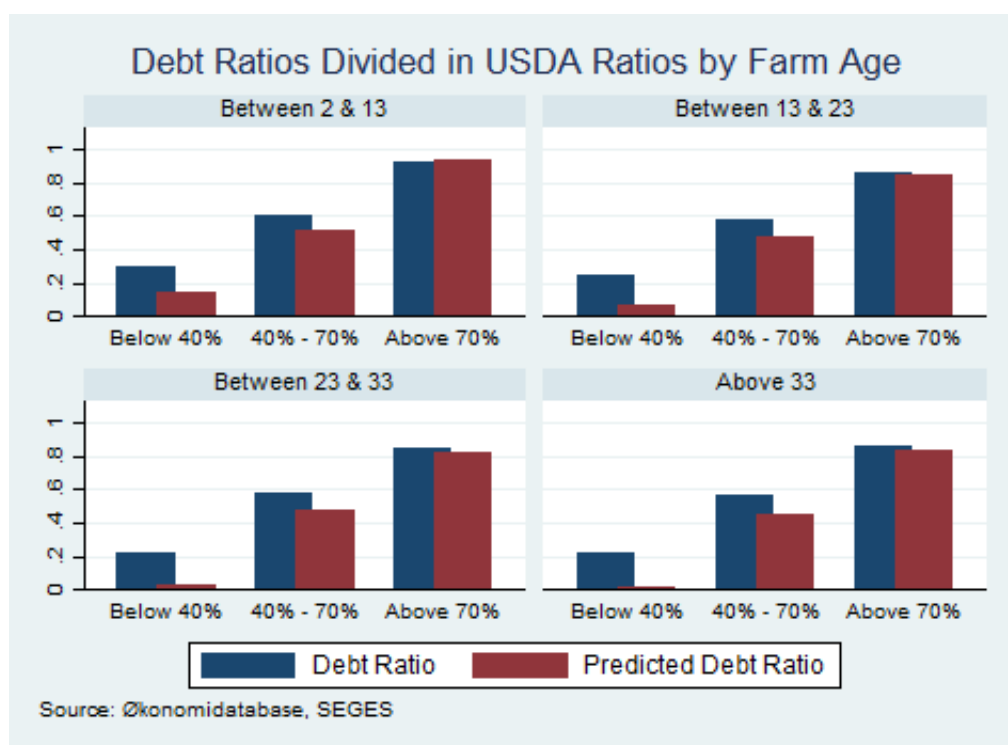


FIGURE A.4: Target Debt Ratio Divided into Farm Age and USDA Ratios Single Year

Appendix B

Single Year Alternate Financing Results

In the below there are corresponding tables and figures as to the ones which are presented in section 3.2. The only difference here is that the following tables and figures are made on only a single year as to see whether or not the regressions, tables and figures made in section 3.2 gives a rightful estimate as to the state at which the farmers are currently in.

TABLE B.1: Modified Regression of Equation 2.1 Corporate Scenario Single Year

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage	post_issue_leverage
net_debt_iss	-0.602*** (0.122)							-0.292*** (0.0376)
debt_ratio		1.025*** (0.0119)						1.023*** (0.0138)
sell_exp			-0.201 (0.401)					-0.0248 (0.100)
tang_ass_ratio				-2.362*** (0.246)				-0.0425 (0.0632)
size					0.129*** (0.00814)			-0.00443* (0.00192)
age_farm						-0.00710*** (0.000648)		-0.000324* (0.000146)
res_b_t							-5.54e-08** (1.76e-08)	2.95e-09 (1.94e-09)
_cons	0.456*** (0.00612)	-0.160*** (0.00691)	0.466*** (0.0170)	2.579*** (0.221)	0.211*** (0.0157)	0.621*** (0.0160)	0.480*** (0.00907)	-0.105 (0.0590)
<i>N</i>	1094	1094	1094	1094	1094	1094	1094	1094
<i>R</i> ²	0.021	0.954	0.000	0.099	0.195	0.097	0.045	0.959
adj. <i>R</i> ²	0.020	0.954	-0.001	0.098	0.194	0.096	0.044	0.958
rmse	0.202	0.0439	0.204	0.194	0.183	0.194	0.199	0.0416

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

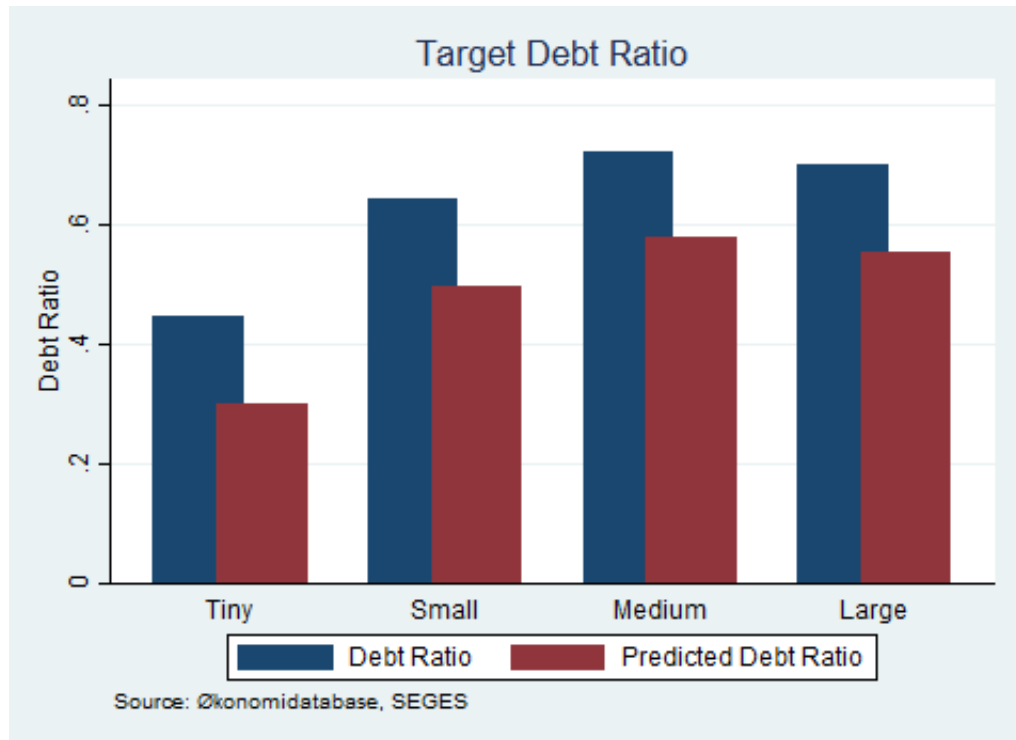
B.0.0.1 Target vs. Debt Ratio in a Single Year and Corporate Setting

FIGURE B.1: Target Debt Ratio Corporate Scenario Single Year

TABLE B.2: Difference in Debt Ratios Based on Size Corporate Scenario Single Year

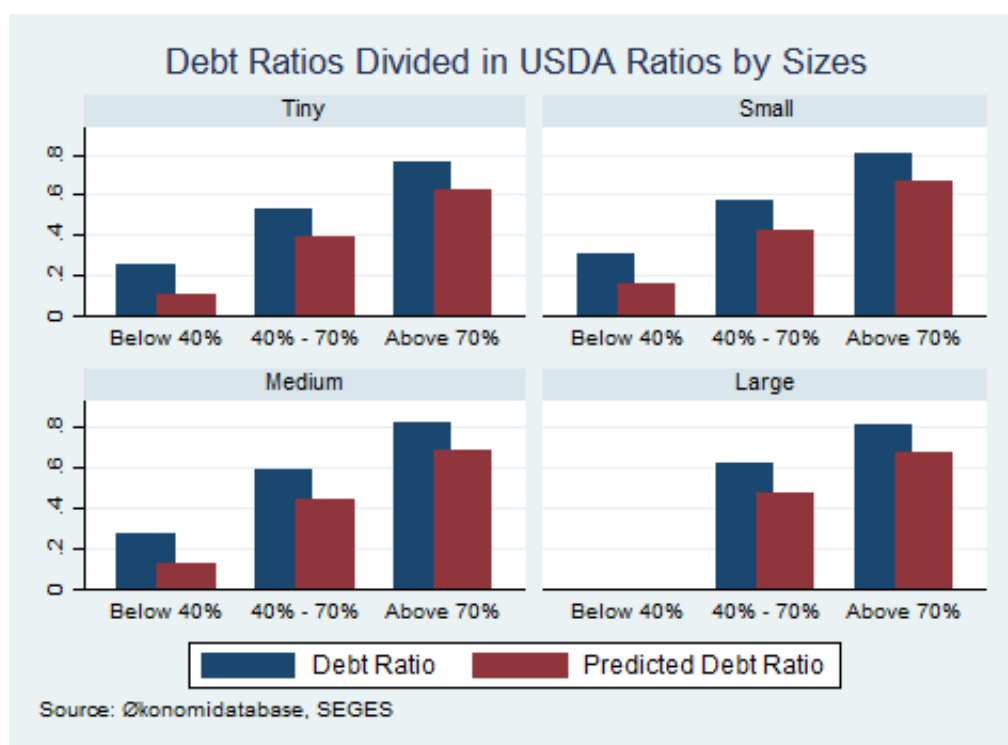
Size	Debt Ratio	Predicted Debt Ratio	Diff in Debt Ratio
Tiny	.446016	.300035	.145981
Small	.641957	.498362	.143595
Medium	.722835	.577647	.145188
Large	.699889	.555297	.144592
Total	.602177	.457707	.144469

Source: Økonomidatabase, SEGES

TABLE B.3: Debt Ratios Divided into Size and USDA Ratios
Corporate Scenario Single Year

size	$\geq 40\%$	$40\% < USDA \leq 70\%$	$< 70\%$	Total
Tiny	0.261311	0.530475	0.762514	0.446016
Obs.	-	-	-	-
Small	0.312259	0.572003	0.804902	0.641957
Obs.	-	-	-	-
Medium	0.279461	0.595822	0.825259	0.722835
Obs.	-	-	-	-
Large	-	0.623026	0.815184	0.699889
Obs.	-	-	-	-
Total	0.275775	0.564487	0.807338	0.602177
Obs.	-	-	-	-

Source: Økonomidatabase, SEGES

FIGURE B.2: Target Debt Ratio over Size and USDA Ratios
Corporate Scenario Single Year

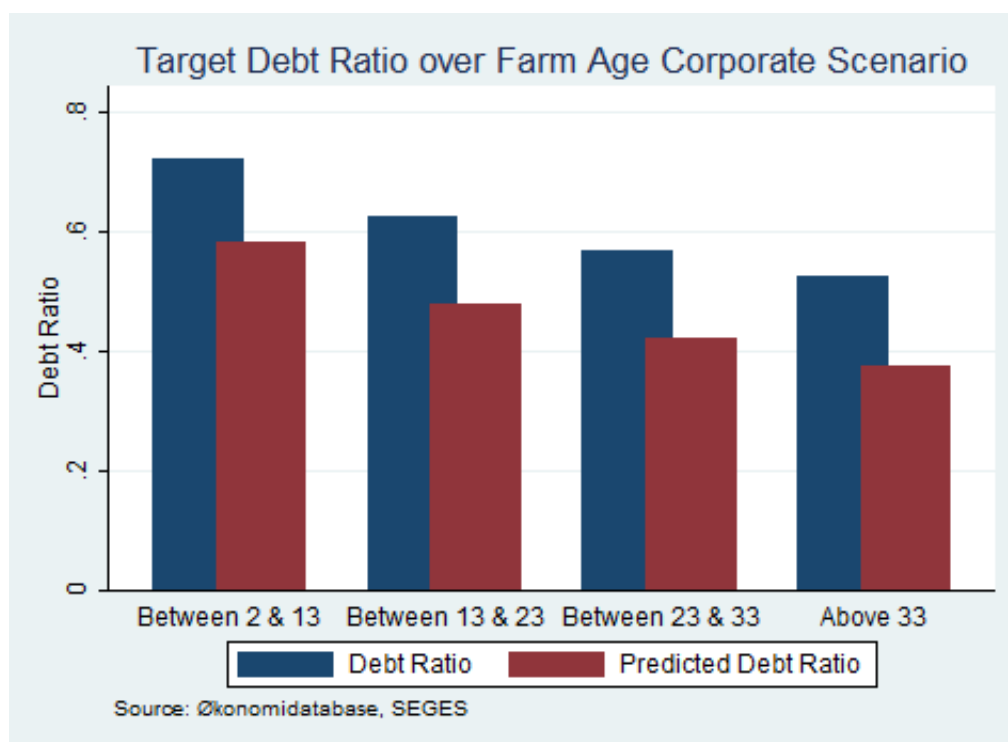
B.0.0.2 Age

FIGURE B.3: Target Debt Ratio over Farm Age Corporate Scenario Single Year

TABLE B.4: Difference in Debt Ratios Based on Farm Age Corporate Scenario Single Year

Farm Age	Debt Ratio	Predicted Debt Ratio	Diff. in Debt Ratio
2 & 13	.720621	.583326	.137295
13 & 23	.624213	.480706	.143507
23 & 33	.569594	.423387	.146207
Above 33	.525735	.376927	.148808
Total	.602177	.457707	.144469

Source: Økonomidatabase, SEGES

TABLE B.5: Debt Ratios Divided into Farm Age and USDA Ratios Corporate Scenario Single Year

Farm Age	$\geq 40\%$	$40\% < USDA \leq 70\%$	$< 70\%$	Total
2 & 13	0.358981	0.590156	0.834717	0.720621
Obs.	-	-	-	-
13 & 23	0.278001	0.562695	0.802602	0.624213
Obs.	-	-	-	-
23 & 33	0.269790	0.564001	0.795984	0.569594
Obs.	-	-	-	-
Above 33	0.277081	0.551304	0.799137	0.525735
Obs.	-	-	-	-
Total	0.275775	0.564487	0.807338	0.602177
Obs.	-	-	-	-

Source: Økonomidatabase, SEGES

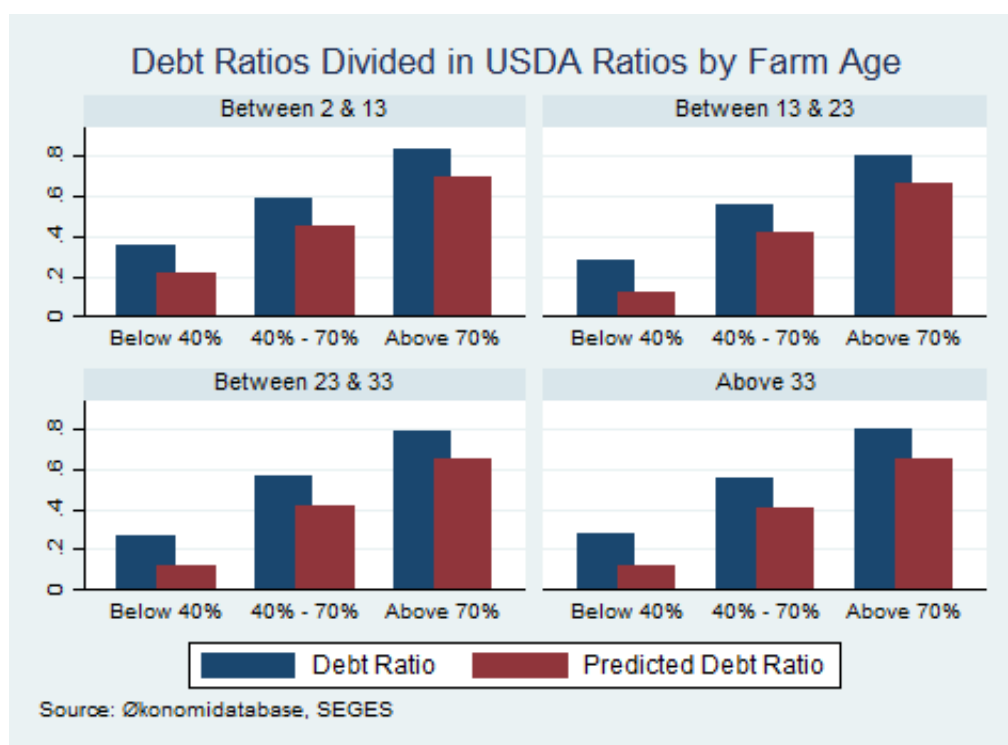


FIGURE B.4: Target Debt Ratio Divided into Farm Age and USDA Ratios Corporate Scenario Single Year

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