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Department of Economics

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- A comparative qualitative study

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Charlotte Eke-Göransson & Magnus Rinman

Abstract

Deregulation on the market for agricultural products leads to a more globalised market with increasing price fluctuations. This, in turn, places the farmer in positions influenced by new risks but also improved opportunities. The farmers are faced by uncertainty in terms of financial outcome. To be able to utilise these new market conditions it becomes increasingly important for farmers to continuously follow the price trend, and to develop strategies how to manage the risks exposed by a volatile market.

Farmers with different conditions perceive risk in different ways. Hence, their risk management behaviour will vary. The aim of this study is to investigate differences in selling strategies of grain between diversified farmer (crop and livestock producers) and non-diversified farmers (crop producers). The diversified farmers use a major quantity of their grain as feed, while the non-diversified farmers are forced to manage a greater quantity of cash crop. Thus, the selling strategies will obviously vary. Therefore, a further investigation is to realise the farmers' attitudes and preferences towards risk, which is made through the theoretical framework of decision-making theory, expected utility theory and portfolio theory.

The study is conducted as a qualitative research study. The empirical material is gathered through in depth-interviews with 12 farmers, where 5 of the farmers are diversified and 7 are non-diversified. The farmers are located in the southern part of Sweden, from Mälardalen in the north to Scania in the south.

The following 6 conclusions can be distinguished in the study:

- *Diversified farmers are more intuitive in their decision making approaches than non-diversified farmers.*
- *Diversified farmers are generally more risk averse than non-diversified farmers.*
- *Non-diversified farmers tend to sell a larger share on the spot market.*
- *Both diversified and non-diversified farmers reveal a weak knowledge about the value of their production cost for crops.*
- *Farmers that rent a greater acreage are more likely to use hedging tools.*
- *Diversified farmers are more likely to have storage capacity for a total harvest.*

Those are the major differences that separate the two groups. The differences are due to several factors. A particularly important factor is found to be the farm's geographic location, that is, if the farm can utilise comparative advantages. Comparative advantages that occur due to farm location in relation to nearest crop company.

Sammanfattning

Spannmålsmarknaden har mött stora förändringar under de senaste åren, delvis till följd av avreglering av marknaden för jordbruksprodukter och ökat intresse för råvaruinvesteringar. Detta leder bland annat till att spannmålspriserna fluktuerar kraftigare än vad de gjort tidigare. Lantbrukaren påverkas således av nya risker, kunskap och tillämpning av riskhantering i jordbruket blir allt viktigare. Genom prissäkring kan lantbrukaren säkra sig mot oväntade prisfluktuationer och för att kunna tillgodogöra sig dessa fördelar krävs kontinuerlig kunskap om prisutvecklingen på marknaden.

Denna studie syftar till att identifiera skillnaderna mellan diversifierade lantbrukare (animalie- och spannmålsproducenter) och icke diversifierade (endast spannmålsproducenter) lantbrukare. Dessa två grupper har olika förutsättningar. De flesta diversifierade lantbrukarna använder en större kvantitet av den egenproducerade spannmålen som foder, vilket i förlängningen är ett sätt att hantera en volatil prismarknad. Icke diversifierade lantbrukare möter utmaningen att hantera den volatila marknaden genom att utveckla olika försäljningsstrategier. Detta kan betyda att de två grupperna har olika inställning till risk. Skillnaderna som studien syftar till att undersöka är; preferenser och attityder gentemot risk samt utformningen av prissäkringsstrategier. Undersökningen görs utifrån teoribakgrunden; beslutsfattarteorin, förväntad nyttoteorin och portföljteorin.

Det empiriska materialet inhämtas genom 12 djupintervjuer med lantbrukare som är aktiva i den södra delen av Sverige, varav fem är diversifierade och sju är icke diversifierade lantbrukare.

Följande sex slutsatser kan fastställas av studien:

- *Diversifierade lantbrukare är mer intuitiva i sitt beslutsfattande.*
- *Diversifierade lantbrukare är generellt sett mer riskaversiva.*
- *Icke diversifierade lantbrukare tenderar till att sälja mer på spotmarknaden.*
- *Båda grupperna visar bristande kännedom om sina produktionskostnader.*
- *Lantbrukare som arrenderar en större andel areal visar större benägenhet att använda sig av prissäkringsinstrument.*
- *Diversifierade lantbrukare har lagringskapacitet för hela skörden i större utsträckning.*

Dessa slutsatser visar sig vara de tydligaste skillnaderna mellan de två grupperna, skillnaderna beror på ett flertal faktorer. En lantbrukares prissäkringsstrategi kan även bero på gårdens geografiska förhållande. Närheten till lokal spannmålshandlare vilket uttrycks som komparativa fördelar i studien är ytterligare en faktor som visar sig påverka lantbrukarens beslutsfattande.

Table of Contents

1 Introduction

The first chapter aims to introduce the reader in the subject through a background description and a systematic review of various hedging instrument. This is followed by a formulation based on the researchers' perception of the problem, aim of the study, delimitations and an outline of the study.

1.1 Background

The harvest year of 2009 was a notable good year in terms of both quantity and quality (Lantmännen, 2009). The same situation occurred in Europe and the rest of the world. Unfortunately, this success resulted in a dramatically drop in grain prices. Due to this, Lantmännen Lantbruk Sverige put large resources in the development of new business strategies to trade crops. They are now one of the leaders within this field in the Swedish crop market. For the period of 2009 were 200 000 ton traded with futures contract, which is equal to a value six times larger than in 2008.

Producers interest in futures trade continues to increase, and a growing number of farmers choose to use futures markets (www, atl 1, 2011). It is important to gain insights into the characteristics of farmers who use futures markets, although, the trend depicted above reveal that Swedish farmers in general holds a stronger willingness to use futures contract today than just a few years ago. Several factors influence the producers' incentives to use futures contract while one of the main reason is considered to be the current price fluctuations. Only 31% of a firms' revenue risk depends on the quality of the harvest while 69% depends on the price (www, atl 2, 2011). Other factors that plays an important role in their use of futures contract are psychological constructs related to market orientation, risk exposure, market performance and entrepreneurial behaviour (Pennings & Leuthold, 2000).

The price volatility worldwide in combination with the ongoing deregulation of the market for agricultural products makes it important for producers to follow the development on the market; in terms of what affects the market and what will decide the direction of the price changes (SJV 1, 2008). This kind of market is challenging which enhances the importance of a producers' continuous knowledge of how to be able to hedge prices at the most advantageous moment. For instance, the deregulation is creating a market that is more globalized. This means that supply and demand and thus the pricing pattern depends on numerous more factors than was the case in the old regulated environment. In other words, producers are facing countless buyers in both countries and industries worldwide. Under these new conditions the producers can no longer rely on intervention by the government or EU.

Before the price peak during 2007/2008 the Swedish grain prices followed the price trend worldwide with relatively stable prices (SJV 1, 2010). After the peak the prices decreased to a level below the stable price which was current before the peak. OECD (Organisation for Economic Co-operation and Development) in collaboration with FAO (Food and Agriculture Organization) expects the world market price to rise above the price prevailing between 1997 and 2006, although, the price will not exceed the peak during 2007/2008. Reasons for the price increase may be attributable to increased costs in agriculture and a rise in demand due to increased population growth and prosperity. An increasing use of ethanol and biodiesel

further contributes to an increasing demand of grains. Figure 1 illustrates the average price volatility for wheat and corn for the years between 1990 and 2010.

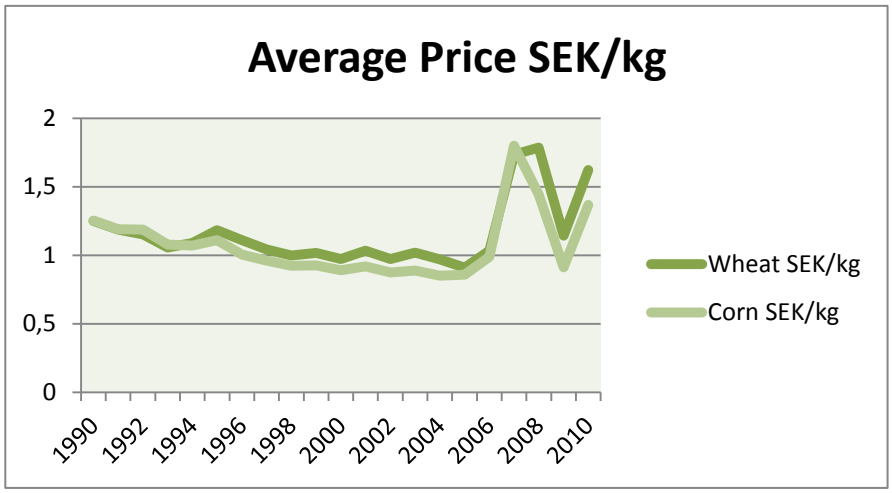

Figure 1: Average price wheat and corn, SEK/kg. Prices are not adjusted according to inflation.
Source: (www, SJV, 2011. Own arrangement)

The exact cause of the extreme price volatility is difficult to predict, because it is a consequence of various factors (LRF Konsult, 2009). It is becoming more obvious that the price levels will remain unstable in the future and therefore the farmers should adapt to these changes and develop strategies how to hedge prices, regardless of the type of agricultural production.

1.2 Futures Trading

1.2.1 Hedging

The price of commodities is determined by the market, thus, the price cannot not be controlled (www, Handelsbanken, 2011). Commodity risk in agriculture occurs in transactions such as purchases or sales of commodities, since the future market-value of the commodity is unknown. The commodity risk makes it difficult to assess the result in advance. This has led to the emergence of forward and future contracts. The contracts make it possible for producers of commodities to hedge the price of the products (SJV 2, 2008). Hence, futures trading is a risk management instrument used to mitigate unexpected price changes of the current commodity. By signing a contract to buy or sell a specific quantity of a certain product to a predetermined price, the buyer or the seller can avoid the suffering from unexpected price fluctuations. A future transaction is basically similar to a stock deal where delivery and payment is deferred.

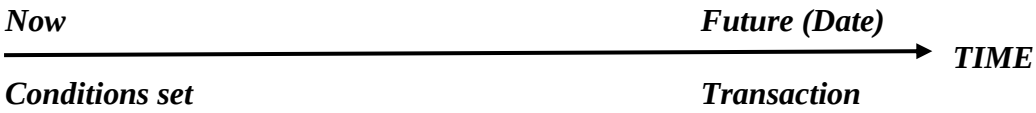

Figure 2: Source (SJV, 2008 Own arrangement)

An important concept within futures trading is "basis". It refers to the difference between spot price and future price (SJV 2, 2008). The value of a basis differs between futures contracts with different maturities, that is, contracts that are based on the same underlying asset but with different maturity have different basis. The basis is often negative since future price normally exceed spot price.

Basis = Spot price – Future price (SJV 2, 2008)

To maintain the incentives to hedge commodities it requires correlation between physical market and futures market (SJV 2, 2008).

1.2.2 Forward Contract

A forward contract may be defined as a contract that gives the opportunity to a seller of a product to determine the price at the level they want to sell the product for in the future (SJV 2, 2008). The seller delivers the product to the agreed place when the contract expires and they receive the price that was signed in the contract, regardless of the current market price. It is important to emphasize that trading with forward contracts the seller has to deliver agreed quantity and quality when the contract expires. Thus, a crop farmer should not hedge larger quantity than what with certainty will be produced. A strategy may be not to hedge the entire harvest to guard against unexpected outcome.

1.2.3 Futures Contract

While forward contracts can be both standardized or individually designed, futures contract are always standardized (SJV 2, 2008). A futures contract is a commitment to make or take delivery of a given commodity to a specific quantity and quality at a specific delivery location and time in the future (CBOT, 2011). All terms of the contract is standardized apart from the price that is discovered through supply (offers) and demand (bids), that is, through stock exchange. This requires numerous of buyers and seller that are willing to trade futures of a specific commodity because single trades will affect the price dramatically. In comparison to a forward contract no product is usually delivered when the contract expires. Instead the contract is sold or bought back and the outcome is regulated based on the price signed in the contract. Although, about 2 % of the underlying assets of futures contracts are delivered, the rest is sold on the market to the current market price. Futures contracts basically aim to create a liquid market, reduce the price volatility and to create profit opportunities for the individual. Standardized futures contract are traded on a global market through regional exchanges, such as, OMX (The Nordic exchange), Euronext, CBOT (Chicago Board Of Trade) or CME (CME Group).

1.2.4 Spot Price

Spot price is the current price at which a commodity can be bought or sold that is the market price at a specified time (www, Lantmännen, 2011). Delivery occurs within two months after order subscription and payment occurs within 30 days after delivery at the price that was quoted on the date of order.

1.2.5 Pool Price

Pool agreement is an efficient tool to distribute risks (www, Lantmännen, 2011). Selling commodities at the pool price means the signing of a contract on a specified quantity. The final price is based on all transactions made during each pool period. Lantmännen offers two pool periods, pool 1 means delivery in the middle of July to the middle of October (harvest period). Pool 2 means delivery from middle of October to the end of March. The payment is made partly as a part payment within 30 days from delivery date while the final payment occurs at the end of each pool period.

This is especially a successful tool for traders that concurrently follow the price volatility on the market and wish to hedge the price on an ongoing basis (www, Lantmännen, 2011).

1.3 Problem

The current price fluctuation in the grain market puts the producer in an uncertain position in terms of the profit outcome. Agriculture has during the last five years experienced changes that have not been experienced since decades before (LRF Konsult, 2009). Hence, the producers of today face a great challenge to adapt to these changes and it is an understandable fact that a growing number of Swedish farmers choose the option of futures trading.

There are different types of risk in the agricultural business attributable to fundamental reasons such as, weather, crop inputs, agronomic practices and demand for the finished product (Parihar, 2003). On the other hand, technical reasons such as, behaviour of speculators, support and resistance levels on prices and market aberrations play a role. Thus, to shape a business strategy becomes a difficult procedure because so many different aspects have to be taken into account. What further play a crucial role are the risk preferences of the producer. It is argued that a greater market orientation leads to higher degrees of risky and innovative *behaviour* (Pennings & Garcia, 2001).

In the current market it also becomes important to the crop trading companies, for example Lantmännen, to understand and identify the *behaviour* of different crop producers. The crop trading companies are exposed to certain risks depending on the farmers' willingness to hedge. If the crop trading companies are able to create a greater understanding of how the farmers generally act on the market they can minimize the internal risk. Producers that are mixed crop and livestock producers and crop producers are exposed to different risks, since the price volatility for milling grain and feed grain differs. Therefore, risk management takes different turns depending on the type of production. Although certain farmers act differently, the crop trading company cannot assume that the behaviour is different between diversified and non-diversified producers. This fact indicates that there is always an inevitable risk. There has been a continuous development of new tools for farmers to reduce their risk exposure. However, there is a lack of research and knowledge about how and why they use a certain combination of tools (Fleisher, 1990).

The complexity is to depict the strategic risk management behaviour of the producers, therefore the problem formulation of this study is:

What are the differences in selling strategies between diversified farmers (crop and livestock producers) and non-diversified farmers (crop producers)? If there exist differences – why do they exist?

1.4 Aim

Farmers face a more volatile market for commodities including greater opportunities to maximise individual profit. The aim of this study is to investigate farmers' perception about hedging and to examine what underlying factors affect a hedging decision. More detailed the aim of the study is to:

- Examine differences in farmers' preferences and attitudes towards risk.
- Investigate differences in hedging strategies between crop farmers and diversified farmers with livestock production.

1.5 Delimitations

Since the study aims to investigate the conditions in the Swedish market the survey does only involve farmers that are active on this market. The survey consists of twelve farmers according to the study's qualitative nature; the empirical material is based on qualitative research interviews. The type of hedging practices the study aims to examine involve conventional produced grain and oilseeds. The price trend for livestock obviously influences the diversified farmers selling strategies, although that is not investigated in this study due to lack of collected data to analyse.

1.6 Outline

The outline of this study is illustrated below:

- **Chapter 1** ***Introduction and Background***
  The introduction of the study aims to give the reader brief background knowledge, by presenting current conditions in the market for grain. This is followed by the problem formulation, aim and delimitations.

- **Chapter 2** ***Literature Review***
  Chapter 2 provides a literature review primarily based on previous research. It presents risk as a concept, risk management and the impact of risk and decision making in agriculture.

- **Chapter 3** ***Theoretical Perspective***
  This chapter describes the underlying theories from which the empirical material will be analysed. Eight hypotheses are formulated based on previous research and the theoretical perspective.

- **Chapter 4** ***Method***
  Chapter 3 primarily presents the method that is used to achieve the aim of the study. The courses of action are described and further a motivation of the chosen method and the selection of interview objects.

- **Chapter 5** ***The Empirical Study***
  This chapter presents the empirical material with a brief description of each case farm involved in the study. The chapter ends with a summary for each case farm.

- **Chapter 6** ***Results & Analysis***
  Chapter 6 provides the results from the qualitative research interviews. The chapter presents the results from the empirical study, which is later analysed in order to able confirmation or rejection of the hypotheses.

- **Chapter 7** ***Discussion & Conclusion***
  This chapter provides discussion and conclusion. The discussion is comprehensive but based on several conclusions that emerge in the study.

2 Literature review

Chapter 2 provides a literature review primarily based on previous research. The chapter is divided under a number of topics related to risk management. The chapter presents previous thoughts and statements under each topic.

2.1 Risk

Risk can be defined as "*The potential loss of equity capital. Risk has two components: uncertainty and exposure. If both are not present, then there is no risk. For risk to materialise there should be exposure to the uncertainty"* (Parihar, 2003).

A company's equity capital is equivalent to the possible amount of risk a company can take (Parihar, 2003). Since, in business, what a company can afford to lose is the equity capital and not the borrowed funds. The risk capital is also measured according to the risk preferences of the owner and shareholders of the company. Risky outcomes may result in decreased or increased well-being, thus, risk is not only negative (Öhlmer *et al*., 2000). According to Miller *et al*., (2004) most farmers associate risk with potential losses. These losses can be in various forms, but the most common denominator is the risk associated with financial losses. The word seems to have a negative association, but indeed, the word risk originally comes from the early Italian word *risicare*, which means "to dare".

2.2 Risk Management

Agricultural businesses and its associated markets surely experience more than their fair share of risk exposure due to the many factors influencing prices, e.g. crop success or failure depending on weather, soil problems or pollution; and issues surrounding distribution of products (James, 2003). The more volatile a market the more important becomes the risk management process. Hence, the evolution of several tools to manage risk in agriculture is no surprise. Since farmers confront numerous risks the risk management in this type of business is complex. They are assumed to select combinations of marketing strategies that maximize the expected returns subject to the degree of risk they are willing or able to accept (Tomek & Peterson, 2001). The expected utility is developed to explain a persons' willingness to bear risk (Kahneman & Tversky, 1979). A risk averse decision maker would value the risk of losing a specific amount higher than the chance of winning the same amount. A risk seeker (prefer risk) would value the opposite (Öhlmer *et al.,* 2000). NcNew & Musser (2000) argue in their research that risk aversion is the primary motive for farmers to hedge.

A useful classification is to categorise risk and uncertainty as tactical and strategic (Boehlje *et al.*, 2005). The tactical risk includes the traditional risk faced by farmers and agribusiness firms, which include business risk and financial risk. It refers to a firms' operational and financial performance. Thus, major operational risk sources are price, cost and production uncertainty, while major financial risks include, for example, uncertain interest rates and uncertain loan availability. The strategic risk is associated with a company selecting inappropriate strategic choices, ineffective strategy implementations or uncertainties in the business climate. The tactical risk is generally easier to manage and identify than strategic risk, partly due to a greater ability to measure these risks but also because of the availability of tools and techniques to transfer these risks to others, through for example insurance and future markets. Strategic risk in agriculture is likely to become increasingly important as the

result of a more industrialised market. A form of strategic uncertainty that may become crucial is contractual or relationship risk. That is the result of a wider use of contractual agreement and other forms of linkages based on negotiation between various stages in the value chain of agricultural production and distribution. An additional strategic risk that farmers confront to a greater extent is the increasing use of regulations in every aspect of the business transaction. Food safety/security and environment regulations are growing rapidly worldwide.

The majority of risk in today's agriculture can only be assessed qualitatively since uncertainty may be difficult to quantify (Boehlje *et al.,* 2005). Not enough numerical observations are available to provide objective assessment of probabilities to develop market instruments for risk transfer or risk allocation. Although quantifiable objective assessment is preferred to subjective, the subjective assessment cannot be ignored, since there is an increasing importance of subjective uncertainty in agriculture.

Scorecarding is a concept increasingly used in various types of business; it aims to identify any potential sources of risk for a particular business and to assess risk and uncertainty in terms of severity, probability of occurrence and range of consequences (Boehlje *et al.,* 2005). The mapping of these assessments is illustrated in table 1.

Table 1: Source: (Boehlje et al., 2005 Own arrangement)

	Illustrative Sources of Risk	Severity
Business/Operational		**Probability Consequences**
1. Operations and Business Practices	Facilities, contractual risk, natural hazards, internal processes and controls	
2. People and Human Resources	Employees, independent contractors, training, staffing adequacy	
3. Strategic Position and Flexibility	Mergers and acquisitions, joint ventures and alliances, resource allocation and planning, organizational agility	
Financial		
4. Financing and Financial Structure	Debt servicing capacity, leverage, debt structure, nonequity, financing, liquidity, solvency, profitability	
5. Financial Markets and Instruments	Foreign exchange, portfolio, cash, interest rate	
Business Relationships		
6. Business Partners and Partnerships	Interdependency, confidentiality, cultural conflict, contractual risks	
7. Distribution Systems and Channels	Transportation, service availability, cost, dependence on distributors	
Market Conditions		
8. Market Prices and Terms of Trade	Product price volatility, input price volatility, cost structure, contract terms, market outlets and access	
9. Competitors and Competition	Market share, pricing wars, industrial espionage, antitrust	
10. Customers and Customer relations	Product liability, credit risk, poor market timing, inadequate customer support	
11. Reputation and Image	Corporate image, brands, reputations of key employees	
Policy and Regulation		
12. Political Factors	Civil unrest, war, terrorism, enforcement of intellectual property rights, change in leadership, revised economic policies	
13. Regulatory and Legislative Factors	Export licensing, jurisdiction, reporting and compliance, environmental	
Technology		
14. Rate of Change and Innovation	Complexity, obsolescence, workforce skill-sets	

2.3 Risk and Uncertainty in Agriculture

Hardaker *et al.,* (1997) emphasize the factors involving risk exposure in agriculture. Risk can be explained as the possibility that an actual value differs from the expected. Every decision has uncertain consequences in the future and decision making in agriculture is no exception. Through time, farmers and others have tried to develop ways how to make farming itself less risky, by attaining better control over the production process. As noted before decision making subject to risk may be a choice consistent with the decision makers' beliefs and preferences for uncertain consequences. In a business profit is something that can be seen as

the reward for risk bearing, in other words, no risk means no gain. The challenge is rather to manage risk effectively. A growing international trade leads to changes in the market for farm products, which expose farmers to competitive market forces with less predictable consequences. Price risk is present in almost every business transaction and the ability to manage this risk may explain the difference in financial success and financial ruin (Chicago Board of Trade Staff, 2006). Futures and options are two tools that help farmers manage risk, the market for futures and options make it possible for those who want to manage price risk to transfer that risk to those who are willing to accept it. That creates a win-win situation which is one of the basic roles of futures markets.

People have different perceptions concerning risk (Pindyck *et al*, 2005). Risk aversion is perceived as the most common attitude toward risk. Broadly speaking there are two reasons why risk in agriculture matters, firstly the fact that *most people dislike risk* and second the so-called *downside risk* (Hardaker *et al.*, 1997). As argued above most people are risk averse when facing considerably risky incomes or wealth outcomes. The author argues that most people dislike risk, in other words, most people are willing to give up some expected return for a reduction in risk. A farmers' risk aversion can be explored in many of their actions. For example it can be found in their willingness to buy certain insurance, in their tendency to choose a production system that is more diversified or in their marketing strategies. Being risk averse will not always lead to the identification of the most preferred option. Since farmers, like most people may not choose the alternative that pay best in "the long run", if that means they have to expose themselves to a high and unacceptable risk.

Downside risk is described as those situations in which any significant deviation from the "norm" leads to worse outcomes (Hardaker *et al.*, 1997). Downside risk may arise in agriculture when an outcome depends on non-linear interaction between several random variables. A yield of a crop is an obvious example since it depends on a large number of variables, such as rainfall and temperature at each stage of the growing process. Large deviations in these variables at any direction from their expected value are likely to have adverse effects, while smaller deviations only might generate a more favourable value than average. In the theory of downside risk in agriculture it is argued that the loss associated with adverse deviation from the mean level, of for example rainfall, is greater than the gain associated with a favourable deviation of a similar magnitude. Other factors, such as the impact of pests, diseases, frosts and strong winds, may also contribute to the occurrence of downside risk. Thus, decision-analytic assessment of riskiness involved in agriculture becomes a worthy exercise.

2.4 Business-related Factors

Farm Size

Literature reviewed by Musser *et al*., (1996) suggests that large-scale farms utilise forward-pricing methods to a greater extent than average sized farms. The explanation dedicates the fact that large-scale farms allow economies of scale which results in larger net price enhancement. Thus, farms with more output make greater use of forward-pricing strategies and may therefore be more likely to adopt them. Size of farm, measured in hectares, is perceived as positively related with hedging. Hedging may further be affected by a farm's storage capacity.

Age, Experience, Education
Significant factors influencing hedging include, among others, age, years of experience managing a farm and years of formal education (Shapiro & Brorsen, 1988). Age seems to have a significant negative relation to hedging decisions, since younger producers require longer planning horizon to distribute costs related to the implementation of new management strategies (Musser *et al*., 1996). Formal education and experience tend to have positive impacts on the use of hedging (Shapiro & Brorsen, 1988).

Financial position
If hedging increases income stability or not, is the most significant variable related to hedging decisions (Shapiro & Brorsen, 1988). A further important variable is debt position, Shapiro & Brorsen (1988) discovered that the more highly leveraged the farms are, the more likely they are to hedge. If a farm has a favourable debt position the need to reduce the risk may not be as pronounced. Since higher debt loads may require hedging to reduce risk and obtain financial resources.

Geographical Location
Farmers active in geographical areas characterized by adverse weather conditions tend to hedge less than average (Musser *et al*., 1996). This may illustrate that farmers devote consideration to the production risk in hedging decisions.

Diversification
There are other strategies to manage risk in agriculture, such as to diversify income, diversify production (livestock production) and crop insurance. According to Shapiro and Brorsen (1988), these strategies are used more frequently than hedging. The literature further implies that diversified producers, in this case livestock producers to a lesser extent manage the financial risk through hedging (Mussler *et al*., 1996)

2.5 Decision Making

In the economic literature it is often assumed that decision makers evaluate every available information and alternative to be able to select one specific alternative that maximizes utility (Pennings *et al*., 2008). Several authors argue that this approach does not describe actual behaviour. In literature it is discussed that human behaviour differs from that predicted by normative economic models. That is due to various reasons, although a significant reason may be human psychological limitations to which humans can process information. Previous research of decision making in the context of the agricultural research identified farm size, diversification and farm characteristics as relevant for risk management decisions. Those factors may have positive or negative effect on the decision to use hedging tools. Characteristics of the producer are further essential in risk management decisions, such as; age, innovativeness, risk aversion, risk perception and market orientation. For example, Musser *et al*., (1996) argue that a younger producer requires a longer planning horizon to learn and adjust costs associated with risk management instrument. Thus, age is considered as negatively related with the use of risk management tools.

Farmers usually apply what is called an intuitive decision process or an analytic process (Öhlmér & Lönnstedt, 2004). Farmers' behaviour has been investigated to realize whether farmers are perceived as intuitive or analytic in their decision making. The focus of the research was to verify to what extent farmers use accounting information in their decision-making process. This type of information is considered as analytic and most farmers tend to

use intuitive decision making. The research reveals that accounting information was used in detection of scale problems, efficiency problems and it was especially used as basis in investment decisions. Although, intuitive information was found to be more important than analytic information to both intuitive and analytic decision makers. Öhlmér & Lönnstedt (2008) conclude that knowledge about the analytic process is well developed, but it was not confirmed before that the intuitive process is involved even if the decision maker use an analytic approach.

Even though several studies have been made on organisational decision making, few studies have been conducted concerning farmers decision making (Öhlmér *et al*., 1998). Öhlmér *et al*., (1998) test the relevancy of current knowledge about decision making in agriculture through a number of case studies. Based on the observations found in the survey a revised version of the conceptual model is suggested, involving four phases of the decision process related to four sub processes, instead of the previous processes involving eight linear functions or elements. The four phases is described as problem detection, problem definition, analysis and choice, and implementation. The revisions emphasize the importance of information search and problem detection and definition relative to the phases of analysis and choice (see also chapter 4.1).

3 Theoretical perspective

Chapter 4 describes the three underlying theories in the study: decision making theory, expected utility theory and portfolio theory. This is followed by a number of hypotheses that are formulated by applied theories and previous studies. The chapter ends with a comprehensive theoretical model based on the theories.

3.1 Decision making theory

Öhlmér *et al*., (2000) describes the decision event as a choice among action alternatives where the best alternative is not evident. A decision can further be considered as the result of a process (Jacobsen & Thorsvik, 2008). The process is the range of actions or judgments that lead to performance. One of the central positions towards decision-making is the rational *economic-man* model which is based on the assumption of a human's ability to be totally rational. The model requires clear and consistent goals and full details about different alternatives. That is to say that an individual in every situation can compare different alternatives in order to choose one alternative that will contribute to the greatest benefit or utility. Hence, this model is not an illustration of reality rather an ideal to aim at when making decisions.

It can be argued that people are *limited rational*. This does not imply that individuals are irrational, because the alternatives and consequences of a decision are often valued as far as possible (Jacobsen & Thorsvik, 2008). Irrational decisions can occur because of the impossibility to obtain complete information about every possible alternative and outcome. Therefore it is difficult to make a choice that with certainty provides maximum utility. The view of limited rationality is called *administrative man*, which implies that a decision maker chooses an alternative that is "good enough", without knowing if it is the best alternative. Decisions are still seen as the result of choices, but instead of maximizing utility a decision maker chooses the first alternative that is most satisfying. Uncertainty and ambiguity are two central concepts when making decisions, since the exact consequences of an action depend on factors that cannot be influenced, such as the weather or the state of the economy (Kahneman & Tversky, 1993). To realise how individuals and organisations collect and use information and how the information determine a decision is especially important when understanding the concept of decision making (Jacobsen & Thorsvik, 2008). For instance, organizational structure or attitudes of a decision maker decides which information that will be captured while others will be ignored. It is obvious that the decision process is essential in the theories of decision making.

Thus, depending on how many choice options exist and the nature of these options, finding the best choice will be simple or more difficult (Hardaker *et al*., 1997). When many options are to be evaluated, methods such as mathematical programming may be used. In a risky world, the real world, it is impossible to know ahead of time what will be a good or bad decision to make. Although, decisions made in the past can identify consequences and uncertainty surrounding certain decisions, but they can rarely tell what would have been the consequences of some other choice. A "good" decision may not always guarantee a good outcome, why decision analysis is based on the statement that a "good" decision is consistent with the beliefs and preferences of the decision making person.

The decision process can be illustrated as series of linear steps, with six identified steps of decision making: problem definition, observation, analysis, decision, action and responsibility

bearing (Öhlmér *et al*., 2000). Whereas in agricultural management it is common to list five to eight steps of decision making, that include setting goals, monitoring and evaluating results. Management texts suggest that the steps should be followed in a linear order for every decision, but researchers find that the decision steps are not followed linearly due to phases of problem recognition, information gathering, development and evaluation of alternatives and choices. Öhlmér *et al*., (2000) realised in a survey based on Swedish farmers that the decision making process need to be expanded according to five aspects: *First*, farmers continually revise their problem perceptions, ideas of option, plans and expectations when new information is obtained. *Second*, farmers tend to use a qualitative approach when constructing expectations and estimating consequences. These are anchored in prevailing conditions and expressed in some sort of direction, such as, "the price will go down so my income will go down". *Third*, most farmers prefer a quick and simple decision approach over a detailed one. *Fourth*, in many cases they collect information and evade risk through small tests and incremental implementation. *Fifth*, during implementation farmers continuously check the clues used to form their outcome expectations.

In figure 3, Öhlmér *et al*., (2000) distinguishes four phases of the decision making process: information search, planning, evaluation and incremental implementations.

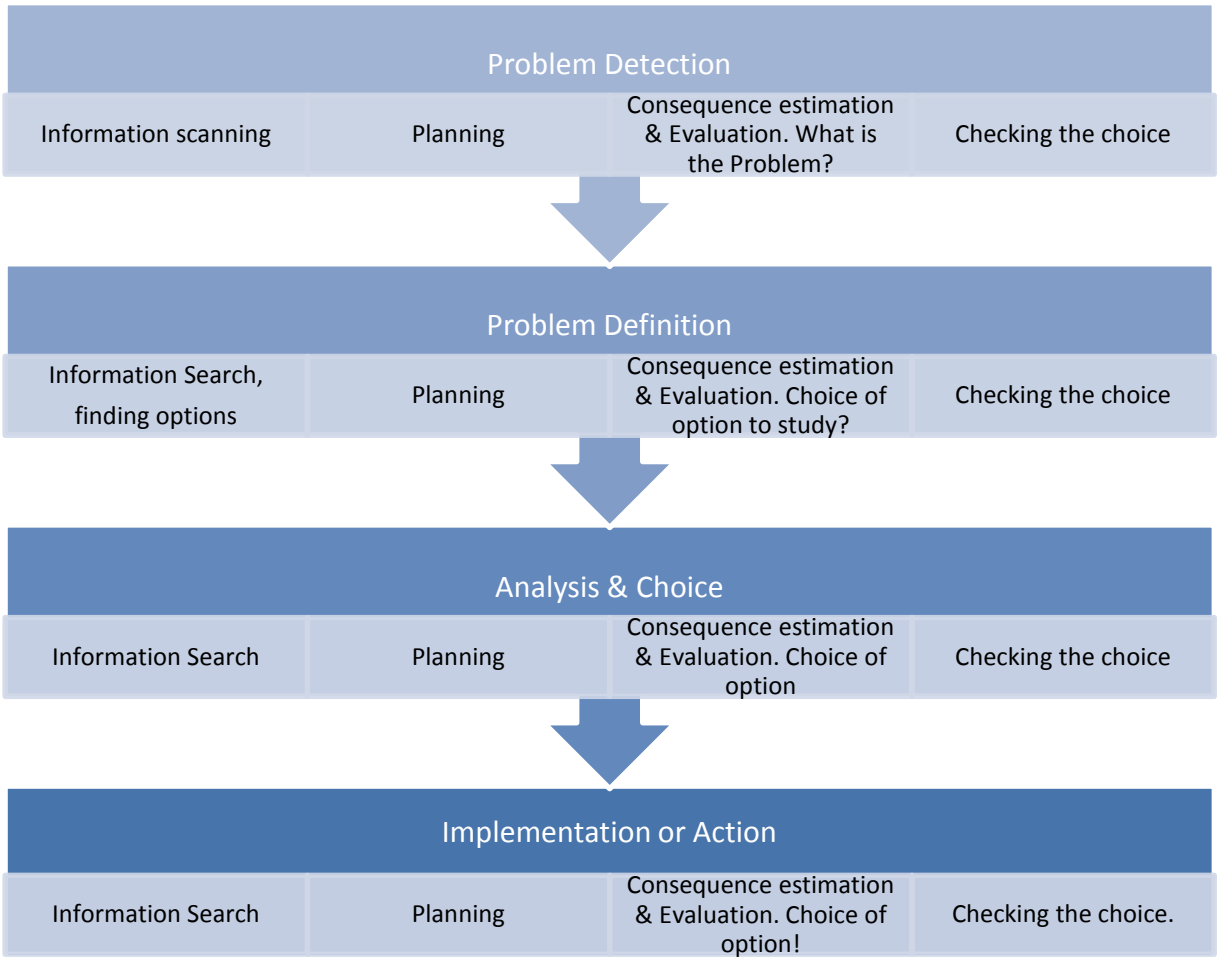

Figure 3: Source: (Öhlmér et al., 2000. Own arrangement)

Farmers are not always expected to follow a common set of steps in any simple process (Öhlmér *et al*., 2000). Some may choose a more conservative choice model, such as some of the so-called "safety-first" rules that put focus on minimising the risk of bad outcomes (Hardaker *et al*., 1997). Yet, conservative choice models lack some of the underpinning rules of decision analysis why they may be unlikely to perform as well as decision analysis in the long run.

There is often an experienced conflict between the level of one attribute (e.g., savings) that has to be given up in favor for another (e.g., leisure) (Kahneman & Tversky, 1993). To understand how such conflicts can be resolved, a formal modelling approach is traditionally employed. These models are used in economics, management science, and decision research and they typically associates a numerical value with each alternative and characterises choice as the maximisation of value. This type of value-based accounts includes models, such as expected utility theory. The expected utility theory is further explained later in this chapter.

3.1.1 Analytic versus Intuitive Approach

The characteristics associated with farmers' decision making can be summarised into two types of decision processes (Öhlmér *et al*., 2000). Firstly, one approach that is based on quantitative expectations, including continual updating of earlier phases, full scale implementation and a continuous check of the clues to expectations of outcome. This process may be perceived as a more elaborated approach, called analytic approach. Secondly a more intuitive approach with qualitative expectations. This process also includes continual updating and checking of earlier phases and outcomes, but decisions related to this process emphasizes qualitative values prior to quantitative. The process is perceived as more quick and simple.

Farmers that adapt an analytic approach have quantified their perceptions about future prices, supports change and the consequences for the farm income (*Ibid*). Qualitative farmers perceive a direction of future price, support changes and about the direction of the farm income. Depending on, among others, the following variables will shape a decision makers approach: education level, farm income aspiration, level of debt, existence of another serious problem, frequency of using individual consulting, doing budgets, and perceived seriousness of the decision problem. A further explanation that distinguishes quantitative farmers from others is that they exhibit proactive problem finding while others exhibit reactive problem finding. Quantitative farmers tend to assimilate more information in their decision making, although, qualitative farmers use individual advisory service more frequently than quantitative farmers.

3.2 Expected Utility Theory

The theory of expected utility has dominated the analysis of decision making under risk and it is generally applied to describe economic behaviour (Kahneman & Tversky, 1979). It has been developed to explain a person's attitude towards risk where the person risk averse or risk seeker. Expected utility is the sum of the utilities associated with all possible outcomes, weighted by the probabilities that each outcome will occur (Pindyck & Rubinfeld, 2005; Kahneman & Tversky, 1986). The expected utility that can be obtained in an uncertain situation is calculated as follows:

$$E(u) = P_1 u(X_1) + P_2 u(X_2) + \ldots + P_n u(X_n)$$

where u is the utility function and X is an outcome that occur with probability P.

To create a utility function it must be assumed that a decision maker acts rationally and consistent when facing the task of making risky financial decisions (Lumby & Jones, 2004). Four basic axioms are formulated regarding the behaviour of investors when making decisions, this is to help construct a function of utility (Lumby & Jones, 2004):

1. Investors are capable to actually reach a decision based on the ability to rank different alternatives in some order of merit.
2. The ranking of alternatives is made so that alternative A is preferred to B, alternative B is preferred to C and then alternative A must be preferred to C.
3. Investors do not differentiate between alternatives that have the same level of risk. Their choice is based only upon consideration of the risk involved, rather than on the nature of available alternatives.
4. Investors can specify for any alternative whose returns are uncertain, an equivalent alternative that is equally preferred, given a return obtained by certainty. That is, an investor should be able to specify a certainty-equivalent.

The utility function clarifies in what way individuals make decisions about risky alternatives, on the assumption that the decision is made in order to maximise their own expected utility index.

The modern theory of decision making subject to risk is the derivation of the expected utility rule from simple principles of rational choice that makes no reference to long-run considerations (Kahneman & Tversky, 1986). When measuring an individual's expected utility it is only possible to measure the person's individual value of a specific outcome (Pindyck & Rubinfeld, 2005). Thus, expected utility is strongly connected with a person's willingness to bear risk. Individuals are categorised into three types; risk averse, risk neutral and risk seeker. Figure 4 illustrates the different utility functions. A risk averse individual prefer a certain income before an uncertain income with the same expected value. That is the most common behaviour and it is related to the establishment of life insurance, health insurance, car insurance but also the sureness of a steady income. A person that is risk neutral is indifferent between a certain income and an uncertain income with the same expected value. A risk seeking person prefers an uncertain income before a certain income, even if the expected value of the uncertain income is lower than the given income.

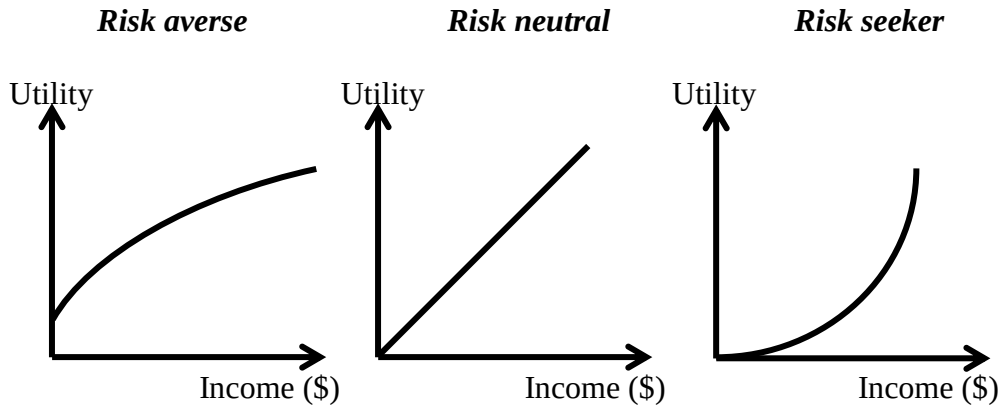

Figure 4: Example of utility functions. Source: (Hardaker et al., 1997. Own arrangement)

3.3 Portfolio Theory

The portfolio theory was founded in the beginning of 1960th by Markowitz (Markowitz, 1991). Markowitz investigated how optimising investors could make their most successful choices. Diversification of assets into different portfolios is realised to be a key of success, while lowering the risk and contribute towards a higher expected return.

Avoiding uncertainty is the challenge for an investor. A favourable solution is to diversify investments and thus spread the risks (Barry *et al*, 2000). Understanding investors' behaviour and how they manage uncertainty is complex (Markowitz, 1991). Any type of investor that is surely aware of future returns would invest in only one asset, the asset with the highest future return. The optimal choice of combination or portfolio of securities would be a portfolio with high expected returns and low standard deviation of return (Ross *et al*., 2005).

Investors meet several decision problems that have certain element in common (Elton *et al*., 2007). Problems involve delineation of alternatives, a selection of criteria for choosing among those alternatives and finally the solution to the problem. To find the optimal solution is, two essential components are needed. Firstly, the choices that are available to the investor, the so-called opportunity set. Secondly, the representation of the investor's taste or preferences, called indifferences- or utility curves. This knowledge is essential for the selection of risky assets. It is impossible to definitely avoid risk, in other words, there is always an unavoidable risk exposure (*Ibid*). Several studies show that about 65% of total risk may on average be managed through diversification (Lumby and Jones, 2003). The remaining 35% of total risk is non-diversifiable. Figure 5 show the declining of portfolio risk:

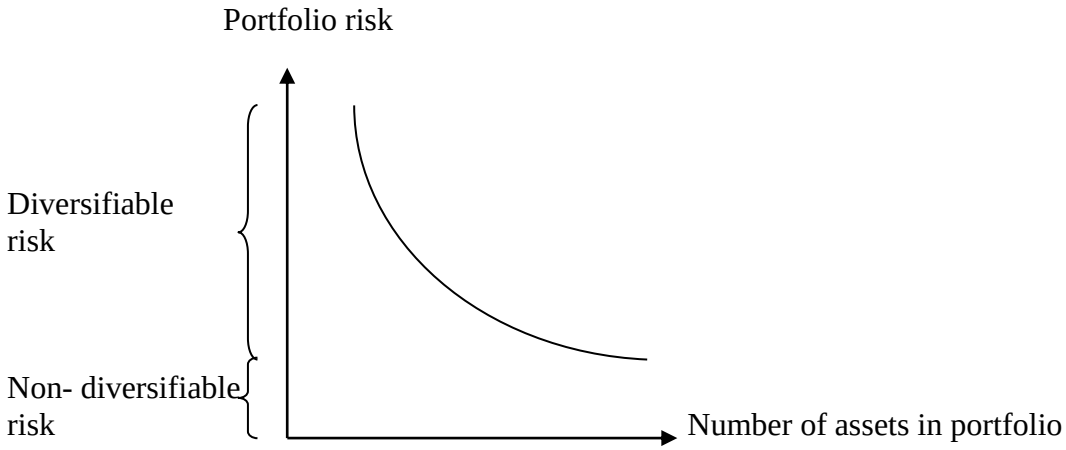

Figure 5: The risk-reduction effect. Source: (Lumby & Jones, 2003. Own arrangement)

The existence of risk means that the investor cannot associate a single number or payoff with investment in any asset (Elton *et al*., 2007). To describe the pay-off it is necessary to determinate the set of outcomes and their associated probability of occurrence, called a frequency function or return distribution. There are two frequently employed attributes of such a distribution. First, a measure of central tendency, called the expected return, and second, a measure of risk or dispersion around the mean, called the standard deviation. An investor should not hold one single asset; they should hold groups or portfolios of assets.

In statisticians average return is usually termed as expected value (*Ibid*). The expected value is calculated by; the sum of outcomes divided by the number of outcomes, for example (12+9+6) / 3 = 9. Another way to determine the expected value is to multiply each outcome by the probability that it will occur, for example ⅓(12) + ⅓(9) + ⅓(6) = 9

The formula below shows the expected value (*Ibid*).

$$\bar{R} = \sum_{j=1}^{M} \frac{R_{ij} P_{ij}}{M} \qquad (2)$$

R_{ij} is possible outcomes in asset *i* and P*ij* is the possibility return *j* in asset *i* and *M* is all possible outcomes (*Ibid*).

It is further necessary to measure how much the outcomes differ from the average (*Ibid*). That is examined by $R_{ij} - \bar{R}_i$. When each outcome is determined it is possible to obtain an overall measure by taking the average of the difference, the variance. The variance of the return on the *i*th asset (σ_i^2) is calculated by the formula below:

$$\sigma_i^2 = \sum_{j=1}^{M} \frac{(R_{ij} - \bar{R}_i)^2}{M} \qquad (3)$$

The standard deviation is the square root of the variance:

$$\sigma_i = \sqrt{\sigma_i^2} \qquad (4)$$

The variance and standard deviations are useful to realise variability of individual assets (Ross *et al*., 2005). It is further of interest to measure the relationship between the return for one asset and another, that is, the covariance and correlation. The covariance is a measure describing how combination of assets' affects one other (Elton *et al*., 2007). When the assets have positive and negative deviations at similar time, the covariance has a large positive number. While if they have positive and negative deviations at dissimilar time, the covariance is negative. If the positive and negative deviations are unrelated, the covariance is zero. The correlations coefficient is the measure of the strength in the linear relationship between the two variables, asset 1 and asset 2 (Lumby and Jones, 2003).

The correlation coefficient varies between positive (+1) and negative (-1). The positive value indicates a positive covariation and a negative indicate a negative covariation, and a value of zero indicates no covariation. The correlation is further an index or a relative measure of the strength of the relation between two investments, but the covariance is an absolute measure of the relation (Barry *et al*, 2000). Figure 6 below illustrates the range of possible portfolio risk and expected returns that an investor can obtain by varying the proportions of the funds between different assets (Lumby & Jones, 2003). All combinations of the variables along A and C have the correlation coefficient of +1. The outcomes that are not absolute positive correlated those that have a certain amount of risk, follow the non-linear line ABC. Portfolio B is preferred to the portfolios below B because the more risk they have the less return will they have. The portfolios that are along AD and DC are all negative correlated, which means that an increasing risk results in a decreased expected return.

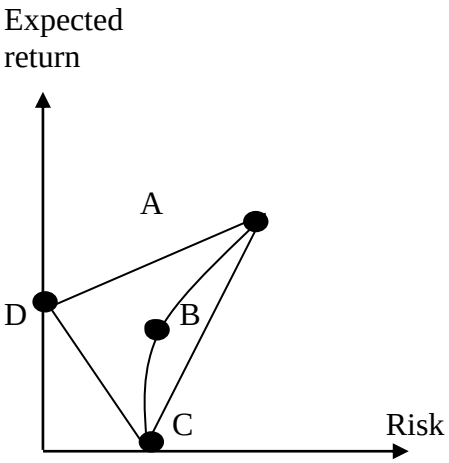

Figure 6: Portfolio risk and expected return. Source: (Lumby & Jones, 2003. Own arrangement)

The total variance of the portfolio is the sum of the individual variance plus or minus the covariance (Barry *et al*., 2000):

$$\sigma_T^2 = \sigma_1^2 P_1^2 + \sigma_2^2 P_2^2 + 2P_1 P_2 c\sigma_1\sigma_2 \quad (6)$$

and the total standard deviation is:

$$\sigma_T = \sqrt{\sigma_T^2} \quad (7)$$

The equation for the total variance shows that the higher value c, the higher is the portfolio risk for any combination of investments X_1 and X_2 (Barry *et al*, 2000).

The portfolio theory explains how a farmer can minimize risk exposure through marketing strategies (Barry *et al*, 2000). Through selling smaller shares of the harvest frequently throughout the year the farmer can spread risks. The marketing pattern a farmer creates varies between farmers but research reveal that if hedging occurs frequently in comparison to one hedge per harvest the risk exposure becomes significantly lower. Diversified farmers conducting livestock production construct a portfolio simply through the type of enterprise, and the risk exposed by crop price is lower.

3.3.1 Optimal Hedge Ratio

Farmers are unlikely to profit consistently from forward pricing strategies even under efficient market view of futures prices (McNew & Musser., 2002). That means that farmers primary motive for using forward markets is that they are risk averse. There are two major reasons why hedge ratio is interesting to study. First, hedge ratio is based on the ratio of the covariance between cash and futures prices to the variance of futures prices. The ratio can easily be estimated by a regression where cash prices are regressed on futures prices. Second, if prices are normally distributed and transaction costs are zero, an individual's optimal hedging decision is independent of the individual risk aversion parameter. The major problem in estimating an optimal hedge ratio is to select the proportion of spot positions that should be covered by the opposite positions on futures markets (Myers & Thompson, 1989.) A general recommended solution is to set the hedge ratio equal to the ratio of the covariance between spot and futures prices to the variance of the futures price. Empirical studies in the U.S have estimated an optimal hedge ratio for grain to be in the range of 55% to 90%, with yield uncertainty (McNew & Musser., 2002). This hedge ratio depends on the extent of yield variability and correlation between yield and price. As higher the yield uncertainty is the more increase the likelihood that production will not meet the contract requirement. Nilsson (2001) found that the optimal hedge ratio in Sweden was approximately 20-50 % (Nilsson, 2001).

In the expression above the hedge ratio is equal to the ratio of the futures positions and the physical position chosen in period *t-1* (Nilsson, 2001). The hedge ratio depends on what the variance and covariance are and also the futures and spot prices. The expected future price changes and individual risk preferences will also influence choice hedge ratio.

3.4 Theoretical Model

The decision process regarding hedging is associated to attributes used by the owner-manager in reaching a choice, and the importance placed on each attribute (Pennings & Leuthold 1999). Farmers base their decisions according to their beliefs, which are formed by perceptions. This leads to different problem detection in different companies, since every farmer holds their own specific underlying attributes.

Figure 7, is developed through Öhlmér *et al*., (2000) and Pennings and Leuthold (1999). It is further revised to reflect the process related to hedging decisions. Öhlmér *et al*., (2000) emphasise the importance of continuously check and control of choices why the decision process rather is described in a matrix than as steps in a linear process. It is reflected in the model that information search, evaluation and checking the choice is recurrent through the entire decision process. When facing a hedging decision the hedger create expectations of future outcome, which generally is an average of all possible outcomes (Pindyck & Rubinfeld, 2005). Further the decision will take shape according to financial factors since financial conditions may restrict the ability to choose the alternative that maximises the expected utility. One step of the process is to evaluate available choices, create a portfolio and distribute the risk in either a number of hedges or through the livestock production. A further decision to make when constructing a portfolio is to decide and estimate the optimal share of hedge, that is, to find the individual optimal hedge ratio (Johnson, 1960). An individual's decision character will also influence the process (Öhlmér *et al*., 2000). Repetitive decisions, similar decisions that occur many times during a longer time period put less focus on the process. While unique decisions, for example investment decisions, require more thoughts and clear processes since the decision maker has to assure possible losses.

Depending on risk attitude the decision process will vary (Öhlmér *et al*., 2000). Since the risk attitude decide the importance of each step in the process and the perception of financial consequences. According to previous studies there are several more attributes that contributes to hedging decisions. A categorisation of the attributes is made in the model as follows:

- Farmer (social factors)
- Farm-related factors
- Values & attitudes

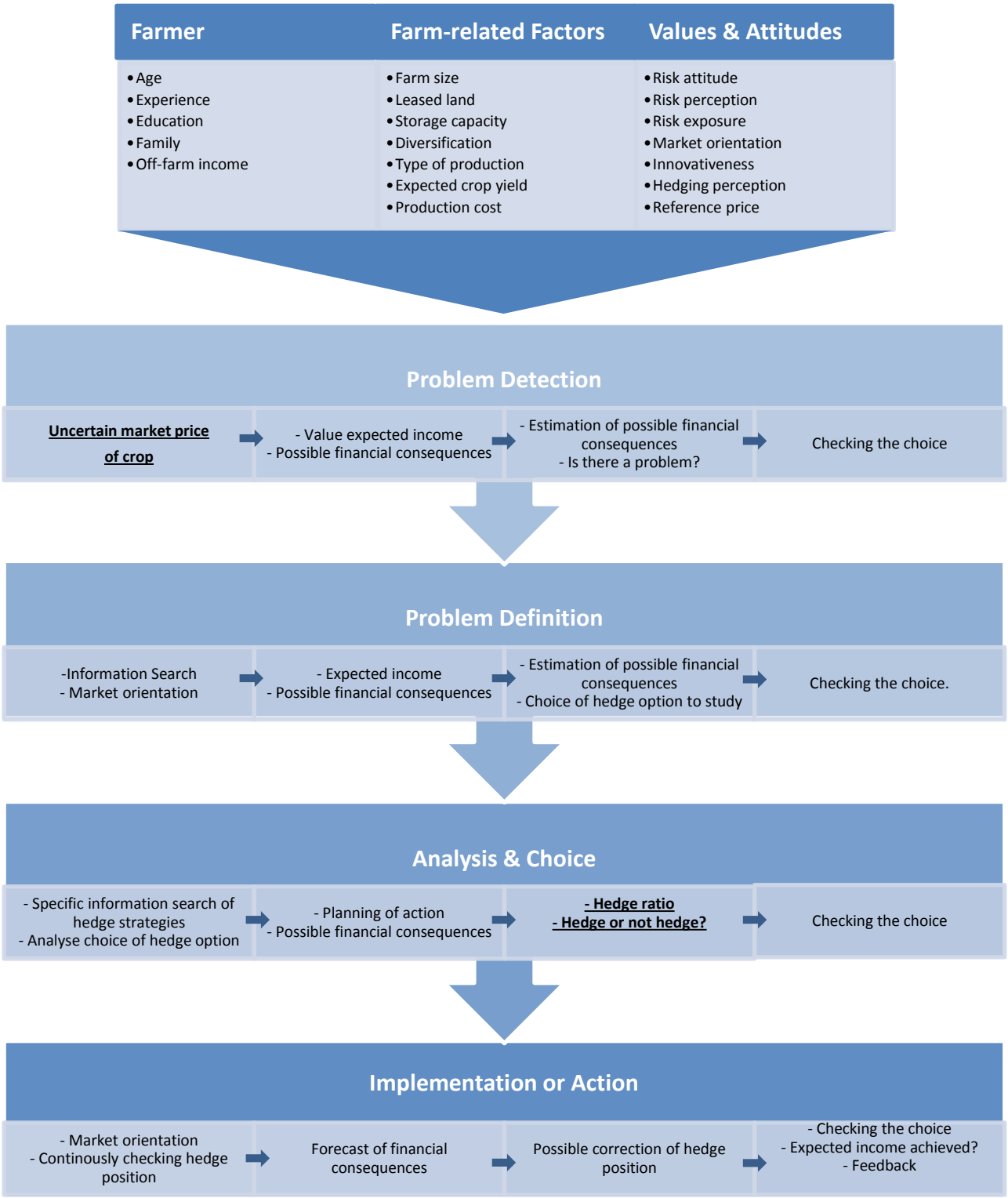

Figure 7: Decision process (Pennings & Leuthold, 1999., Öhlmér et al., 2000., & Own arrangement)

3.5 Hypotheses

A number of hypotheses are formulated on the basis of findings during the literature and theory research. The hypothesis concern farmers' decisions to hedge in terms of what factors that influence a farmer's willingness to hedge. They are perceived as relevant since the all touch the aim of this study, using the empirical data the hypothesis is further rejected or confirmed in the analysis.

1. *Most farmers use what is called an intuitive decision process* (Öhlmér & Lönnstedt, 2004).

2. *Farmers base the decision directly on the current economic situation* (Öhlmér & Lönnstedt, 2004).

3. *Farmers do not hedge because of lack of understanding regarding hedging or bad experiences with hedging* (Shapiro & Brorsen, 1988).

4. *Farmers that are sufficiently risk averse should hedge even if hedging may give a lower average price* (Shapiro & Brorsen, 1988).

5. *The more highly leveraged farmers consider themselves, the more likely they are to hedge and the more they hedge if they do* (Shapiro & Brorsen, 1988).

6. *Farm size is positively related to hedging* (Shapiro & Brorsen, 1988).

7. *Farmers that diversify their business activities, for example through livestock production or off-farm income are less likely to hedge* (Shapiro & Brorsen, 1988).

8. *Farmers who are more risk averse will choose diversified production which exposes them to a lesser amount of risk* (Pennings, 1998).

4 Method

Chapter 3 presents the method used to achieve the aim of the study. It begins with a motivation of the chosen method, followed by a description of the qualitative research interview. The chapter also contains a brief version of the course of action, the structure of the interviews and finally the selection process of interview objects.

4.1 Choice of approach

The choice of method depends on the focus of the study (Merriam, 2006). The most widely used method is case studies, because it tends to provide a deep understanding of a problem in form of how a specific situation is revealed and how the people involved interpret the situation. The focus in a case study is to explore a phenomenon rather than to prove one. It is feasible in the development of a new theory as well as to test an existing theory on different case studies. It is possible with both quantitative and qualitative information. The challenge is to find a method that is best suited for one specific study, not to find a method that gives the most correct or true interpretation of the collected information. The purpose is to eliminate erroneous conclusions so the correct interpretation can emerge. The major part of the empirical results of this study is taken from qualitative research interviews with farmers. A minor part is taken from brief surveys with the same farmers. A qualitative method is chosen because the approach is considered to be particularly applicable in investigation of human behaviour (Allwood, 2004).

There are two possible alternatives in the implementation of this study, surveys and interviews. Advantages of a survey are; the cost per respondent is lower in comparison to interviews. It is less time consuming and the geographical area is less important because of the time and costs it takes to go to the place of meeting (Ejlertsson, 1996). The respondent can answer the survey in peace without pressure. A survey may also provide more clear and distinct results; the questions to each interviewee are equal which lower the risk of misinterpretation and the results will be easier to interpret. The interviewees' answer will not be influenced by the way the interviewer chooses to ask a question.

A survey has some definite disadvantages. Many surveys may never get answered (*Ibid*). A survey can only contain a certain number of questions. A further issue in the use of survey studies is that the respondent cannot ask questions to the interviewer which can lead to misunderstandings. The identification of the respondent cannot be verified in a survey. In an interview it is easier to ask more complicated and supplementary questions.

The decision to use qualitative research interviews with support of surveys is due to several aspects. Most important in the choice of method is that the research method is applicable in the context. At the same time it can be difficult to choose just one standard method in a specific context, and therefore it is better to compromise between two or several methods (Kvale, 1997). The approach in a method is a result of many considerations. It is easier to get an understanding of farmers' reasoning, their strategies and their attitudes towards risk using interview results rather than pure survey results. To achieve a high quality and to get as good feedback as possible in the interviews, a brief survey (see appendix 2) will be sent to each respondent before the actual meeting. This provides an opportunity to the farmer to carefully

think about their answers and start to prepare for the later interview. The empirical material is therefore a combination of survey and interview results. In this type of study, qualitative research interviews are of great advantage because it gives the farmers a chance to ask questions if something is unclear. This increases the possibility that the outcome of the interviews has a high degree of reliability and validity.

4.2 Qualitative research interviewing

Different forms of interviews attempt to serve different purposes. A qualitative research interview aims at understanding the world from the subject's point of view and further to unfold the meaning of their experiences (Brinkman & Kvale, 2009). Research interviews are professional conversations that have a certain structure and purpose. It is based on the knowledge constructed in the interaction between the interviewer and the interviewee, although the researcher controls and defines the situation. In depth interviews, which this study is based on, attempt to obtain specific information that later will be analysed, and to assure truthfulness the entire conversation should be recorded (Rubin & Rubin, 2005).

There are different aspects of the concept of qualitative research interviews (Brinkman & Kvale, 2009). The interview, for example, seeks qualitative knowledge expressed in normal language, it does not aim in quantification. The interview can be interpreted as an everyday conversation, it is focused on particular themes but it is not strictly structured with standard questions. An interview that is not totally open but neither strictly structured is theoretically called a *semi-structured* interview. A qualitative interviewer encourages the subject to describe as precisely as possible how they feel and act, and what they experience. The way an interviewee act or feel becomes the task for the interviewer to analyse. The subject may give apparently contradictory statements through an interview and answers may appear ambiguous. Therefore, another task of the interviewer is to as far as possible clarify if the ambiguities and contradictory statements are the result of a failure in communication, or if they reflect ambivalence and contradictions in an interviewees' life situation. In the course of an interview the subject may suddenly realize relations they have not been aware of before. That is to say that a qualitative research interview can be seen as a learning process for the interviewee, but also for the interviewer. Similar interviews with the same structure and purpose may produce different statements, due to perceptions of the interviewer. A well-conducted interview may further give the subject a positive experience, such as new insights to his or her life situation (Brinkman & Kvale, 2009). Finally, a qualitative research method aims to discover *variations, structures* and *processes* of yet unknown or unsatisfactory known phenomena, characteristics and meanings (Starrin & Svensson, 1994).

4.2.1 Interview quality

The reliability of a qualitative research interview may be questioned (Starrin & Svensson, 1994). All forms of research findings may be lacking in credibility, accuracy and validity, but the case in qualitative research has a slightly different meaning. The findings in such method are the result of the researchers' ability to interpret and analyse material in accordance with reality. That is if the researcher has made a correct construction of what the interviewee tried to convey. The result in other methods of research rather depends on whether the correct object has been measured and how carefully the measurement was conducted.

The quality of the analysis is the result of the quality on the original interview (Brinkman & Kvale, 2009). Emphasis should be placed on the improvement of the quality of the interaction between the interviewer and the interviewee. A research interview is strongly dependent on the relationship between these two parties. When choosing the type of interview the researcher should have a perception of the result, since a certain type of interview structure is usually associated with certain quality criteria. Several critics have been directed against the quality of interview produced material. It can be argued that the material has no scientific ground. It is rather a reflection of common sense. The quality of the material further depends on the analysis capability and objectivity of the interviewer since different interpreters find different meanings. Although, a number of different perspectives put on one specific interview text may turn into strength for interview research. The number of interview objects is never equivalent to the number of people in a reality context, why the interview results rarely have the ability to be generalised.

The critic towards qualitative research is discussed, but one could claim that this criticism may be reinterpreted to an advantage (Brinkman & Kvale, 2009). An advantage that lies within this type of interviewing is the privileged access to the interview objects' everyday life. The interaction between the personal perspectives of the interviewer and the interviewee may offer a specific and receptive understanding of the everyday "life-world". The different interpretations give a richer meaning, and therefore a greater quality of the material. The researcher as person is the most sensitive tool when creating a description of human meanings in new phenomenon. A result of this is the development of several techniques on how to become a good interviewer. Pilot interviews, for example, are often used in order to improve the interviewers' ability to secure and stimulate interaction with the interviewee so the quality of the research interview increases.

A major problem with research interviewing is the issue of *leading questions* (Kvale, 1997). A leading question may affect the answer of the interview object and even make them change previous statement and this may affect the quality of the study. It is a known fact that the formulation of a question unintentional shapes the content of an answer. However, even if this will affect the answer it is often necessary to use leading questions depending on the topic and aim of the study. When conducting a qualitative research interview it is especially useful to apply leading questions to test the reliability of the answers but also to identify the interpretations of the interview object. Contrary to above statement, leading questions may rather increase the quality of the result and it should not be avoided to consciously use leading questions in qualitative research interviews. Therefore, the decisive issue is not whether to lead a question or not, but where the questions should lead. They may lead to new and trustworthy knowledge. This gives opportunity to the readers of the study to evaluate their influence on the research result and to their own asses the validity of the findings.

4.2.2 Ethics

It is important to secure the interviewee's integrity and remain confidentiality (Trost 2010). This can be a problem when the data should be presented and analysed. When the data is presented the interviewer should always have the interviewee's integrity in mind so they never feel intruded. It is further important to maintain impossibility to the interviewee's wife/husband, children, parents, neighbours or anybody else to recognise or identify the interviewed person. In this study the authors choose not to include any interviewee that the authors have any type of relation to. The Swedish agriculture sector is small and individuals engaged in this sector especially in the same region tend to know each other, which can be a disadvantage in an interview. There is a prevailing conflict between the ethical requirements

on confidentiality and the principles for scientific research (Kvale, 1997). Some researchers argue that it is impossible for surrounding community and other researchers to clarify and believe the result of such study if they cannot control the source or know who/what participated in the investigation.

The authors should not try to fiction a description of the interviewee (Trost, 2010), since the fictional description of the interviewee may possibly match someone somewhere. However, researchers may occasionally "make-up" a description of the interviewee to make the text more substantial and interesting. The use of quotes can also give misleading significance (*Ibid*). It may expose the identity of the interviewee. Although, in some cases quotes may be necessary if the expression has a high degree of importance for the credibility of the analysis. Since there are differences in the spoken language and written language the use of quotes may add quality to the study than it will harm the interviewee.

There are contradictory arguments concerning how much information the interviewee should receive before the actual interview (*Ibid*). According to Kvale (1997) the interviewee should have a good and wide insight into the aim of the study before the interview, while Trost (2010) advocates the opposite.

4.3 Course of action

Firstly the researchers get familiar with the subject by studying previous research of the topic. The aim is to orientate previous results to realise what has been less explored within the subject in order to find a different focus of the study. Several studies have been made the past 10-20 years concerning price strategies in agricultural businesses. Hence, finding articles with high quality for the background chapter is no problem. While creating a wider knowledge of the subject the researchers can pinpoint a problem formulation for the study. When the problem is clear the next step is an extensive literature review in order to find relevant and applicable theories. All literature that is used for the theory part, method chapter and previous studies are gathered from the library and databases available at SLU, such as Web of Science, Scopus, LUKAS, LIBRIS and Epsilon. To narrow the search process several key words are used, such as: selling strategies, hedging, portfolio theory, expected utility function, decision making and risk management.

When the theory and method chapters have been developed process to conduct the approach towards the empirical study begins. The qualitative interviews provide the base of the study. Therefore, the preparation of the actual interviews is very important. That is fundamental in order to create interesting and valuable material. The interviews are aimed at understanding each farmer in terms of selling strategies, risk attitudes, the choice of a certain strategy and further the implementation. The farmers' behaviour is related to achieved success. Therefore the analysing of the material aims to realise how certain behaviour will lead to success. Eight hypotheses in chapter 3 are stated from the literature to confirm or deny previous statements considering farmers' management behaviour. The hypotheses are based on previous studies and the applicable theories. To create relevant empirical material 49 questions are formulated on basis of the hypotheses. An interview guide (see appendix 1) is designed to secure that each interview follows the same orientation and structure, but also to ensure that the achieved empirical material will be related to the aim of the study. Further to construct clear and useful questions for the interviews a meeting with a consultant, Christian Näslund at LRF Konsult, is made.

To create a trustworthy empirical base the material is gathered from farmers concentrated in the Swedish prominent farming areas, Gss (Götalands södra slättbygder), Gns (Götalands norra slättbygder) and Ss (Svealands Slättbygder). When the interviews are performed the results are structured and presented in chapter 5. Before the background information of each farmer is presented in the thesis it is sent to respective farmer who are given the opportunity to verify the content and to propose any changes.

4.3.1 Interview structure

In the beginning of the interviews a short presentation of ourselves, the aim of the study and the structure of the interview is made. By agreement, and to increase the incentives to answer honestly all the interviewees will be kept anonymous. They are also promised complete confidentiality in the beginning of the interview. The interviews are of a, so-called, deep character and to meet the requirements of a *semi-structured interview* the interviews will proceed according to an interview guide (see appendix 1). This is mainly to avoid unwanted digressions from the subject, and to provide possibilities for follow-up questions (Widerberg, 2002). The interview guide contains 49 questions which are divided into four main themes of the subject: risk attitudes, hedging, management and financial factors. Each question is formulated so that the authors can obtain information to analyse the hypotheses. To improve the quality of the interviews the entire conversation is recorded, written notes are also taken during the interview. In the end of the interview the interviewee gets a chance to add additional comment to any of the questions.

About a week before the interview the interviewee receives a survey by mail (see appendix 2). The survey aims to prepare the interviewee for the actual interview, to create a broader and interesting conversation.

4.3.2 Selection of farmers

The selection of interview objects should create conditions to make it possible to interpret variations on how one study group perceives the same phenomenon (Starrin & Svensson, 1994). If the study group turns out to be too homogenous it becomes difficult to distinguish nuances and variations that may be of interest to the study's result. Thanks to the requirement range of variations the study objects can be "hand-picked", given different circumstances that may be relevant in the context. However, one should assure that the interview objects hold different experiences of the phenomenon that constitutes the study's focus. They should hold different attitudes and values, work in different areas and the group should reflect a variation in terms of educational- and social background.

Numbers of interviewees should be sufficiently large so that the researcher can reach the aim (Kvale, 1997). Thus, the number of interviewees needed depends on the purpose of the study. If the group is too small statistics are not generalisable and if the group is too large the researcher cannot make more detailed interpretations of the interview. Kvale (1997), consider the optimal number of interviews to be between 5 and 25, but the number may vary depending on available time and resources.

The survey involves 12 qualitative research interviews with farmers located in the southern part of Sweden. The selection is made by certain criteria in order to create a group that is homogeneous but still reflects heterogeneity in form of, for example, production sector and

geographical conditions. The amount of 12 farmers may be too small to create generalizable statistics. To achieve a valuable variation and for the relevance of this study there are two criteria that has to be fulfilled. The farmers selected conduct conventional grain production and they should actively engage in hedging. The aim of this study is to compare selling strategies and attitudes between diversified and non-diversified farmers. That is why 41.6% of the interviewees are farmers with diversified livestock and crop production and the remaining interviewees consist of farmers with only crop production.

To find farmers that meet these criteria Erik Hartman (CEO) at Foder & Spannmål is contacted. Erik Hartman is well updated within the market of grain and possesses a large number of valuable contacts in this line of business. The researcers' received contact information to the following grain companies in the southern part of Sweden: Dalviks Kvarn, Forsbecks, Hallands Frökontor, Kristianstadsortens Lagerhusförening, Svenska Foder, Vallberga Lantmänn and Varaslättens Lagerhusförening. These companies provided the researchers' with contact information to specific farmers in each geographic region. A risk that may occur by this way of selecting interviewees is that the person helping the researcher finding objects may get too helpful in such a sense that the try to control the selection so that only "interesting" and "knowledgeable" objects will be interviewed (Trost, 2010).

All interview objects consist of men which can provide misleading results when analysing general behaviour. Previous research findings show that women tend to be more risk averse than men when facing most types of decisions (Eckel & Grossman, 2008). Therefore the involvement of women in this study should probably give other conclusions. It can thus be argued that the selection of farmers in this study is a lack of reflection of reality. Although, the selection can be defended by the fact that only 10.6% of the crop producers in Sweden consists of women (SJV, 2011).

5 The empirical study

Chapther 5 provides a description of the 12 case farmers involved in this study. In the end of the chapter there is a summary table showing the farmers individual conditions.

5.1 Case Farms

The study is based on twelve case farms. Each of the farmers produces conventional grain and oilseeds. They are geographically located in the Swedish production areas: Gss, Gns and Ss. 6 of the farms are located in Gss, 4 in Gns and 2 in Ss. The first 5 farmers are those who conduct any form of livestock production, in this study they are termed *diversified farmers*, the following 7 farmers produce crops as the main field of activity, they are henceforth called *non-diversified farmers*. Below follows a short description of each case farm.

Farmer 1
Case farm 1 is located in Gns. The farmer is 45 years of age and has a University Diploma in Agricultural Management. The farmer has been active in agriculture for 21 years. The farm covers > 600 hectares of tillable land, where about 35% of the area is rented. The farm operate crop production, mainly grains and oilseeds. Pig production is the core business of the farm but forestry and housing for rent are also conducted. The farm has a drying plant and storage capacity up to 5 000 ton, which provides an opportunity to store the entire harvest.

Farmer 2
The farm is located in Ss. The farmer is 40 years of age. He has been active in farming through his entire life. The farmer has had the main responsibility for the farm for 16 years. The farm area is < 200 hectares, where about 65 % of the area is rented. Grain and pig production is conducted and the farm has the ability to dry and store the total harvest. In addition to agriculture the farmer works in the construction business.

Farmer 3
The farm is located in Gss. The farmer is 45 years of age and has a degree in farm management. He has been actively involved in farming for 15 years and he has had the main responsibility for the business during the same time. The farm area covers < 100 hectares, and about 15% is rented. The farm cultivates grain and a smaller area of oilseeds. A drying plant and storage facilities are available to a capacity of 300 ton, which covers an average harvest. The main operation is broiler production although pig production, potato and forestry are also part of the farm. In addition to farming the producer works as a carpenter.

Farmer 4
Case farm 4 is located in Gss. The manager is 50 years of age and has had the main responsibility for the business for 4 years. Although he has been actively involved in farming for 20 years. The farmer has a degree in farm management. The farm comprises > 300 hectares, where about 85% is rented. Grain is the major crop, while the main operation of the farm is pig production. A drying plant is available on the farm and the storage capacity amount to 1 500 ton, which gives the ability to store the whole harvest. The farmer also manages central grain collection silos.

Farmer 5
Case farm 5 is located in Gss. The farmer is 40 years old. He has had the main responsibility for the farm for 10 years and he has received a degree in farm management. The farm covers > 100 hectares, where about 35 % is rented. The farm operates crop production, mainly grains and oilseeds, although pig production is the core business of the farm. A drying plant and storage capacity up to 1000 ton is available on the farm, which allows storage for the entire harvest. Besides agriculture the farmer also conducts contract and workshop activities.

Farmer 6
The farm is located in Gns. The manager of the farm is 40 years of age. He has been an active farmer for 9 years. The farmer has a University Diploma in Agricultural Management and a degree in engineering. The farm covers > 600 hectares, and about 70% is rented. Crop farming is a major activity where grain is the main crop along with a limited area of oilseeds. A drying plant and storage with capacity to store 90% of total average harvest is available.

Farmer 7
Case farm 7 is located in Ss. The farmer is 55 years of age and he has been an active in agriculture for 23 years. He has a Master of Science in Agriculture. The farm covers < 200 hectares where some 35% of the land is rented. The farmer is engaged in a collaboration arrangement along with 3 other farmers, who together cultivate 400 hectares grain and oilseeds. The farmer rents a drying plant close to the farm which offers drying and storage capacity for the harvest. In addition to crop farming, energy forest is grown, on 80 hectares and also horse barns are offered for rent.

Farmer 8
The farm is located in Gns. The farmer is 50 years of age and has been actively involved in the farm for 30 years. He has a University Diploma in Agricultural Management. The farm area covers < 200 hectares, where about 5% of the land is rented. The fields of activity involve mainly crop farming where grain is the major crop. The farm has a drying plant and storage capacity for 1 200 ton, which allows storage for the entire harvest. Besides farming the farmer serves on the board of a company.

Farmer 9
The farm is located in Gns. The farmer is 50 years of age and has been active in farming for 20 years. He has a University Diploma in Agricultural Management. The farm area amounts to < 300 hectares, and about 35% of the land is rented. Crop farming is the activity of the farm and grain is the major crop. Ley and other crops are produced but in a smaller scale. A drying plant and storage are available for the entire harvest. The capacity is 1 500 ton.

Farmer 10
Case farm 10 is located in Gss. The farmer is 35 years of age, has been active farmer for 6 years after receiving a University Diploma in Agricultural Management. The farm covers > 200 hectares, and about 75% is rented. Crop farming is the core business of the farm. Drying and storage are available to a capacity of 700 ton, which can handle 60% of average harvest. The farmer also produces firewood in addition to agricultural production.

Farmer 11
The farm is located in Gss. The manager of the farm is 40 years of age and he has been active in farming for 8 years. He has a degree in Master of Science in Agriculture. The farm acreage amounts to > 300 hectares where 25% of the land is rented. The farm cultivates mainly grain but also oilseeds, potatoes and sugar-beets. The farm can manage drying and storage to a capacity of 1 150 ton, that is, 90% of total average harvest.

Farmer 12
Case farm 12 is located in Gss. The farmer is 50 years of age. He has been actively involved in farming for 20 years and has a University Diploma in Agricultural Management. The farm covers < 300 hectares where the total area is held on rent. Grain and oilseed production are the fields of activity of the farm, while the farmer also runs a machine station. The farm has no drying plant or storage capacity on the property.

5.1.1 Summary of interviews

Table 2: Distribution of selected farmers according to the criteria. (Source: Own arrangement)

Farmer	Geographical Location	Age	Years of experience	Education	Farmed hectares	Livestock Production
1	Gns	45	21	University Diploma in Agricultural Management	> 600 ha	pigs
2	Ss	40	>20	High School	< 200 ha	pigs
3	Gss	45	15	Degree in Farm Management	< 100 ha	broiler and pigs
4	Gss	50	20	Degree in Farm Management	< 400 ha	pigs
5	Gss	40	10	Degree in Farm Management	< 130 ha	pigs
6	Gns	40	9	University Diploma in Agricultural Management	> 600 ha	
7	Ss	55	23	Master of Science in Agriculture	< 200 ha	
8	Gns	50	30	University Diploma in Agricultural Management	< 200 ha	
9	Gns	50	20	University Diploma in Agricultural Management	< 300 ha	
10	Gss	35	6	University Diploma in Agricultural Management	> 200 ha	
11	Gss	40	8	Master of Science in Agriculture	> 300 ha	
12	Gss	50	20	University Diploma in Agricultural Management	< 300 ha	

6 Results and Analysis

This chapter aims at analysing the results from the qualitative research interviews. The analysis is based on the theories presented in chapter 4 (Theoretical Perspective). The analysis intends to test the relevance of the hypothesis based on previous research.

Through the empirical data the hypothesis are analysed. Each of the hypotheses is individually tested on each of the 12 farmers. Necessary result is presented to able confirmation or rejection of previous statements. In the end of the chapter there is a summary table revealing each of the farmers' individual results

6.1 Decision Making

1. *Most farmers use what is called an intuitive decision process* (Öhlmér & Lönnstedt, 2004).

2. *Farmers base the decision directly on the current economic situation* (Öhlmér & Lönnstedt, 2004).

3. *Farmers do not hedge because of lack of understanding regarding hedging or bad experiences with hedging* (Shapiro & Brorsen, 1988).

6.1.1 Decision subject to risk management

The personal factors considered in this study are age, decision approach and education. The average age of the farmers conducting livestock production is 44 years old, and they have been active farmers for an average of 16.4 years. The average age of the farmers with only crop production is 45 years old and they have been actively involved in the farming for an average of 16.6 years. The decision approaches are described in the theory as intuitive and analytic, a decision maker's approach is due to several factors, for example education level and farm income aspiration.

Probably the most distinctive characters between intuitive and analytic decision makers are the perceptions about future prices and the consequences for the farm income (Öhlmér *et al*., 2000). The analytic approach is characterised by someone who has quantified perceptions about future price and thus estimated consequences for the farm income. The analytic decision process is based on rationality, consequences are valued to choose the alternative with the best expected consequences. The intuitive decision maker has perceptions about the direction of the future price and thus the direction of the farm income changes, that is, their perceptions are based on learned routines and experiences. Yet, that is not enough why decisions finally are based on intuitive "gut-feeling". The farmers' education is shown in figure 8.

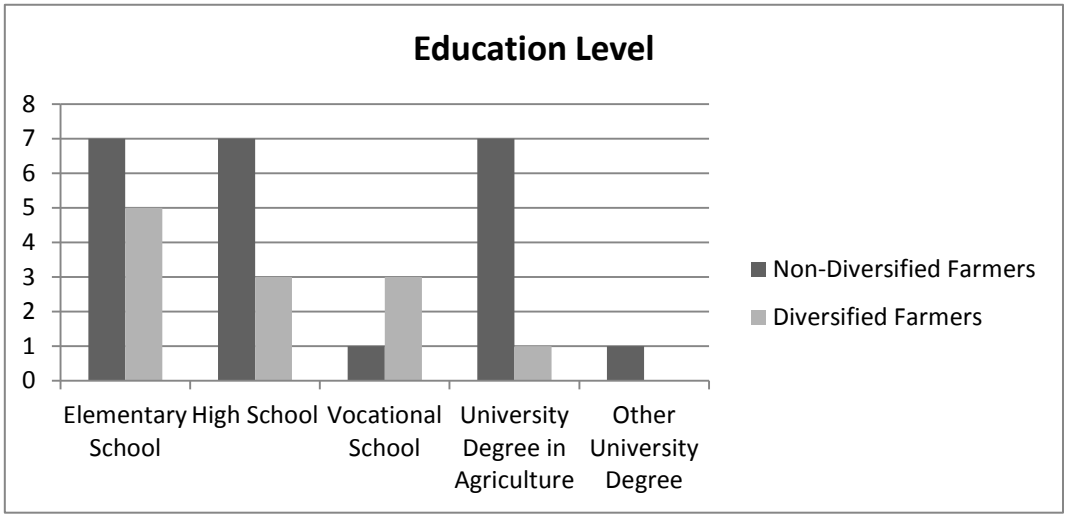

Figure 8: Education level

Figure 8 show that more of the non-diversified farmers have obtained a university degree in agriculture. Vocational school is considered as courses in agricultural work management which is more completed by the diversified farmers.

The results in figure 9 and 10 show that farmers tend to use both analytic and intuitive decision approaches, although the final decision is either based on "gut-feeling" or elaborated calculations. The results are based on the answers on how the farmers make decisions involving risk and how important decisions are made in the business. The majority of the farmers answer that decisions are based on combinations of accurate calculations, external adviser, previous experiences and "gut-feeling"/intuition. Despite this, as illustrated in figure 9, 42% of the farmers are perceived as more intuitive than the others since they tend to value qualitative aspects rather than quantitative. 33% of the farmers describe their decision processes as more analytic, the processes towards a decision is clear, involving accurate calculations with quantitative values. 25% of the farmers' value quantitative and qualitative values equally. Thus, their behaviour towards decision making is perceived as both intuitive and analytic and the exact character is difficult to distinguish.

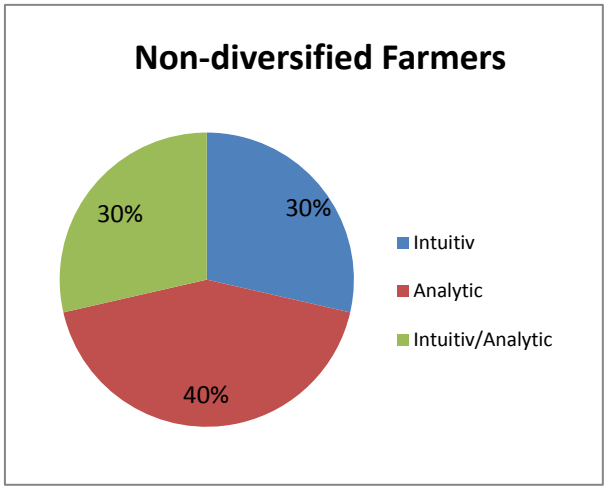

Figure 9: Decision Approach, Non-diversified Farmers

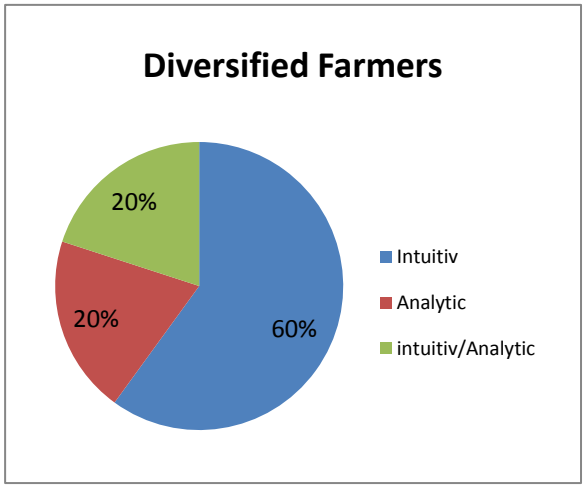

Figure 10: Decision Approach, Diversified Farmers

Öhlmér *et al*., (2000) describes the decision event as a choice among action alternatives where the best alternative is not evident. A decision can further be considered as the result of a process (Jacobsen & Thorsvik, 2008). The process is the range of actions or judgments that leads to performance. The farmers' decision-making was questioned in the interviews, and it is clear that decisions are the result of a process for all farmers. Every farmer describes their decision-making as following: a problem related to the production is detected and the farmer tries to define the problem in order to find a solution, several alternatives are evaluated through information search, discussions with colleagues, family members and advisors. Through these steps the farmer can limit the number of alternatives, calculations and/or thoughts concerning the remaining alternatives are made, in order to find the most profitable alternative. The calculations involve both quantitative and qualitative values. The final step in the process is implementation and/or action. Accordingly, decisions are based on a number of factors which all depend on the surrounding environment. The majority of the farmers further claim that they make decisions according to financial positions they want to achieve in the future and not only by the current economic situation. Following factors was mention as decision basis:

- Price and price trend
- Storage capacity
- Liquidity
- Previous experiences
- Preferences
- Economic situation
- Goals (qualitative and quantitative)
- Debt-equity ratio
- Interest rates
- Farm subsidies

6.1.2 Level of knowledge

To realise how individuals and organisations collect and use information and how the information determine a decision is especially important when understanding the concept of decision making (Jacobsen & Thorsvik, 2008). Today the market is provided with several channels where farmers can collect information, both national and international. The many channels and the infinite amount of information farmers' can receive make the decision process complicated and the farmer may find it difficult to find those alternatives that will contribute to the greatest benefit. Formal literature describes decision making as a linear process where information gathering is a step of its own, while recent studies by Öhlmér *et al*., (1998) suggest a revised version emphasising information search during the entire process. Depending on the farmers risk attitudes, decision approaches and other farm related factors they devote more or less time resources to information search.

During the interviews the farmers were asked to estimate the time they actively spend on information search, in order to keep themselves updated on the market. The time varies throughout the year for all farmers due to seasonal factors. Figure 11 show the amount of time each farmer on average spends on searching information per week.

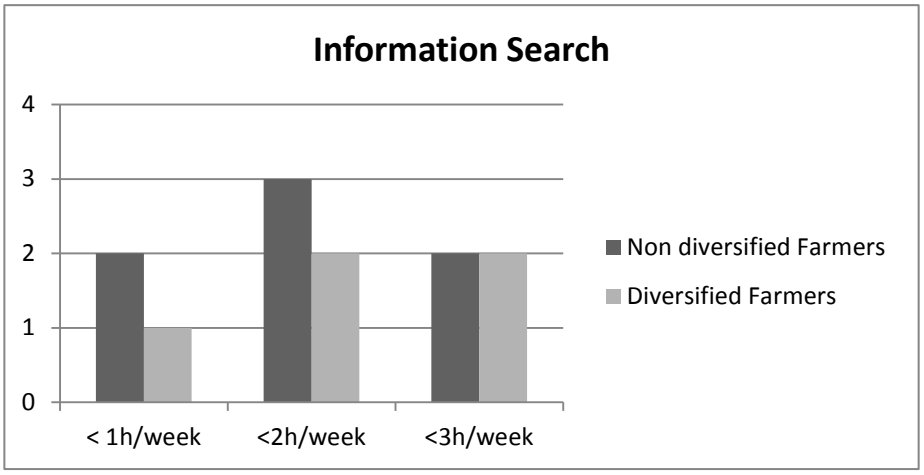

Figure 11: Total time each farmer spends on information search to monitor the market.

The results show that non-diversified and diversified famers on average spend the same amount of time on information search. The total time differs between one and three hours per week. Farmers tend to revise their problem perceptions every time they obtain new information or knowledge on how the market changes (Öhlmér *et al*., 1998). Their perception about reality is due to their individual knowledge about hedging and the futures market. Thus, their knowledge level may influence their willingness to use hedging as a risk management tool, it may further affect what kind of tools they will apply in their selling strategies. The farmers in this study were asked to define their knowledge about different hedging strategies, the result show no significant difference between non-diversified farmers and diversified farmers. Totally have 58% of the farmers participated in courses in futures trading while 42% of the farmers define themselves as self-taught.

80% of the diversified farmers think they hold the knowledge required to use the available tools in the market. They find hedging as useful instrument to even out the distribution of income on a market with strong price fluctuations. Although, the diversified farmers mention that their motivation to manage risk related to grain prices would be even stronger if they did not conduct livestock production. This may indicate that lack of time is a limiting factor. 72% of the non-diversified farmers believe that their knowledge level is sufficient to use available hedging tools, although, all of them realise their lack of knowledge when it comes to stock market hedging. 28% of the non-diversified farmers wish they had a wider knowledge about the different tools, in order to manage the risk more effectively. Despite different knowledge levels no obvious relation between knowledge level and willingness to hedge can be perceived. Since there is no difference in the incentives to hedge between the farmers that find themselves as sufficient informed and the farmers that wish they hold a wider knowledge. However, a relation between incentives to hedge and available time can be detected, since all the diversified farmers believe they should engage more in this type of risk management practice if they had more time. All farmers involved in this study have mainly good experiences with hedging. They believe hedging is an efficient tool to perceive increased income stability.

The farmers mention several channels where they collect information, such as; Handelsbanken, BM Agri, Agronomics, Lantmännen, the board of trade (e.g. Chicago Board of Trade and Matif) and also dialogues with colleges and advisors is a significant source of

knowledge (figure 12). Lantmännen and other local grain retailers offer price quotations through sms-services, which is appreciated by many of the farmers. Mainly they use those sources to create a perception of the current price of commodities, but also to examine the expected price trend. According to the theory of decision making, too much information may be seen as a disadvantage in the decision process, due to human psychological limitations to which humans can process information (Pennings *et al*., 2008). The statement is reflected in this study since the majority of the farmers find themselves exposed to too much information. They perceive that this part may complicate evaluation and selection of necessary information to reach a decision. In addition, the many sources express diverse information which further complicates the ability to create a realistic view of the market. Although, all of the farmers find their information about market price of the produced commodity as very up to date.

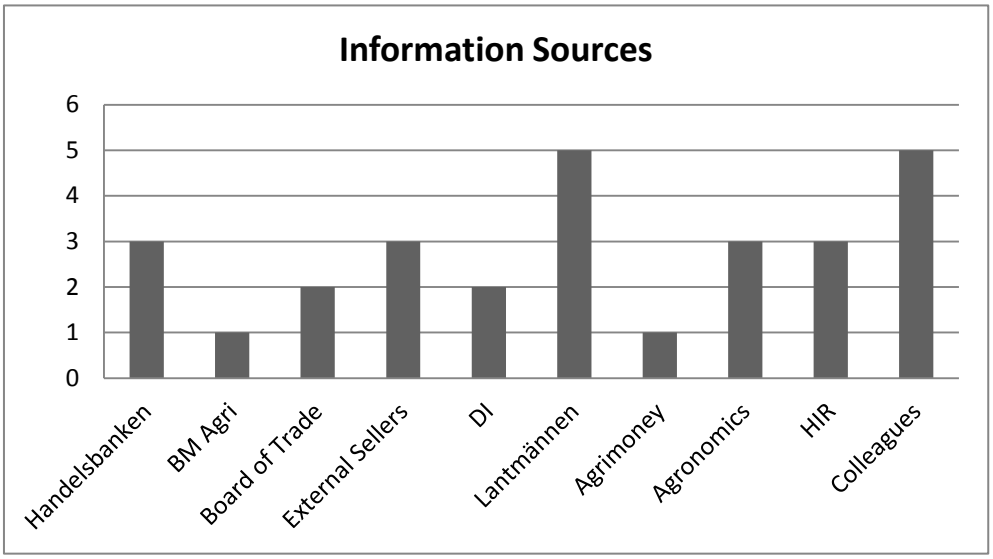

Figure 12: Used information sources.

Farmers can reduce their risk exposure through diversification. Diversification can partly be considered as using different tools when selling crops, that is, different selling strategies. The different strategies analysed in this study are; forward contract, future contract, spot price, pool price and contract of growing crops. Forward and futures contracts are, in this study, considered as strategies where the price is hedged.

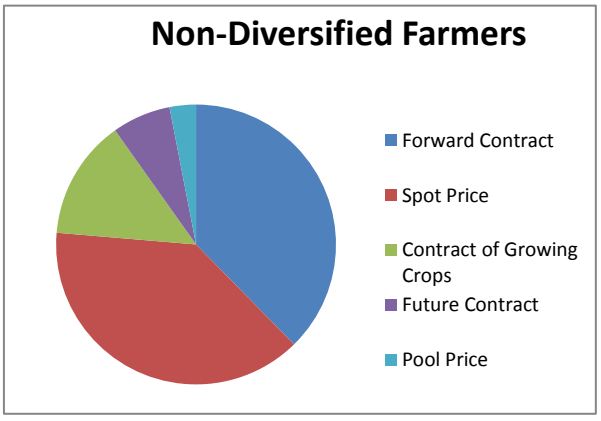

Figure 13: Share of used selling tools. The estimation is based on total quantity from the non-diversified farms.

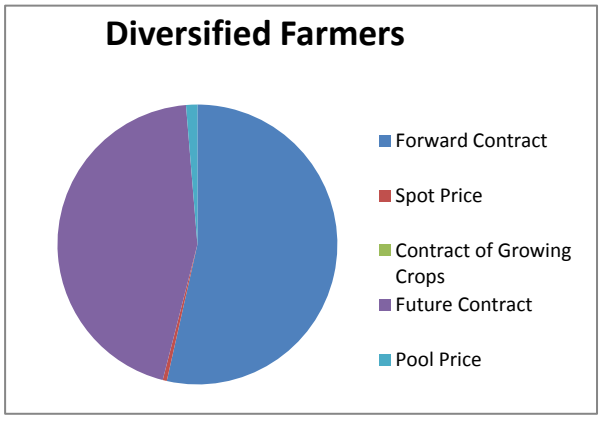

Figure 14: Share of used selling tools. The estimation is based in total quantity from the diversified farms.

The result in figure 13 reveals that the non-diversified farmers sell a significant proportion of the harvest on spot price, although an almost equal proportion using forward contract. This may indicate that the non-diversified farmers are in a greater need of liquid assets in connection to the harvest period. The non-diversified farmers do, in general, not have a steady income allocation over the year, that is, they may have greater cash flow needs. Their income is mainly received during a short period and in between these short periods the company is charged with expenses. The income in such company is primarily farm support, which they normally receive in December, and income from sales of grains after the harvest period. Diversified farmers maintain a steady cash flow continuously over the year which, to a greater extent, can cover their variable costs. Therefore, the diversified farmers' incentives to sell on spot would be higher. Although, figure 13 show that diversified farmers mainly hedge by forward or future contracts. This may be due to the fact that the majority of the diversified farmers in this study conduct pig production, which for the past years has been associated with lower profitability and therefore they hedge the price on the grains to ensure a "good enough" income. This may illustrate the "safety-first" rule described in the theory, which put focus on minimising the risk of a bad outcome (Hardaker *et al*., 1997).

6.1.3 Analysis

Hypothesis 1 declares that *most farmers use what is called an intuitive decision approach (*Öhlmér & Lönnstedt, 2004). The hypothesis is confirmed if diversified and non-diversified farmers are evaluated as a group, since totally 42% of the farmers are perceived as intuitive decision-makers. 33% of the farmers are analytic and 25% of the farmers are both analytical and intuitive. When the groups are analysed separately the hypothesis is further confirmed when looking at the diversified farmers, where 60% of these farmers are clearly intuitive. The hypothesis is however rejected when analysing the non-diversified group of farmers because the majority of this group consider themselves as analytic decision makers. According to the theory, decision approach is related to personal factors, such as educational level and farm income aspiration. The non-diversified farmers in this study are more educated than the diversified farmers. They are generally more analytic in their decision approaches. Therefore, one could claim that the higher educational degree, the more likely becomes a more analytic *behaviour*.

Hypothesis 2 claims that *farmers base the decision directly on the current economic situation* (Öhlmér & Lönnstedt, 2004). The hypothesis is rejected according to the results of the empirical study. It is clear that every farmer base their decision on several grounds; previous experiences, current situation and future financial goal. This holds regardless non-diversified or diversified production. The majority of the farmers mention for example previous profits and dept-equity ratio and future factors such as rate, economic situation, farm subsidies and price trend as basis for decisions. Thus, the empirical results show that decision-making is complex and several more factors than only the current economic situation is suggested to be taken into account.

Hypothesis 3 declares that *farmers do not hedge because of lack of understanding regarding hedging or bad experiences with hedging* (Shapiro & Brorsen, 1988). According to the results this study rejects the hypothesis. The theory implies that farmers would choose not to involve in hedging because of lack of knowledge. The result shows that it is rather other factors, such as available time or interest that would prevent their use of hedging tools. 80% of the diversified farmers find their knowledge level sufficient. 20% of these farmers wish they hold

a wider understanding, although the entire harvest is usually used as feed in the livestock production. 23% of the non-diversified farmers realise a lack of understanding regarding the tools they use today. However, the result shows that they hedge the price to a similar extent to the other farmers. Thus, even though farmers wish they hold a wider understanding regarding hedging they tend to hedge. The results reveal no evidence to confirm the hypothesis. Considering bad experience with hedging none of the farmers mention any bad experience with hedging. Perhaps bad experiences would influence the incentives to hedge, but unfortunately it is impossible to realise such statement on the basis of this study. The reason is that all farmers agree about the fact that hedging is an efficient tool to manage risk related to fluctuating prices. All of the diversified farmers mention time as a factor why they not hedge in some cases, which indicates that it is rather the lack of time that influence willingness to hedge more than lack of understanding. However, a lack of understanding may be a result of lack of interest and time, why the latter two factors are the main reasons why farmers do not hedge.

6.2 Expected Utility

4. *Farmers that are sufficiently risk averse should hedge even if hedging may give a lower average price* (Shapiro & Brorsen, 1988).

5. *The more highly leveraged farmers consider themselves, the more likely they are to hedge and the more they hedge if they do* (Shapiro & Brorsen, 1988).

6.2.1 Risk Attitude

It is argued in the theory that a greater market orientation leads to higher degrees of risky and innovative *behaviour* (Pennings & Garcia, 2001). Different risk attitudes are related to farmers intention to use future contracts, risk attitudes are individual and cannot be extracted by one single measure. Although, a main risk related to business can be considered as the price risk, therefore the analysis of this study focus on the risk in the price domain. Farmers are further exposed by risk related to, for example, production and various market changes. The expected utility is strongly connected to an individual's willingness to bear risk (Pindyck & Rubinfeld, 2005).

As stated above, risk is perceived different by different individuals and how a person perceives risk shapes the business management behaviour. The theory implies that most farmers associate risk with various forms of losses (Miller *et al*., 2004). During the qualitative research interviews the farmers were asked how they interpret the concept of risk, and in fact, most farmers states opportunities as strongest association. One farmer means that if there is no risk there are no opportunities to gain, which may depict 58% of the farmers approach towards risk. 42% of the farmers associate risk with uncertainty, i.e., the risk that the result turns out worse than expected. On basis of the expected utility theory an individual risk approach is divided into three types; risk averse, risk neutral and risk seeker (Pindyck & Rubinfeld, 2005). To realise how the farmers according to this theory approach risk the farmers were asked to indicate their agreement or disagreement on a 6 point scale with the statements:

"I prefer financial certainty with lower profit opportunities to financial uncertainty with higher profit opportunities?"

"I worry more over loosing significant profits than making significant losses in my business?"

"I like to experiment with new ideas in my business?"

Were 1 is "I disagree" and 6 is "I agree". Through the given answers each farmer's risk approach could be realised by calculating a mean value of the total values. The farmers risk level and share of hedged harvest can be deduced in table 3.

Table 3: The farmers risk approaches and share of hedged crop.
Farmers 6-12 are the non-diversified farmers.

Farmer	Risk Attitude	Years of Experience	% Hedged Crop
1	3,7	21	25%
2	2,6	16	< 50%
3	3,7	15	0%
4	4,3	20	> 50%
5	4	10	10%
6	***4***	***9***	***33%***
7	***4***	***23***	***50%***
8	***5***	***30***	*****
9	***4,3***	***20***	***45%***
10	***4,5***	***6***	***50%***
11	***3,7***	***8***	*****
12	***3,3***	***20***	*****

The share of harvest hedged display the farmers stated share that they strive to hedge each year. Table 2, show hedged crop of total quantity, therefore the diversified farmers hedge ratio is calculated by their total harvest. The sign (*) indicates farmers that has no actual strategy, they rather strive to maximise profits or to create a stable income. Their share of hedged harvest varies between years depending on price and quality of the harvest. The risk attitude numbers shows if a farmer's risk appetite is 6 it is clearly a risk seeker, 1 is risk averse and 3 is risk neutral. Mean value of the diversified farmers risk attitudes is 3,7 and the mean value of the non-diversified farmers is 4,1. Thus, the non-diversified farmers are perceived as slightly more risk-prone than the diversified farmers. In literature it is mention that long experience and training promotes a risk seeking behaviour (Shapiro & Brorsen, 1988). The statement may be reflected in the results since the farmer with the longest experience (30 years) possess the most risk seeking behaviour (5). However, this may be a coincidence. The data in table 2 further illustrate that the diversified farmers are more inclined to hedge a given quantity, while the non-diversified farmers are more inclined "to play the game". A reason why diversified farmers may have strong incentives to hedge may be if the harvest gives high quality they get the possibility to sell the harvest and buy grains of lower quality for feed, and thereby they can earn the difference. It is further possible to realise that regardless of risk attitude farmers are prone or less prone to hedge. The one farmer that is the most risk averse wishes to hedge half of the harvest, which may explain that this farmer like "playing it safe" because of his risk averse nature.

6.2.2 Hedging Attitude

The farmers were given the question if they are satisfied with the hedge positions they have obtained through the years, and the single answer was yes. They all agree that hedging is perceived to increase income stability, and that under current market conditions hedging is necessary. The diversified farmers, but also some of the non-diversified farmers, mention that time is a limiting factor. They mean that the engagement in this new market conditions requires further operations during a working day. However, the attitudes are positive and all farmers show a great interest towards hedging. They argue that the efficient way to increase income stability and further to on their own "decide" the price, are of advantage to the individual farmer. Some of the farmers mention difficulties to in some cases realise if the current price is beneficial. Most of them have an idea of what the price should be to cover costs of production. This is probably due to many years of experience (table 2).

To increase income stability and to secure a price that certainly cover cost of production are major aims with hedging. This offers security and risk reducing opportunities to the company. All farmers agree that hedging further helps to affect the financial position and to avoid problems related to liquidity.

6.2.3 Leverage

According to Shapiro & Brorsen (1988) debt load is strongly connected to farmers' intention to hedge. Whether high or low debt load the expected utility value obtained by hedging may vary. The higher debt load the expected utility value obtained by hedging tends to be higher. Table 4 shows the farmers debt positions and actual share of hedged crop year 2009 and 2010.

Table 4: The farmers debt ratio in relation to hedged crop 2009 & 2010
Farmer 6-12 are the non-diversified farmers

Farmer	Debt Ratio	% Hedged Crop 2009	% Hedged Crop 2010
1	50%	100%	100%
2	10%	0%	100%
3	40%	*no data*	*no data*
4	40%	100%	100%
5	60%	*no data*	*no data*
6	**50%**	**52%**	**61%**
7	**50%**	**55%**	**100%**
8	**0%**	**89%**	**10%**
9	**30%**	***no data***	**28%**
10	**75%**	***no data***	***no data***
11	**30%**	**100%**	**100%**
12	**0%**	**0%**	**0%**

The first five farmers are the diversified farmers. Unfortunately there is insufficient data to analyse for those farmers noted with "*no data*". The results show that the diversified farmers tend to hedge a large share of the crop that is marketed. That is, understood as they use a major quantity of the crop as feed in the livestock production they hedge remaining quantity. However in most cases, future and forward contracts (crop for sale is only considered in this results). This reverts to previous result that diversified farmers may hedge in order to ensure a

"good enough" income on crop sales. Farmer 2 consume the total crop quantity as feed grain 2009, therefore the percentage of hedged crop this year is equal to 0. The debt ratio varies widely between the farmers and also the percentage of hedged crop. It is difficult to distinguish any relation between debt ratio and hedged crop. The results of the non-diversified farmers show that farmer 11 hedge 100% of selling crops for both years. The same farmer mentions the agreement of a relatively expensive lease and therefore the current hedging strategy is to, at least, cover the lease costs. The lease agreement increases financial uncertainty which by this farmer is managed through hedging. Thus, the price is hedged when the farmer, considering circumstances, is satisfied and the lease costs are covered rather than trying to hit the peak to maximise profits. In other words, this farmer would hedge even if it may give lower average price. Farmer 12, with a debt load of 0% hedges no quantity of the crop. this farmer has no storage capacity and deliver total quantity to local grain retailer directly related to harvest time. The agreement offers the farmer best market price and secured deliver.

6.2.4 Analysis

Hypotes 1 claims that *farmers that are sufficiently risk averse should hedge even if hedging may give a lower average price* (Shapiro & Brorsen, 1988). Unfortunately none of the farmers in this study behave sufficiently risk averse. Therefore the results provide no confirmation or rejection of the hypothesis. All of the farmers are satisfied with the outcome of the hedging positions they have taken. They all argue that when hedging they mainly aim at reducing financial risk, why one could argue that they would hedge even if it would give a lower average price. The one farmer that holds a high cost lease tends to be relatively risk averse considering these conditions. He states that he would hedge even though it would give a lower average price. In fact, previous research argues that risk aversion is the primary motive for farmers to hedge (Mc New & Musser, 2000).

Hypotes 2 declares that *the more highly leveraged farmers consider themselves, the more likely they are to hedge and the more they hedge if they do* (Shapiro & Brorsen, 1988). The empirical material is not enough to confirm or reject the hypothesis. Again it is obvious that willingness to hedge depends on several factors and it may therefore be misleading to value the willingness by one single measure. In previous research a relation between leveraged and likeliness to hedge is proven. According to Shapiro and Brorsen (1988) the dept position is an important variable to observe when realising a farmer's intention to hedge. Higher debt loads may require hedging to meet financial needs, thus, the expected utility increases. If inverse position with a more favourable position the expected utility value of s hedge may not be as high, since the financial risk exposure is lower. The diversified farmers have a higher average debt ratio than the non-diversified farmers. In table 4 one can see that they have hedge total amount of selling crop for both 2009 and 2010. This can confirm a trend that the more highly leveraged farmers are the more likely they are to hedge.

6.3 Portfolio

6. *Farm size is positively related to hedging* (Shapiro & Brorsen, 1988).

7. *Farmers that diversify their business activities, for example through livestock production or off-farm income are less likely to hedge* (Shapiro & Brorsen, 1988).

8. *Farmers who are more risk averse will choose diversified production which exposes them to a lesser amount of risk* (Pennings, 1998).

6.3.1 Farm size

Previous research realises that large-scale farmers may utilise hedging more extensive than the average farmer. Table 5 shows the farm sizes in hectares, share of leased land and percentage of hedged crop.

Table 5: Hedged crop in relation to farmed hectares and leased land.
Farmer 6-12 are the non-diversified farmers.

Farmer	Farmed Hectares	% Leased Land	% Hedged Crop
1	> 600 ha	35%	25%
2	< 200 ha	65%	< 50%
3	< 100 ha	15%	0%
4	> 300 ha	85%	> 50%
5	< 200 ha	35%	10%
6	**> 600 ha**	**70%**	**33%**
7	**< 200 ha**	**35%**	**50%**
8	**< 200 ha**	**5%**	*****
9	**< 300 ha**	**35%**	**45%**
10	**> 200 ha**	**75%**	**50%**
11	**> 300 ha**	**25%**	*****
12	**< 300 ha**	**100%**	*****

The share of leased land is relatively high for this group of farmers, therefore this factor is considered in the analysis. According to the results the amount of rented land increases the farmers' incentive to hedge. A reason may be that these farmers have higher total costs for the rented land and it motivates them to use hedging instruments. Shapiro and Brorsen (1988) declare that large-scale farmers will be less concerned about the lumpiness of futures contracts. Indeed, no farmer in this study worries over the lumpiness of futures contract, regardless if they hedge more or less. There are no appeared differences between the two groups, diversified and non-diversified farmers. In fact, all the farmers in this study are perceived as large-scale farmers, which may explain the consistently positive attitudes. The farmers hedge, in general 20-50% of their crop, which matches Nilsson's (2001) suggestion, of an optimal hedge ratio of 20-50% in Sweden.

6.3.2 Diversification

Probably the most common solution to avoid risk in a farm business is through diversification (Barry *et al*., 2000). Diversification in agriculture can be compared to investment diversification. Barry *et al*., (2000) realised in a study that the most successful investors were characterised by those who diversified their assets in different portfolios. This led to a higher expected return. 92% of the farmers in this study are diversified in such sense that they conduct some sort of economic activity beside grain and oilseeds production, for example, other crop production, machinery services or firewood production. All farmers, both diversified and non-diversified argue that diversification through varying crop rotation partly manages the risk related to production.

The result show clear evidence that the diversified farmers are more affected by risks associated to livestock rather than to crops, since they all are connected to insurances against different livestock diseases and a small number of buyers. One of the diversified farmers argues that the security of his business is the livestock production, but in the meantime it is also the enterprises were he may suffer the greatest financial losses. This argument reveals the observation that diversified farmers find the risk associated to the livestock production most important. 40% of the diversified farmers mention crop production when they were given the question of how they manage production risk. This statement illustrate that this type of farmers generally put more focus towards the livestock production. They emphasise the possibility to add value the crops through livestock, which drastically reduces the quality risk exposure. In addition, marketing opportunities of the product occur several times during the year, why they obtain a smoother cash flow.

Figure 15, distribution of the farmers' different enterprises. In the figure, other crops refer to crops as sugar beet, potato and grass.

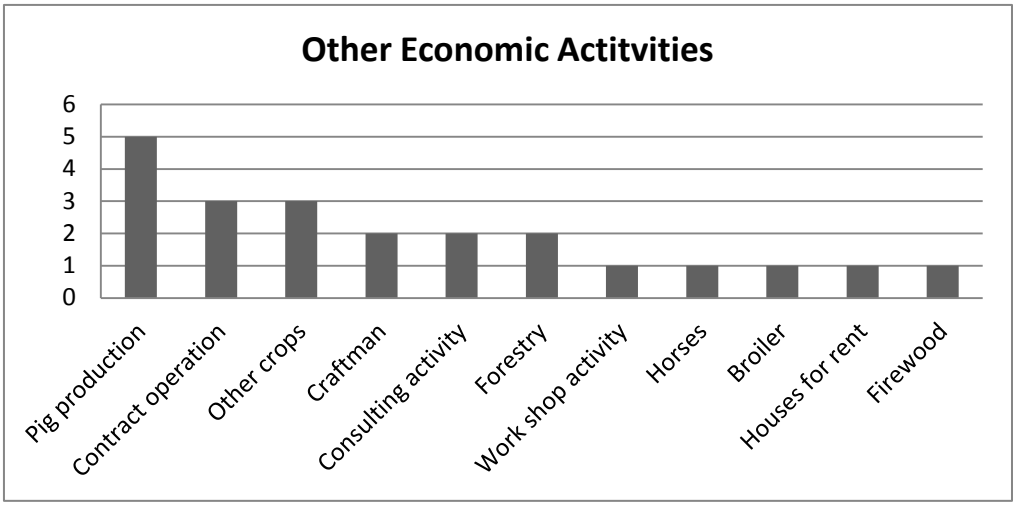

Figure 15: Distribution over economic activities.

Farm-related factors play an important role to the risk management. For instance, storage- and drying opportunities give advantages and more options to the farmer. In figure 16 the farmers' storage capacity in relation to total harvest is displayed.

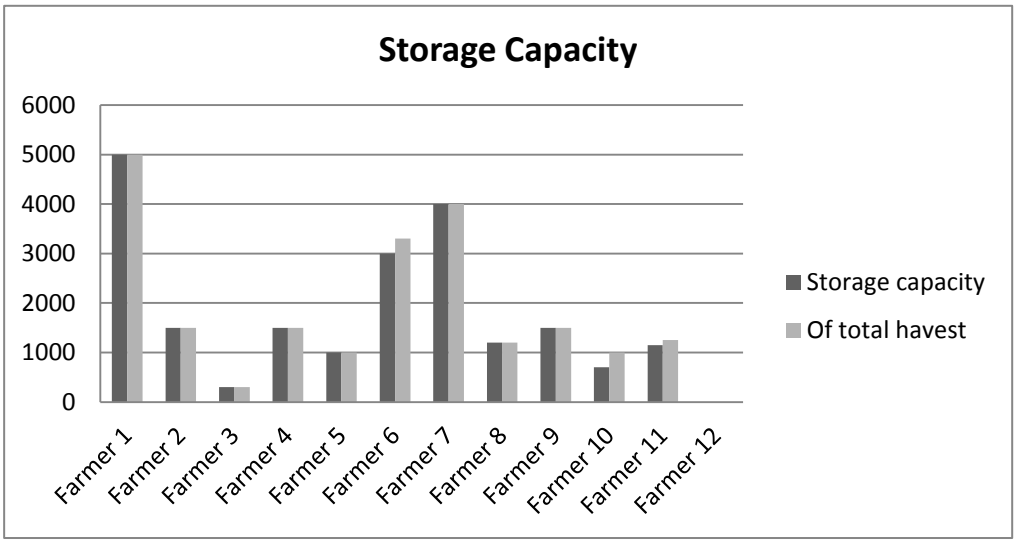

Figure 16: Storage capacity in relation to total harvest.
Farmer 6-12 are the non-diversified farmers

The average tillable acreage by the non-diversified farmers is 299 hectares, 42.8% of these farmers state that they can store and dry the entire harvest on the farm. The average farmed hectares by diversified farmers are 296 hectares. All of these farmers can dry and store the total harvest. The diversified farmers mention a total storage capacity as a great advantage since they use the grain as feed in the livestock production. The non-diversified farmers also highlight the advantages with available storage. They believe that a higher storage capacity may reduce the risk exposure due to lower quality and price, since they are able to store the harvest in anticipation of a rise in the price. Diversification through different markets strategies is further a favourable way to diversify income and distribute risk. Therefore high storage capacity enables possibilities for the farmer to use different selling tools since they do not have to deliver at harvest. This is also a period when the prices tend to be the lowest.

6.3.3 Analysis

Hypothesis 6 claims that *farm size is positively related to hedging* (Shapiro & Brorsen, 1988). The majority of the farmers, both diversified and non-diversified are perceived as relatively large-scale farmers. All of them further engage in some type of hedging why the hypothesis is confirmed. The hypothesis is further confirmed by formal literature that suggests that large farms utilise hedging more than the average farm (Musser *et al*., 1996). That is partly due to economies of scale opportunities which result in net price enhancement. Also the farm size may have positive relation to the incentives to locate storage possibilities on the farm, and thus, open up for the option to diverse the selling strategies.

Hypothesis 7 declares that *farmers that diversify their business activities, for example through livestock production or off-farm income are less likely to hedge* (Shapiro & Brorsen, 1988). Diversification is a strategy to reduce risk exposure. 91,7% of the farmers involved in this study conduct some sort of economic activity beside crop production. That is, they knowingly diversify production to reduce risk. Despite this, no findings in this study indicates that diversification influences the farmers' willingness to hedge. Therefore the hypothesis is rejected. Mussler *et al*., (1996) also claim that farmers who diversify through, for example livestock production are less likely to manage the financial risk through hedging.

The livestock producers in this study (diversified farmers), show strong incentives to manage the financial risk related to the selling crop through forward-pricing methods.

Hypothesis 8 claims that f*armers who are more risk averse will choose diversified production which exposes them to a lesser amount of risk* (Pennings, 1998). The hypothesis is confirmed since the diversified farmers display on average a slightly more risk aversive behaviour (3,7) than the non-diversified farmers (4,1). This may indicate that these farmers are more prone to manage the risk exposure within their agricultural activities. However, the result does not clarify if the diversified farmers decided to conduct livestock production primary because of their risk aversive traits or because of other motives.

6.4 Concluding Analysis

Table 6: Summary of the first five farmers' attitudes divided under the hypotheses.
Table 6 continues on the following page. Source: (Own arrangement)

Hypothesis/ Farmer	*1. Decision Theory*	*2. Decision Theory*	*3. Decision Theory*	*4. Expected Utility Theory*	*5. Expected Utility Theory*	*6. Portfolio Theory*	*7. Portfolio Theory*	*8. Portfolio Theory*
Farmer 1	Show a more analytic *behaviour* in the farm-management	No	He feel that he has sufficient knowledge about hedging tools that he utilise today	Risk neutral - strategy to hedge 25% each year	No	Yes	No, he hedge a great amount of selling crop despite the livestock production	Yes, risk-neutral and choose livestock production
Farmer 2	Intuitive decision approach	No	He feel that he has sufficient knowledge about hedging tools that he utilise today	Tend to be risk averse, strategy to hedge 50% each year	No	Yes	No, he hedge a great amount of selling crop despite the livestock production	Yes, risk averse and choose livestock production
Farmer 3	Base decisions mainly on "gut-feeling", intuitive decision approach	No	Hedge today, but would utilise hedging more if he had more knowledge	Risk neutral - use crop for feed in the livestock production	No	Farm less than 100 hectares and use the total quantity for feed	He usually use the total quantity for feed, but in case of remaining crop he tend to hedge	Yes, risk-neutral and choose livestock production
Farmer 4	Tend to be more intuitive than analytic	No	He feel that he has sufficient knowledge about hedging tools that he utilise today	Tend to be risk seeker. Strive to hedge 50% each year	No	Yes	No, he hedge a great amount of selling crop despite the livestock production	No, he tend to me a risk seeker
Farmer 5	Analytic when concerning major investment, but usually intuitive	No	He feel that he has sufficient knowledge about hedging tools that he utilise today	Risk neutral. Strive to hedge 10% each year	No	Yes	He usually use the total quantity for feed, but in case of remaining crop he tend to hedge	Yes, risk-neutral and choose livestock production

Hypothesis/Farmer	*1. Decision Theory*	*2. Decision Theory*	*3. Decision Theory*	*4. Expected Utility Theory*	*5. Expected Utility Theory*	*6. Portfolio Theory*	*7. Portfolio Theory*	*8. Portfolio Theory*
Farmer 6	Extremely analytic, elaborated calculations	No	He feel that he has sufficient knowledge about hedging tools that he utilise today	Risk neutral. Strive to hedge 33% each year	No	Yes	He conducts a less diversified production	No, risk neutral and no diversification
Farmer 7	Both analytic and intuitive decision maker	No	Feel he has sufficient knowledge about hedging tools that he utilise today	Risk neutral. Strive to hedge 50% each year	No	Yes	No, he is diversified through other economic activities but he still hedge	No, risk neutral but is not diversified through livestock production or other significant economic activity
Farmer 8	Analytic due to detailed calculations	No	He feel that he has sufficient knowledge about hedging tools that he utilise today	Risk seeker. To increase income is the main strategy	No	Yes	No, he is diversified through other economic activity and off-farm income but he still hedge	Yes, risk seeker and he is not diversified through livestock production or other significant economic activity
Farmer 9	Combination between analytic and intuitive approach	No	Hedge today, but would utilise hedging more if he had more knowledge	Tend to be risk seeker. Strive to hedge 45% each year	No	Yes	No, he is diversified through other crop production but he still hedge a significant amount	Yes, tend to be risk seeker and he is not diversified through livestock production or other significant economic activity
Farmer 10	Generally most "gut-feeling", intuitive	No	He feel that he has sufficient knowledge about hedging tools that he utilise today	Tend to be risk seeker. Strive to hedge 50% each year	No	Yes	No, he is diversified through other economic activity but he still hedge	Yes, tend to be risk seeker and he is not diversified through livestock production or other significant economic activity
Farmer 11	Analytic decision approach	No	Hedge today, but would utilise hedging more if he had more knowledge	Risk neutral, no defined hedging strategy	No	Yes	No, he is diversified through other crop production and off-farm income but he still hedge a significant amount	No, risk neutral but is not diversified through livestock production or other significant economic activity
Farmer 12	Base decision mainly on experiences, intuitive	No	He feel that he has sufficient knowledge about hedging tools that he utilise today	Risk neutral, no defined hedging strategy	No	Yes	Yes, he is diversified through other economic activity and he tend to not hedge selling crop	No, risk neutral but is not diversified through livestock production or other significant economic activity

7 Discussion & Conclusions

Chapter 7 provides discussions and conclusions. Every conclusion, which is stated in consideration of the aim of the study, is followed by relevant discussion. The end of the chapter gives suggestions for future research.

The aim of this study is to examine differences in farmers' preferences and attitudes towards risk, and further to investigate differences in hedging strategies between crop farmers (non-diversified) and diversified farmers with livestock production. When comparing these two groups, on the basis of some theoretical hypothesis it becomes possible to distinguish the following conclusions:

1. *Diversified farmers are more intuitive in their decision approaches than non-diversified farmers.*

According to Öhlmér *et al*., (2000) farmers and other owner managers develop an intuitive or analytic decision approach. There are several factors that will shape the individual decision approach, such as education level and the characteristics of the underlying factors that will lead to decision. The theory is applied to realise the differences in the decision processes between diversified and non-diversified farmers. The diversified farmers tend to reach decisions on a more intuitive basis than the non-diversified farmers. A reason may be that the non-diversified farmers in this study have obtained a higher degree of education, which, accordance to the theory, may lead to a more analytic behaviour. Qualitative and quantitative expectations are further factors that will intensify intuitive or the analytic approach (Öhlmér *et al*., 2000). Both groups base decisions on both qualitative and quantitative expectations. However, the diversified farmers tend to value qualitative values higher, such as more freedom. That is directly related to their type of production since livestock production requires more work throughout the year.

Öhlmér *et al* (1998) suggest that information search should proceed during the entire decision process. The diversified farmers' finds available time as a limitation to increase market orientation. Therefore, time may be a limiting factor for the diversified farmers to change or develop their selling strategies. This argument may further partly explain why the diversified farmers are generally more intuitive in their decision approaches, since analytic decisions require elaborated estimations, and thus, more time.

2. *Diversified farmers are generally more risk averse than non-diversified farmers.*

In the theory a risk averse individual is characterised by someone who prefers a certain income before an uncertain income with the same expected value (Pindyck & Rubinfeld, 2005). The diversified farmers in this study show a slightly more risk averse behaviour. According to formal literature diversification is a strategy to reduce risk, which is reflected in this conclusion. Diversified farmers usually consider the livestock production to be the company's main field of activity. This type of enterprise is exposed to risks that are difficult to handle if they occur, such as diseases. Further, since the livestock production covers a major share of the company's turnover, an unexpected consequence will result in a great

financial loss for the company. Thus, to reduce the risk that an unexpected consequence occurs the diversified farmers act more risk averse.

Pennings (1998), argues that farmers who are risk averse will choose a diversified production system, which exposes them to a lesser amount of risk. One could claim that there is a contradiction in this statement. It is impossible to prove if the risk averse farmer conduct diversified production due to his risk aversity, or, if the type of production encourages the farmer to become risk averse. I.e. the direction of causality may be ambiguous.

3. *Non-diversified farmers tend to sell more on spot price*

Shapiro and Brorsen (1988), suggest that farmers that diversify their enterprise for example through livestock production are less likely to hedge. The diversified farmers in this study show that diversification does not exclude hedging. The analysis shows that the non-diversified farmers tend to sell more on spot than the diversified farmers. Perhaps this reflects the diversified farmers risk attitudes. They are less prone to take risks and act in accordance with the "safety-first" rule. Thus, they hedge the price to minimise the risk of bad outcomes (Hardaker *et al*., 1997). Indeed, the concept with hedging is to reduce risk. Important to emphasise in this study is that the majority of the non-diversified farmers can benefit from comparative advantages. That is, they are located relatively close to local grain-trading companies who they also have had years of continuous trade relations. This may encourage their incentives to sell and deliver their crop directly, which means that they receive the current spot price.

4. *Both diversified and non-diversified farmers show a weak knowledge about the value of their production cost for crops.*

The cost of production is an essential factor to consider when hedging (pers. com Näslund, 2011). The aim of hedging is to cover cost of production. Hence, knowledge about those costs is important to the farmers. The cost of production is a key ratio to calculate the selling price. It may seem strange when 50 % of the farmers in this study do not know their production cost of for example winter wheat. A reason may be that many farmers take their decisions intuitively. However, some decisions may require a quantitative approach since the margins in crop farming are relatively small in some cases. The results reveal no differences between diversified and non-diversified farmers. The large-scale farmers in this study tend to possess a greater knowledge about their cost of production. The diversified farmers have, however, good perceptions about the production cost for their livestock production. Pennings & Leuthold (1999) argue that hedging effectiveness is related to trading volume. This study verifies the statement, the production cost is related to willingness to hedge. The large scale farmers in this study show a greater knowledge about their cost of production and also a greater willingness to use hedging tools.

5. *Farmers that lease a greater acreage are more likely to use hedging tools.*

The results show that farmers who rent more land are more likely to use hedging tools. A reason might be that these farmers have higher total costs for the farm-land. Another aspect is that the farmers that rent a greater share of their farm-land perceive a strong association between the rental costs and the cost of farm-land. While farmers with higher debt loads may not associate the debt loads as strongly to the cost for farm-land.

On the other hand it is interesting that the farmers that are highly leveraged are not more likely to use hedging tools than farmers with lower debt ratios. Shapiro and Brorsen (1988) found that the debt ratio influence the willingness to use hedging tools. The debt ratios between diversified and non-diversified farmers are almost the same in this study. On average, the debt ratio for the diversified farmers is 40% and 33% in average for the non-diversified farmers.

There are a number of factors that influences a farmer's incentives to hedge for example comparative advantages. A comparative advantage in this context is the farmers close location to local crop-trading companies, which give them benefits that other farmer not can obtain. The catchment area for these crop-trading companies is defined and those farmers located inside this catchment area meet more flexible deliveries. The benefits may lower their incentives to use hedging tool on a wider market.

The hedge ratio is a part of a farmer's strategy for cash crops. How a farmer develops the efficient market strategy is definitely an individual decision and depends on several factors. A major factor is a farmer's preferences, what circumstances are by the individual perceived as risky (Nilsson, 2001). What one farmer may find as a risky business may be perceived as a non-risky business by another farmer. Indeed, hedging is both a risk reducing and a risk increasing tool depending on a farmer's preferences.

6. *Diversified farmers are more likely to have storage capacity for a total harvest.*

The results show that diversified farmers are more likely to have storage capacity for a total harvest. A reason may be that these farmers are in need of the grain for feed. If the diversified farmers do not have the ability to store the harvest they will loose the benefits from using farm-produced grain for feed. Many farmers' believe that storage capacity is an important factor for the development of marketing strategies involving hedging. The farmers with less storage capacity mention that as a weakness in their business.

7.1 Future research

This study is of a clearly qualitative nature and examines 12 farmers' attitudes and preferences towards risk and hedging. The aim of this study is to realise distinctive nuances between diversified farmers and non-diversified farmers, but since the two groups only contain a small number of case farms it may be difficult to generalize the results. Therefore, a proposal for further studies is to perform a more extensive study, but with a similar purpose. This kind of study would, perhaps more significantly, capture the farmers collective attitudes and thus determine more distinctive differences in managerial behaviour between these two groups of farmers.

It is clear that the farmers in this study acquire some comparative advantages. They have loyal business-relations to their local crop-trading companies. This fact may reduce their incentives to speculate and sell crops in a wider market. Thus, due to loyal business-relations they also have relatively well defined marketing strategies. A suggestion for further studies is therefore to conduct a qualitative study of this subject but in an environment where comparative advantages are not so obvious.

Finally, cost of production is an important factor to consider when hedging. It is realised in this study that 50% of the farmers involved have insufficient knowledge about their costs of

production for grain. Therefore, an additional proposal for future studies would be to investigate farmers' knowledge about cost of production in relation to realized profits and implementation of risk management strategies.

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Personal messages

Christian Näslund
Agronomist at LRF Konsult
Personal meeting, 2011-10-27

Appendix 1 Interview Guide

Inställning till risk

1. Hur tolkar du begreppet risk?

2. På en sexgradig skala, vad väljer du?

1	2	3	4	5	6
Säker intäkt/lägre vinst				Osäker intäkt/möjlighet till högre vinst	

3. ”Jag är mer bekymrad över att göra stora förluster i mitt företag än att gå miste om betydande vinster”

1	2	3	4	5	6
Instämmer ej					Instämmer helt

4. ”Jag gillar att experimentera med nya idéer i min verksamhet”

1	2	3	4	5	6
Instämmer ej					Instämmer helt

5. ”Jag chansar mer än andra”

1	2	3	4	5	6
Instämmer ej					Instämmer helt

6. Hur hanterar du risk?
   a. Produktionsrisk
   b. Prisrisk på insatsvaror
   c. Prisrisk på tillgångar
   d. Maskinhaveri/driftstörningar

7. Vilka av nedanstående transaktioner representerar det största ekonomiska risktagandet i ditt företag? **Rangordna!**
   a. Inköp av insatsvaror
   b. Försäljning av spannmål/slutprodukt
   c. Försäljning/inköp inventarier
   d. Valutor
   e. Ränta
   f. Kvalitetsrisk
   g. Osäkerhet kring skörd

8. Hur fattar du besluten som omfattar risk?
    a. Du gör noggranna kalkyler
    b. Du går på magkänsla och intuition
    c. Du fattar beslut enligt tidigare erfarenheter
    d. Med hjälp av extern rådgivare

9. På en sexgradig skala, hur riskbenägen är du i allmänhet?

1	2	3	4	5	6
Ej riskbenägen alls					Klart riskbenägen

Prissäkring

10. Hur många år har du aktivt prissäkrat?

11. Vilka prissäkringsverktyg använder du dig av? Varför?

12. Vilka är dina erfarenheter? Vilken kunskap hade du innan du började? Har du deltagit i någon utbildning?

13. Hur stor andel prissäkrar du? Varför just den mängden?

14. Vad är din uppfattning om prissäkring?
    a. Tidskrävande
    b. Komplicerat
    c. Svårt att bedöma marknaden
    d. Möjlighet att säkra intäkter

15. Vilka är dina framgångsfaktorer? Vad kan du göra bättre?
    a. Diversifierad produktion
    b. Starkt marknadsintresse
    c. Ser möjligheter snarare än nackdelar
16. Vad anser du vara framgång i en spannmålsaffär i ditt företag?

17. Skiljer sig ditt beslutsfattande beroende på vilken gröda du ska prissäkra?

18. Varför har du tagit just dessa beslut?

19. Är du nöjd med utfallet av dina prissäkringar?

20. Vad hade du kunnat göra annorlunda?

Management

21. Hur ser planeringsprocessen ut vad gäller spannmålsförsäljning? Regelbundna möten, om ja, med vilka?

22. Är någon mer, utöver dig själv delaktig i beslutsprocessen? Vem/Vilka?

23. Hur långt sträcker sig planeringen? Ex. var ska företaget befinna sig om 5 år? 10år? 15år?

24. Vad gäller formuleringen av mål. Har företaget eller du några nedskrivna mål för företaget och/eller för dig själv?

25. Hur ofta sätts nya mål upp? Vad är tidshorisonten?

26. Vilken typ av mål är det? Kvalitativa och/eller kvantitativa? Är målen uttryckta i siffror eller kvalitativa värden?

27. Vad betraktar du som det största problemet i ditt företag? Hur hanteras detta?

28. Var hämtas information in vad gäller framtida mål och strategier?

29. Vad är ditt företags strategi vad gäller riskhantering?

30. Skiljer det sig mellan företagets uttalade idéer och faktiskt genomförda? Hur?

31. På en sexgradig skala, hur benägen är du att anpassa dig till marknaden?

1	2	3	4	5	6
Ej benägen alls					Klart benägen

32. Hur fattar du större beslut i ditt företag?

33. Hur ser din beslutsprocess ut?

34. Hur många timmar arbetar du i genomsnitt per vecka?

35. Har du avsatt någon tid för att bevaka marknaden?

36. Hur mycket tid ägnar du i så fall åt att bevaka marknaden?

37. Hur bevakar du marknaden? Vilka är dina informationskanaler?

38. På en sexgradig skala, hur aktuell är din information om marknadspriserna på de produkter som du producerar/konsumerar?

1	2	3	4	5	6
Inta alls aktuell					Mycket aktuell

39. Har du god uppfattning om dina produktionskostnader? Hur beräknas den? Vad är din produktionskostnad för dina två viktigaste grödor?

40. När du prissäkrar, tar du hänsyn till din produktionskostnad? Vilken marginal är du nöjd med?

41. Hur ser du på riskspridning i ditt företag?

42. Jag investerar i nya moderna produkter före mina kollegor?

1	2	3	4	5	6
Aldrig					Alltid

Ekonomiska faktorer

43. Hur mycket omsätter företaget?

44. Uppskattningsvis, hur stor andel av tillgångarna är skulder i företaget?

45. Vilken är den maximala skuldsättningsgrad du skulle anse dig vara bekväm med? Skulder/Tillgångar?

46. Har du något uttalat avkastningskrav på ditt egna kapital? Om ja, hur stort?

47. Anser du att du har de kunskaper som krävs för att nyttja de prissäkringsinstrument som finns?

48. Om nej, vad saknar du?

49. Övriga tillägg?

Appendix 2 Cover Letter and Survey

Uppsala 2011

Hej!

Vi var i kontakt med dig per telefon den XX-XX. Inför vår intervju **torsdagen den XX-XX** skulle vi vilja att du fyller i nedanstående enkätformulär. För att själva intervjun ska gå så snabbt och smidigt som möjligt. Det vore önskvärt om du kan fundera lite kring den strategi du valt vad gäller prissäkring samt varför du tagit de beslut som du tog under åren 2008, 2009 och 2010. Fundera även över din inställning till prissäkring och vilka för- och nackdelar du upplever. De frågor som kommer att behandlas under själva intervjun är din inställning till risk, dina tankar, agerande och beslutsfattande kring prissäkring, ditt företags management samt din uppfattning om diverse ekonomiska faktorer. Om det uppstår några frågor angående formuläret så är du välkommen att kontakta oss per telefon eller så reder vi ut dem under intervjun.

För att vår undersökning ska bli trovärdig och hålla hög kvalité önskar vi att få spela in intervjun. Du kommer även att ha möjlighet att läsa arbetet innan det publiceras. Dina kontaktuppgifter och all annan information i anslutning till enkäten och intervjun kommer självklart att behandlas konfidentiellt.

Med Vänliga Hälsningar

Charlotte Eke-Göransson & Magnus Rinman
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0730 89 77 71 0704 82 38 15

Uppsala 2011-11-10

Enkätformulär

Persondata

1a) Namn: _____

1b) Ålder: ____ år

1c) Jag har följande utbildning:

Grundskola/Folkskola	❑ Ja	❑ Nej
Yrkesskola	❑ Ja	❑ Nej
Gymnasium	❑ Ja	❑ Nej
Lantmästare/Agronom	❑ Ja	❑ Nej
Annan Högskola/ Universitetsexamen	❑ Ja	❑ Nej

Om annan Högskola/Universitetsexamen, vilken? _____

1d) Hur många år har du varit verksam som lantbrukare? _____ år

1e) Hur länge har gården funnits i familjen? _____?

1f)Hur länge har du varit huvudansvarig på gården? _____år

1g) Är fler än du i familjen engagerade i verksamheten?
❑ Ja ❑ Nej

1h) Har du förvärvsarbete eller har du förvärvsarbetat tidigare utanför lantbruket?
❑ Ja ❑ Nej

Om ja, i vilken omfattning? _____
Inkomst av tjänst och/eller annan form av företag?_____

Företaget och dess produktion

2a) Hur stor åkerareal brukar du? _____ ha
_____ ha egen areal _____ ha arrenderad areal

2b) Andel höstsäd_____ ha
Andel vårsäd_____ ha

2c) Hur stor areal odlade du 2008? _____ ha
Hur stor areal odlade du 2009? _____ ha

Hur stor areal odlade du 2010? _____ ha

2d) Grödfördelning

2008: Spannmål _____ ha Oljeväxter _____ ha Vall_____ ha Andra grödor_____ ha
2009: Spannmål _____ ha Oljeväxter _____ ha Vall_____ ha Andra grödor_____ ha
2010: Spannmål _____ ha Oljeväxter _____ ha Vall_____ ha Andra grödor_____ ha

2e) Animalieproduktion? Ja/Nej _____
Produktionsgren/ar _____
Omfattning _____

2f) Har du torkanläggning på din gård?

❑ Ja ❑ Nej

Kan du lagra hela din skörd?

❑ Ja ❑ Nej

Om nej, hur stor andel kan du lagra?_____% av genomsnittlig årsskörd

Hur stor lagringskapacitet har du? _____ ton

2g) Bedriver du andra näringsgrenar än spannmålsodling på gården?

❑ Ja ❑ Nej

Om ja, vilken typ, omfattning och hur länge har den verksamheten bedrivits?
_____
_____
_____

2h) Till vilken(a) aktör(er) säljer/köper du din spannmål?
_____

2i) Hur många personer sysselsätts i företaget, inkl. dig själv? _____ personer

Prissäkring

3a) Jag har utfört följande prissäkringar (Se nästa sida):

Skörd 2009 Fyll i tabellen enligt exemplet

Typ av gröda	Typ av kvalitet (foder/kvarn)	Prissäkrat?	Typ av kontrakt	Kvantitet (ton)	Faktiskt pris (kr/kg)	Övrig leverans (pool el. spotpris)
Höstvete	Kvarn	☒ Ja ❑ Nej	Terminskontrakt Lantmännen	300 ton	1,50 kr/kg	200 ton pool1: 1,30 kr kg
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				

Skörd 2010

Typ av gröda	Typ av kvalitet (foder/kvarn)	Prissäkrat?	Typ av kontrakt	Kvantitet (ton)	Faktiskt pris (kr/kg)	Övrig leverans (pool el. spotpris)
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				
		❑ Ja ❑ Nej				