Solvency II
A compliance burden or an opportunity for the Swedish non-life insurance industry?

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Master’s thesis LIU-IEI-TEK-A--07/051--SE
Linköping University
Department of Management and Engineering
Economic Information Systems
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If we knew what it was we were doing, it would not be called research, would it?

Albert Einstein (1879–1955)
Executive summary

Insurance companies and banks are of great importance to the economy, which is why their stability must be ensured. In order to prevent bankruptcies in the financial sector, these companies are subject to strict regulations, which set standards for risk management and the amount of reserve capital required. Such capital reserves act as safety buffers to protect the customers from extraordinary events. In the insurance industry, the reserve capital is referred to as the solvency margin.

Solvency II is new set of insurance regulations that aims to set a common standard regarding solvency capital and risk management for insurance companies within the European Union. The potential costs and benefits of the regulations are of importance not only to insurance companies but also to those firms that offer services and products to the insurance industry in the field of risk management. Solvency II is often compared to the Basel II accord for banks, which had a strong business case in the way that banks could significantly lower their reserve capital and use it for other purposes. The question is, however, whether insurance companies can expect similar benefits from Solvency II.

The purpose of this study is therefore to explain how the Solvency II regulations will affect risk management in the Swedish non-life insurance industry, and whether these changes can result in opportunities for insurance companies. This is achieved by studying the new regulations and conducting a number of interviews with insurance company representatives as well as industry experts. Four potential effects of Solvency II have been investigated: capital levels, insurance pricing, credit ratings and reinsurance.

The findings of the study indicate that no obvious benefits related to the potential effects above can be realised by complying with Solvency II. The future capital requirements will come close to those already enforced by supervisors today, resulting in a minor change that can go both ways. Neither credit ratings nor reinsurance covers seem to become notably affected by Solvency II. As for insurance pricing, an increasingly sophisticated risk-based allocation of the cost of solvency capital provides the most notable opportunity of Solvency II, but at present, no conclusions can be drawn regarding the effects of such changes. On the other hand, Solvency II will put pressure on improving systems to ensure the quality and traceability of data.

Thus, the actual changes in risk management practices are not expected to be substantial among Swedish non-life insurance companies, and it therefore seems unlikely that insurance companies would be willing to invest as heavily in reaching Solvency II compliance as banks have done in Basel II.
Preface

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1 Introduction

Insurance deals with the transfer of risk and is one of the key functions of a modern economy. This chapter presents the background of regulations regarding insurance and the problems that are associated with these as well as an introduction to the aims of this study. Some important concepts are defined before presenting the purpose of the study. Finally, a reader’s guide is presented in order to give different readers an overview of what chapters to focus on based on the reader’s background and preferences.

1.1 Background

Insurance, as we know it today, consists of a basic principle: one party compensates another party for protection against potential losses in the future. Such agreements have been in place for several thousand years, for example in the ancient Babylonian and Roman societies (Försäkringsförbundet, 2007). Still, it is not until quite recently that the very fundament of insurance has been understood in detail, namely the concept of risk.

As the understanding of risk has increased, so has the need to manage it. Risk management is therefore a central concept in many organisations today, in particular among banks and insurance companies due to their numerous financial agreements involving risk. If such agreements cannot be met – caused by poor risk management – insurance customers would come away empty-handed. This is where regulation comes into place, aiming to ensure sufficient customer protection and the stability of the financial markets. Banks and insurance companies are considered the very backbone of the economy, and since bankruptcies in this sector will have serious consequences for the economy as a whole they are subject to more strict regulation than the average company.

For banks and insurance companies, there are regulations that require certain levels of buffer capital to protect against insolvency, i.e. the situation where a company cannot fulfil its financial obligations. Developing such regulations in a way that is fair to all the parties concerned is of course difficult, but regulations that were quite rudimentary at the start have grown more realistic and sophisticated over the years.

A set of regulations concerning risk management in international banks, the Basel II accord, was recently released to rectify inadequacies in the previous regulations, mainly concerning the amount of capital a bank must keep in relation to its risk profile. Even though the effects of these regulations are somewhat unclear, they are expected to be significant. According to business press journalist Nachemson-Ekwall (2006), Swedish banks alone claim to be able to free 60 billion SEK of buffer capital which can then be used for increasing dividends, acquisitions or the funding of expansion plans.

The insurance industry now faces a similar situation to that of the bank industry, in updating a somewhat out-of-date set of so-called Solvency regulations. A new project called Solvency II has therefore been initiated by the European Union, aiming to “ensure a high standard of risk assessment and efficient capital allocation, as well as to contribute to increased transparency and help in the development of a level playing field across Europe” (CEA & Towers Perrin, 2006).
Solvency II is not expected to reach its final state until at least 2010, but according to many experts, the work that needs to be done in a near future is extensive.

1.2 Problem discussion

No one questions that the new regulations promote sound changes, but there is a great deal of uncertainty today around the content of Solvency II, what efforts will be required, the project’s timeframe and its potential effects.

The possibility for banks to reduce capital levels through Basel II provided a very strong incentive for investing in large-scale implementation projects. However, a recent report by the European Insurance and Reinsurance Federation states that the current capitalisation is already reasonable among European insurance companies (CEA & Towers Perrin, 2006), implying that Solvency II cannot be expected to have the same effect on capital levels as Basel II did. Other incentives equally persuasive are yet to be found for Solvency II, making it much more difficult to justify any significant investments.

Clearly, one incentive is simply the demands from regulators and supervisors that have to be met in order to be allowed to conduct business. However, such an incentive is more likely to be a seen as a purely regulatory demand resulting in no real changes taking place other than a façade being put up towards the supervisor. A better approach would be to make sure that the regulations have positive economic effects for European insurance companies.

This is a burning question, not only for the insurance companies themselves, but also for consultancy firms, solution providers and supervisors, all having their own Solvency II agendas with different perceived benefits. Several reports, issued mainly by consultancy firms, have discussed the expected effects and benefits of Solvency II, focusing on breadth rather than depth. This study will rather attempt to make an in-depth investigation of the Swedish market and explain the mechanisms and drivers behind Solvency II-related changes in the insurance industry.

1.3 Defining important concepts

Before proceeding to the purpose and research questions of the study, some concepts specific to the insurance industry need to be understood by the reader. This section will clarify the meaning of risk, insurance, life insurance and non-life insurance.

1.3.1 Risk defined

This report deals with risk in different aspects. According to Harrington & Niehaus (1999), risk usually has different meanings depending on the context in which it is used. It is sometimes used to describe variability around the expected value and other times to describe the expected value. In insurance, the meaning of a high-risk customer is a customer where the expected losses to be paid by the insurer is high. Thus, risk in this context describes the expected value of the customer. (Harrington & Niehaus, 1999)

This report will also use the other meaning of risk such as when discussing high-risk assets. In this context, risk refers to a high variability around the expected value. Since we will use both meanings of risk, the twofold definition will be used. The particular meaning will usually be clear from the context but will otherwise be specified.
Risk

Variability around the expected outcome, or a measurement of the expected outcome itself.

1.3.2 Insurance defined

Before going into the details of insurance, we would like to present a definition of what an insurance contract actually means. Dorfman (1994) speaks of one financial and one legal definition. Financially speaking, an insurance contract is “a financial agreement that redistributes the costs of unexpected losses”. Legally, the definition is slightly different: “a contractual agreement whereby one party agrees to compensate another party for losses”. The former definition will be used in this report since it emphasises that the losses are of an unexpected nature which in turn causes the need for buffer capital.

Insurance contract

A financial agreement that redistributes the costs of unexpected losses.

1.3.3 Life insurance defined

Life insurance can mean two things. Either it is a financial agreement that redistributes the cost of an unexpected death of a person to the benefactors of that person, e.g. his or her relatives. The term is also used for a form of investment, which is usually paid out when the insured has reached a certain age. There are also other names for this sort of insurance, such as capital- and pension insurance but for all sorts of insurance that are investment-like in nature, life insurance is the common name.

Life insurance

A financial agreement that redistributes the costs of an unexpected death, or a form of investment.

1.3.4 Non-life insurance defined

We consider everything that is not life insurance to be non-life insurance. One example is property insurance such as house- or car insurance. For legal reasons, insurance organisations are usually divided in separate companies for life and non-life insurance because of the different nature of their respective businesses. This study will focus on non-life insurance companies.

Non-life insurance

All forms of insurance that is not life insurance.
1.4 Purpose of the study

This study is concerned with the Solvency II regulations and their impact on the Swedish insurance industry. As previously stated, this is not only of interest to the insurance companies but also to those that sell various products or services related to the risk management area.

The purpose of this study is to explain how the Solvency II regulations will affect risk management in the Swedish non-life insurance industry, and whether these changes can result in opportunities for insurance companies.

In the coming sections the reader will be briefly introduced to the Swedish insurance industry, what Solvency II is and what the potential effects might be, as well as modern techniques for handling risk in insurance companies.

1.5 Research questions

The purpose of the study is further broken down into two research questions, which will then be used to form the method and act as a base for further investigation.

As stated in the purpose, this report is concerned with the coming effects of the Solvency II regulations. In order to understand these effects it is important to recognise the current state of Solvency II-related issues. The first research question will therefore be used to present the reader with a view of the present situation, as well as how the different factors related to Solvency II are influenced by current regulations and other stakeholders.

What is the current state of the Solvency II project in the Swedish non-life insurance industry?

When the present state of the factors that Solvency II is likely to influence have been examined, these will be viewed in the light of the new framework to determine in what way they will be affected. Since Solvency II is not yet final, discussions on the effects will sometimes be needed regarding how the regulations will turn out.

What effects regarding risk management will Solvency II have on the Swedish non-life insurance industry?

In order to answer the two questions and to fulfil the study’s purpose, a collection of general, well-established theories and textbooks on insurance and risk management will be complemented by recent reports from regulators, consultancy firms and other relevant stakeholders. The empirical phase will be based on a number of interviews, further explained in the research methodology.
1.6 Delimitations

The scope of the study has been narrowed down through three major delimitations, decided upon together with SAS Institute.

» First, only Swedish insurance companies will be considered. The reasons for doing so are that (1) conducting face-to-face interviews abroad would require significantly more resources, further explained in section 4.3.2, and (2) regulations differ between countries, which would require even more time for investigation.

» As mentioned in section 1.3, the insurance industry can be divided into life and non-life, where the two are quite different. Life insurance will not be a part of this study, largely because of the previous purpose of the study, which focused more exclusively on price differentiation, as explained thoroughly in section 6.1. Another reason is that life and non-life insurance are quite different lines of businesses. For the same reasons, only private insurance customers will be considered, as opposed to corporate customers. More details on these delimitations can be found in section 2.1.2.

» Solvency II can be expected to imply many changes regarding both technology and people. Both SAS Institute’s business and the authors’ educational profile are oriented towards creating business value from the use of IT. Organisational aspects will therefore not be considered in this study.

1.7 Reader’s guide

This report consists of eight chapters and this section is the end of the first one. In chapter two an introduction to insurance as well as the Swedish non-life industry is given and important concepts related to the study are described. Chapter three deals with the Solvency regulations, followed by potential effects of Solvency II presented in a visual framework. In chapter four the research methodology is presented, describing how the study was conducted.

Chapter five contains the empirical studies collected during interviews with four insurance company representatives, as well as others involved in the Solvency II process. The empirical results are then analysed in chapter six. Chapter seven presents the conclusions and key messages of the study and relates back to the purpose and research questions formed previously in this chapter. Finally, chapter eight contains a discussion regarding the reliability and generalisability of the results, as well as suggestions for further research.

Readers with a chief interest in the business perspective may be interested primarily in chapters five, six and seven. If unfamiliar with the subject of Solvency II and the insurance industry, chapters two and three are recommended as well.
SOLVENCY II – A COMPLIANCE BURDEN OR AN OPPORTUNITY FOR THE SWEDISH NON-LIFE INSURANCE INDUSTRY?
2 Insurance Overview

Some important concepts of insurance were briefly presented in the previous chapter. This second chapter will provide a more complete overview of what insurance actually is, followed by some important areas which will be discussed further in chapter 0 in relation to Solvency II – differential pricing, reinsurance, credit rating and dynamic financial analysis. Textbooks on insurance and risk management have been the primary source for describing general concepts. The more specific topics such as differential pricing and dynamic financial analysis need a more thorough explanation and have therefore primarily been based on academic articles.

2.1 An introduction to the insurance industry

To clarify the definition of insurance, provided in section 1.3.2, Dorfman (1994) uses an example of a large number of houses where every house-owner pays an equal insurance premium to an insurance pool for protection against accidents. If a fire takes place, the owner of the damaged house will receive compensation, as shown in Figure 1 below (the numbers used are purely illustrative).

![Figure 1. Insurance redistributes the costs of unexpected losses](Source: Adapted from Dorfman (1994))

Using such an example, it becomes clear how insurance is an important function for a society since it helps to distribute risks between individuals (Försäkringsförbundet, 2007).

2.1.1 Basic insurance theory

Let us continue with the example above concerning insurance against loss due to fire. If the insurance company providing the insurance has 1,000 customers and there is an estimated probability of 0.3 percent of each house burning down, the expected costs for the insurance company each year will be 3 million SEK, assuming that every fire costs 1 million SEK. This is called the expected claims cost or expected value. Of course, there will not be three houses burning down each year, since accidents are random events. The larger the difference is between the observed values and expected value the higher is the standard deviation, which is a measurement of the spread within a statistical distribution. In order to predict more accurately the expected
claims costs it is preferable with a low standard deviation. This can be accomplished by having a very large number of houses in the pool, which will make the observed value converge to the expected value according to the law of large numbers. Since standard deviation is a measure of risk (see section 1.3.1), one way for an insurance company to reduce risk is to diversify by having a large number of houses, analogue to the discussion in section 2.1.5 about risk management. (Harrington & Niehaus, 1999)

For more information about these concepts, the curious reader is encouraged to review basic mathematical statistics.

### 2.1.2 Major types of insurance

Many types of insurance exist, and this thesis does not intend to cover them all. Both Dorfman (1994) and Rejda (1998) begin by distinguishing between private insurance and government insurance, the latter mainly concerning social security. Private insurance, in turn, is usually grouped into life insurance and non-life insurance, as explained earlier. Non-life insurance is then grouped into insurance provided to corporations and to individuals, as shown in Figure 2.

![Figure 2. The major types of insurance](source: Adapted from Dorfman (1994) and Rejda (1998))

Corporate insurance is a financial agreement between an insurance company and a legal entity. This type of insurance is usually far more complex than insurance to individuals because of the difficulty of estimating expected claims costs, an important part of the price further explained in section 2.2.1. In order to maintain a reasonable level of generalisation, only non-life insurance provided to individuals will be considered.

### 2.1.3 Business model

Non-life insurance companies make money in two ways, namely through premiums paid in by customers and through returns from investing those premiums (Harrington & Niehaus, 1999). Figure 3 illustrates this, with arrows leading to the insurance company indicating income and the ones from it representing expenses. Dotted lines represent uncertainty in the cash flows.
Because of this uncertainty in the return from investments and the size of the claims, insurance companies are required to hold a buffer of capital, which must meet certain specifications. This buffer is called the *solvency margin* (Sandström, 2006) and is described in detail in chapter 0 about the Solvency regulations.

### 2.1.4 The Swedish non-life insurance industry

Although the Solvency II regulations are formed on a European basis, this study will focus exclusively on the Swedish insurance industry, as explained in section 1.6. A short introduction to the characteristics of the Swedish non-life industry therefore follows.

Figure 4 shows how the non-life insurance industry in Sweden is concentrated to only a few companies, implying that it can be considered an oligopoly. The four largest players – Länsförsäkringar, If Skadeförsäkring, Codan/Trygg-Hansa and Folksam – account for 84 percent of the total premium income (Försäkringsförbundet, 2005).
Due to their dominant position, a brief presentation of the four largest companies is given below. Two of them are run like regular public limited companies with regular shareholders while in the other two, the customers are per definition the owners. These companies are referred to as mutual insurance companies.

Länsförsäkringar
Länsförsäkringar is Sweden’s largest non-life insurance company. The group consists of 24 local mutual branches. The branch offices, in their turn, own the group company called Länsförsäkringar AB. Länsförsäkringar also provides life insurance at group level. (Länsförsäkringar, 2007)

If Skadeförsäkring
If Skadeförsäkring is the largest non-life insurance company in the Nordic region and second largest on the Swedish market. It has been formed mainly through fusions between the insurance companies Swedish Skandia, Norwegian Storebrand and Finnish Sampo. If Skadeförsäkring is now a fully owned subsidiary of Sampo. (If Skadeförsäkring, 2007)

Codan/Trygg-Hansa
The third largest non-life insurance company in Sweden, famous for its ring buoys, is a fully owned subsidiary of the Danish non-life insurer Codan AS that, in turn, is owned to 70 percent by UK-based Royal & SunAlliance, one of the world’s largest insurance groups. (Trygg-Hansa, 2007; Codan, 2007)
Folksam
Folksam is a mutual non-life and life insurance company, operating solely on the Swedish market and having close ties to the labour unions. (Folksam, 2007)

2.1.5 Fundamentals of risk management
Risk management is of importance in any large organisation today and a cornerstone in insurance companies, both from the perspective of their customers and internally. This chapter briefly describes the risk management process, the basic types of risks and the methods to manage it. First, a general definition of risk management is in place.

Risk management
The logical development and implementation of a plan to prevent and deal with accidental losses. (Dorfman, 1994)

The risk management process
The risk management process starts by identifying the events that can damage the company or reduce business value. An analysis of the potential impact and loss resulting from these events is then conducted, as well as an evaluation of the frequency of these losses. Methods for dealing with these risks must then be developed and implemented and the methods are to be monitored and updated to fit the firm’s strategies on an ongoing basis. Risk in this context refers to measuring the expected outcome. (Dorfman, 1994; Harrington & Niehaus, 1999)

Types of risks
There are many different types of risk, and depending on the context, the terminology can differ. Below is a list of the most common risks and the underlying cause for each one of them (Harrington & Niehaus, 1999):

» Credit risk – a debt not being paid
» Pure risk – damage of assets, employee injury, legal liability
» Market risk – changes in value of an investment, which is usually divided into:
  – Equity risk – changes in stock prices
  – Interest rate risk – changes in interest rate
  – Currency risk – changes in foreign exchange rates
  – Commodity risk – changes in commodity prices

Risk management methods
There are various methods available for risk management the most common ones are depicted in Figure 5 below. These methods are generic and applicable for both regular organisations and insurance companies alike, although they are often referred to with different names depending on the circumstances.
The three major types of risk management are further explained below:

» **Loss control**

Actions that reduce the expected cost of losses by either reducing the frequency of losses – loss prevention – or reducing the magnitude of losses once they occur – loss reduction – are known as loss control. For a business, this could mean focusing on less risky product lines or increase precautions in these product lines in order to reduce losses. (Harrington & Niehaus, 1999)

» **Loss financing**

Methods to pay for losses that occur are called loss financing. In its simplest form – retention – this could mean that the business pays for the loss with funds available in operations. A more formal plan to cover losses by retention is usually referred to as self-insurance, as opposed to insurance or reinsurance where the risk is transferred to an insurance company in exchange for a premium. Hedging is the means of offsetting risk by using financial derivatives such as forwards, futures, swaps, options, and is mostly used for market risks. Other than the methods mentioned here, there are also other types of contracts where the risk is transferred to another party. (Harrington & Niehaus, 1999)

» **Internal risk reduction**

Diversification can be used as a method for risk management and is based on the
principle that a pool of unrelated risks reduces the variability of the expected outcome (Harrington & Niehaus, 1999). This concept is commonly referred to as “not putting all eggs in the same basket” and is analogue to the example at the beginning of this chapter. Another way to reduce risk is through better prediction of the expected costs, i.e. reducing the variability of the expected outcome. In this way, investments in information that improves prediction accuracy can be used to reduce risk (Harrington & Niehaus, 1999). This will be discussed on several occasions in this report.

2.2 Insurance concepts relevant to Solvency II

During the course of this study, it was found that several concepts were relevant when discussing Solvency II and the potential effects. Differential pricing, reinsurance, credit rating and Dynamic Financial Analysis (DFA) all appear to be important in understanding the impact of the new regulations.

2.2.1 Differential pricing

As seen in section 2.1.3, insurance premiums constitute one of the two major sources of income for insurance companies. Calculating the correct price for each insurance contract is, as further described below, no easy task for an insurance company. This section explains how insurance prices are set, describes the components of an insurance premium as well as the difficulties in giving the right price to each customer.

The insurance pricing problem

When calculating prices, most companies are well aware of their costs of production and therefore set prices to cover these costs and to generate a reasonable profit. Insurance companies, on the other hand, do not know in advance, what their costs are going to be (Dorfman, 1994; Rejda, 1998). Thus, they always run the risk of setting prices too low, so that costs cannot be covered, or too high, so that customers will turn to another insurance company with lower prices. Accurately estimating the future insurance costs is therefore highly important, and this is performed by actuaries using mathematical models based on statistical data regarding fires, diseases, crime rates and so on (Rejda, 1998).

For a further description of what constitutes the price of an insurance contract – the insurance premium – is explained below in detail.

The insurance premium

The components of an insurance premium are stated somewhat differently by Dorfman (1994) and Harrington & Niehaus (1999). They both agree that the expected cost of claims must be covered, as well as administrative costs and a deduction for investment earnings. Moreover, Dorfman states that reserve for unexpected losses should be added to the premium, a component that Harrington & Niehaus do not include. They do account, however, for the fact that the insurance company wishes to make a profit. It seems reasonable that both these additional components should be included and, consequently, the definition of an insurance premium used in this study contains five components as illustrated in Figure 6.
Of these components, the expected claims cost is the largest one, followed by administrative costs and the reserve for unexpected losses. Therefore, in order to set fair premiums, these claim costs must be estimated as accurately as possible using actuarial methods (Rejda, 1998). The reserve for unexpected losses reflects the risk of the insurance pool and exists because of the margin of error in predicting the expected claims cost (Dorfman, 1994).

Even though all components should of course be calculated and allocated to different insurance products as accurately as possible, this study aims to investigate those components that could be directly affected by the Solvency II regulations. As explained in chapter 1, Solvency II concerns risk management within the insurance industry. This is why only the expected claims costs and the reserve for unexpected losses will be considered. Even though Solvency II can also be expected to affect the investment behaviour of insurance companies, this is not easily investigated today and lies too far from the other areas included in the study.

Now that the pricing of insurance has been identified as a potentially important area related to Solvency II, some theoretical background is needed to fully understand what the effects may be. First, as mentioned in section 1.3.1, risk has a two-fold meaning; it can refer both to the variability around the expected outcome and to the expected outcome itself. In terms of the insurance premium, each of the two factors investigated above corresponds to one of the definitions of risk – the expected claims cost corresponds to the “outcome risk”, while the reserve for unexpected losses corresponds to the “variability risk”. The next two sections will explain how insurance companies, in particular actuaries, deal with these factors.

The expected claims cost – “outcome risk”

The expected claims cost is based on the risk profile of a customer or a group of customers. In an ideal world, every insurance customer would pay a premium that directly corresponds to the risk of that person incurring a loss. In reality, however, the law of large numbers forces insurance companies to create segments of customers with certain characteristics. Harrington & Niehaus (1999) take the example of casualty insurance for two groups of individuals, bookworms and skateboarders. As expected, the members of the prior group have a significantly lower expected claims cost due to the less dangerous nature of their preferred leisure time activity.
The reserve for unexpected losses – “variability risk”
Apart from the expected claims costs, insurance companies also need to protect themselves against unforeseen events. This protection corresponds to the solvency capital, further explained in section 3.1. Here, it is not the expected claim that affects the premium but rather the variability of the claims – how skilled the actuaries ever may be there is always some uncertainty involved in their calculations.

Differential pricing explained
The very basis of differential pricing, i.e. giving different prices to different customers, was explained above, in the example concerning bookworms and skateboarders. Nevertheless, one could raise the question why this concept is so important. If two premiums of 200 SEK, giving a combined premium income of 400 SEK, were split into one bookworm contract for 150 SEK and one skateboarder contract for 250 SEK, the total premium income would still be 400 SEK. However, such reasoning fails to take into account the behaviour of customers and competitors.

In fact, if insurance companies did not pay attention to price differentiation, the complete insurance system would collapse in the end. This situation was described by Akerlof (1970) who took the market for used cars as an example. The person selling a used car always knows more than the buyer does, something that Akerlof refers to as information asymmetry. The buyer has a conception of how high or low the quality of the car being sold could be, but he does not know the exact level of quality. Therefore, he will perceive the quality of the car as being something in between, which in the end benefits the bad cars. In the United States, these bad cars are referred to as “lemons”. In the end, owners of good cars could be unwilling to sell their cars, so the overall quality of the market for used cars drops together with the average price level.

Akerlof continues by describing a similar case for the American insurance industry, where medical insurance is very hard to obtain for people over the age of sixty-five. It is quite natural to pose the question why the price does not rise to match the increased risk. The problem is that as price levels rise, only persons that are quite certain to benefit from a medical insurance feel they can afford it. This leads, as for used cars, to a situation where the average medical condition of applicants deteriorates while the price increases, which results in no insurance sales whatsoever. This phenomenon is called adverse selection and refers to the situation when one party has more information than the other has, and thereby taking advantage of the possession of asymmetric information (Dorfman, 1994).

The role of differential pricing in this troublesome situation is to reduce the information asymmetry between the insurance company and the potential customer. Just as the owner of a good car would be able to get a higher price than for a bad car, the bookworm and the skateboarder would receive different insurance premiums if their risks can be properly assessed.

The effects from differential pricing
Consider the data for five fictitious insurance products in Table 1. Only the two premium components of particular interest in this study have been included here, so their sum should not be interpreted as the total insurance premium.
Table 1. Data for five fictitious insurance products

<table>
<thead>
<tr>
<th></th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
<th>P5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected claims cost (ECC)</td>
<td>100</td>
<td>50</td>
<td>180</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>Reserve for unexpected losses (RUL)</td>
<td>10</td>
<td>20</td>
<td>10</td>
<td>30</td>
<td>50</td>
</tr>
</tbody>
</table>

The relative weights of the data are also fictitious; there is no theoretical evidence supporting that the reserve for unexpected losses would be approximately one fifth of the expected claims cost (obtained by dividing the two factors’ mean values from Table 1). Dorfman (1994) uses figures indicating that the ratio would be 10 rather than 20 percent, but provides no evidence as to where these figures come from, and insurance companies do not wish to share such information. Thus, the results from this comparison should not be interpreted as empirically proven but rather as an illustrative example, even though Harrington & Niehaus (1999) assert that the expected claims cost in most cases makes up for the largest part of the premium.

In Figure 7 each one of the five products is represented by three bars, where the lower part of the bar is the expected claims cost and the upper one represents the reserve for unexpected losses. The first of three bars is equal for all products, since it is equal to the sum of the mean for the two factors, i.e. $ECC + RUL$. The middle bars use the individual expected claims cost for each product $i$ and the mean of the reserve for unexpected losses, i.e. $ECC_i + RUL$, whereas the last bar represents a complete differentiation, i.e. $ECC_i + RUL_i$.

By comparing the three bars for each product, it becomes clear that risk-based price differentiation can make a significant impact on the premium levels. Taking the implications suggested by Akerlof (1970) into account, it would be of interest to investigate the possible effects of Solvency II on risk-based price differentiation.
2.2.2 Reinsurance

Reinsurance is a way for insurance companies to transfer risk to another company, a reinsurer. Using reinsurance, insurers can protect themselves from extraordinary events the same way their own customers do. There are several reasons for this, and this chapter will explain reinsurance and its connection to the solvency margin. First, a definition of reinsurance is in place:

Reinsurance

The purchase of insurance by an insurer. (Harrington & Niehaus, 1999)

The buyer of the reinsurance is called the *ceding company* and the seller is referred to as the *reinsurer*. (Dorfman, 1994)

Reasons for reinsurance

The primary function of reinsurance is to reduce underwriting risk for the ceding company and *transfer risk* to the reinsurer. By doing this the ceding company can limit the potential losses of its insurance undertakings and *stabilise its profits*. It also enables the ceding company to hold *less capital in reserve* for extreme events. Of course, this comes at a price which is the premium paid to the reinsurer. (Dorfman, 1994)

Another reason for reinsurance is to *increase underwriting capacity* for the ceding company. A small insurance company may have customers who ask for certain policies that the company itself cannot provide because it is too small to achieve a sufficient diversification for that type of risk. Instead of asking the customer to turn to another insurance company, the risk is transferred to a reinsurance company that is typically larger and internationally diversified for the type of risk in question. In this sort of arrangement, the ceding company acts as a sales function for the reinsurance company. (Dorfman, 1994)

Types of reinsurance

Reinsurance contracts can broadly be classified in two categories; proportional and non-proportional. Under a proportional contract, the ceding company shares a ratio of premiums and losses with the reinsurer. For example, the reinsurer might pay 65 percent of all losses in exchange for the same share of the premiums. Usually the reinsurer also pays the ceding company a commission to cover sales and administration costs called the “ceding commission”. (Harrington & Niehaus, 1999)

In non-proportional reinsurance the reinsurer pays the ceding company’s claims in excess of some specified threshold, a type of reinsurance is know as “excess of loss”. These types of contracts can be tailored in a variety of different ways to fit the two insurance companies involved in the risk transfer. (Harrington & Niehaus, 1999)

2.2.3 Credit ratings

A credit rating is an important statement about an organisation’s financial health. Independent rating agencies provide evaluations based not only on financial data but also on processes and systems with emphasis on risk management practices. A standard definition of credit rating is:
Credit rating

An evaluation of the likelihood of a borrower to default on a loan. (University of Northern Texas, 2006)

Credit ratings on an international level are mainly provided by the three top rating agencies Moody’s, Standard & Poor’s and Fitch. Ratings are especially important to companies, which are dependent on risk capital and loans for financing or selling products, and services that include some kind of financial obligation, such as insurance. Many companies do not conduct business in these types of areas with companies that are rated below a certain level because this indicates that the credit risk is too high (Brealey & Myers, 2003). For many insurance companies a good credit rating is necessary in order to compete in certain sectors such as insurance for corporations (Guy Carpenter & Mercer Oliver Wyman, 2006).

To give a better picture of what a credit rating means, consider Table 2 below, which presents statistics regarding the percentage of bonds defaulting within a specified timeframe.

<table>
<thead>
<tr>
<th>Rating at time of issue</th>
<th>1 year after issue</th>
<th>5 years after issue</th>
<th>10 years after issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>.0</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>AA</td>
<td>.0</td>
<td>.7</td>
<td>.7</td>
</tr>
<tr>
<td>A</td>
<td>.0</td>
<td>.2</td>
<td>.6</td>
</tr>
<tr>
<td>BBB</td>
<td>.0</td>
<td>1.6</td>
<td>2.8</td>
</tr>
<tr>
<td>BB</td>
<td>.4</td>
<td>8.3</td>
<td>16.4</td>
</tr>
<tr>
<td>B</td>
<td>1.5</td>
<td>22.0</td>
<td>33.0</td>
</tr>
<tr>
<td>CCC</td>
<td>2.3</td>
<td>35.4</td>
<td>47.5</td>
</tr>
</tbody>
</table>

Source: Brealey & Myers (2003)

An A-rated bond, for instance, has a 0.6 percent probability of default within 10 years, whereas the default probability for the same period is 33 percent for a B-rated bond. Every instance that issues bonds is given a rating, i.e. corporations as well as nations. For example, the Republic of Italy has a significantly lower A+ rating than Toyota Motor Corporation’s AAA rating (S&P, 2007).

Rating agencies have their own models for evaluating credit risk, which usually include both quantitative and qualitative requirements. These models have elements common to those used by the insurance supervisors, but under the present Solvency regulations it has been far easier to meet the requirements of the supervisor then those of the rating agencies for a solid rating1. With the new Solvency II regulations, there is a likely convergence of demands from supervisors and requirements for higher ratings (Jones, Rief & Pallec, 2006).

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1 Interview with Claes Thimrén Länsförsäkringar on 28th September 2006
The convergence of regulatory demands with those of rating agencies will most likely not affect the rating of those companies already with a high rating, although some agencies have indicated that they will pay closer attention to the opinions of supervisors under the new regulations (Jones, Rief & Pallec, 2006).

2.2.4 Dynamic Financial Analysis

Insurance companies have high uncertainty in both their incomes from investments and in their expenses from customer claims. In order to plan future cash flows, insurance companies must somehow predict them. Dynamic Financial Analysis (DFA) is a methodology for making such simulations, which could also be used to model the amount of solvency capital needed under various scenarios (Kaufmann, Gadmer & Klett, 2001).

As it has been previously stated, the new Solvency II regulations give the option for insurance companies to develop their own internal models, provided they can be approved according to regulatory standards. For companies that already use DFA models this provides an opportunity to get their DFA model approved as an internal Solvency II model. However, it is still unclear how large the incentives for an internal model will be and how much it will cost to get an internal model approved. If the incentives are large enough, Solvency II might be a reason for some companies to start using DFA if they have not previously done so.  

Introduction to DFA

Insurance has traditionally been a heavily regulated industry, which led to a basic set of insurance products typically addressing only one risk at a time. Analysis of investment and underwriting risks were usually separated and carried out in different parts of the organisation. In this environment, there was little need for more sophisticated cross-section analysis but as regulations became more flexible and the market for financial products grew, more advanced products were introduced. Through mergers and acquisitions, integrated financial service providers entered the scene and the traditional separation between banks and insurance companies became less clear. (Blum & Dacorogna, 2005)

During this development, some noticed that diversification effects between different business lines could be used to form a more holistic view of risk throughout the organisation. Enterprise Risk Management (ERM) is the practise of trying to produce a more complete and coordinated way to address risk. According to Blum & Dacarogna (2005), ERM is opposed to traditional risk management where different business lines are viewed as separate and diversification effects are not accounted for. (Blum & Dacarogna, 2005)

DFA is the term used in the non-life insurance industry for stochastic simulation and is a tool that is used in the ERM process. Essentially, DFA tries to predict how different strategies will affect the insurance company. This is done by creating a model of the company where every decision affecting the financial status is a parameter and a set of parameters represents a strategy. The model also has variables for different “states of nature” where one variable could represent something that is beyond the management’s control such as changes in interest rates or inflation. Each set of variables represents a scenario and these are generated in a random way and tested on

the different strategies. The process could be visualised as Figure 8 below. (Blum & Dacorogna, 2005)

The model should reflect the actions of the company under the given strategy and state of nature. Needless to say, this type of modelling requires significant skills and knowledge about the organisation. (Blum & Dacorogna, 2005).

Before testing, the scenario generator needs to be calibrated in order to generate sensible scenarios. It must also acknowledge dependencies between variables in the scenario in order to be realistic. After a large number of scenarios have been tested, the results are analysed and used to evaluate the strategy against other simulated strategies or used to update the strategy for more testing. Before analysis, one or more target variables are selected depending on the goals of the study. An example of target variable could be earnings, equity or – as is the focus in this report – regulatory capital. (Blum & Dacorogna, 2005; Kaufmann, Gadmer & Klett, 2001)

Uses of DFA
According to Kaufmann, Gadmer and Klett (2001) a DFA model could be used for various purposes such as

» Strategic asset allocation
» Capital allocation
» Performance measurement
» Market strategies
» Business mix
» Pricing decisions
» Product design

Kaufmann, Gadmer and Klett (2001) further state that the concrete application and implementation depends on two fundamental questions:
» Who are the beneficiaries of the DFA?
» What are the company objectives with respect to the target group?

In the case of DFA for Solvency capital, the beneficiaries are the customers and the objectives are to minimise the risk of becoming insolvent according to regulatory standards.

**Dynamic Financial Analysis compared to Asset-Liability Management**

Scenario simulation is used in many different contexts and under various different names. The most closely related to DFA is Asset-Liability Management (ALM), which is used in life insurance and in the banking industry to take a holistic approach in risk management of assets and liabilities. Under some ALM approaches, simulation is used to test scenarios in a way similar to DFA analysis. The liabilities of a bank or life-insurance company are, however, considerably more stable than the claims costs of a non-life insurance company. Therefore, scenario analysis with ALM usually regards the liabilities as more or less deterministic. Due to the higher variability of liabilities in non-life insurance stochastic simulation is necessary which makes DFA a considerably more advanced approach than ALM. (Kaufmann, Gadmer & Klett, 2001)
SOLVENCY II – A COMPLIANCE BURDEN OR AN OPPORTUNITY FOR THE SWEDISH NON-LIFE INSURANCE INDUSTRY?
3 The Solvency regulations

As explained in chapter 0, insurance companies need to set aside capital for unexpected events, called solvency capital. In order to establish fair competition and to protect customers, there are regulations for the insurance companies to follow when calculating the solvency margin. Due to the developments in risk management, a new set of regulations is being put forward: Solvency II. The current and previous Solvency regulations are also presented briefly in order to highlight the differences compared to the new approach. A major part of this chapter is based on the book Solvency by Arne Sandström, the only work available also containing information on Solvency II. Potential effects of Solvency II are mainly discussed in industry reports, e.g. issued by consultancy firms, which is why the final section compares a number of such reports.

3.1 The solvency margin

Risk plays a major role in the everyday business of an insurance company. Essentially, the risk neutral insurance company profits from offering insurance to risk averse customers3. In order to protect the insured and to ensure the stability of the financial markets, insurance companies are required to hold a buffer of assets called the solvency margin. The solvency margin is calculated as the difference between assets and liabilities (Sandström, 2006). It is important to point out that assets and liabilities in this context do not have the same meaning they usually have in an accounting balance sheet. When calculating the solvency margin the assets and liabilities that can be used are specified by the regulations, which leads to our definition, adapted from Sandström (2006).

Solvency margin
The difference between assets and liabilities, as they are specified by the Solvency regulations.
(Adapted from Sandström, 2006)

The nature of this buffer, i.e. properties such as the size and the time horizon for which it is calculated, is determined by the solvency regulations. In Europe, there have been common regulations or directives since the 1970s. Since this buffer consists of capital that has to fulfil certain criteria specified by the regulations, a larger buffer usually represents a higher cost. From the perspective of the owners it is also capital that is bound in the company. It is therefore important not to hold more capital than is necessary, is demanded by regulations and needed to ensure the stability of the enterprise. (Sandström, 2006)

3.1.1 Determining the solvency margin

Since the purpose of the solvency margin is to lower the likelihood that an insurance company becomes insolvent, that is, when its assets are lower than its liabilities, factors that may reduce the value of the assets and increase the value of the liabilities should be taken into account. These

3 Risk aversion is the reluctance of a person to accept a bargain with an uncertain payoff rather than another bargain with a more certain but possibly lower expected payoff. A risk neutral person, on the other hand, cares only about the expected payoff. For example, consider a game where a coin is tossed and head gives the gambler 100 SEK while tails implies a loss of 50 SEK. Thus, the expected payoff is 0,5×100 + 0,5×−50 = 25 SEK. An alternative to participating in the game is to receive 25 SEK without any risk involved. A risk averse person would prefer being handed a certain 25 SEK, while a risk neutral person would be indifferent between the two choices. (Harrington & Niehaus, 1999)
factors are numerous, and sophisticated models for calculating the required solvency margin consider several of these. So far, simpler models have been used for common European legislation, which has led to some member states implementing their own stricter models in local legislation. A good model should reflect the true risk of an insurance portfolio leading to efficient capital allocation. (CEA & Towers Perrin, 2006)

3.1.2 The solvency margin under the Solvency 0 directives (1979)
The first, second and third non-life directives commonly known as Solvency 0, specify which assets should be used for calculating the solvency margin. They also specify that the required solvency margin should be the greater of the adjusted premium index or the adjusted claims index. Sandström (2006) writes that the adjusted premium index is:

- 18% of total premiums received during the financial year up to 10 million euros, and
- 16% of total premiums received during the financial year in excess of 10 million euros,

and the adjusted claims index is:

- 26% of the average of claims paid out during the last 3 years up to 7 million euros, and
- 23% of the average of claims paid out during the last 3 years in excess of 7 million euros.

This reasoning is summarised in Figure 9 below.

Figure 9. Calculating the required solvency margin under the first Solvency directives

3.1.3 The solvency margin under the Solvency I directives (1997)
The Solvency I directives are similar to the earlier directives but use a slightly more complicated model. The assets to be included in the solvency margin are specified in more detail than before, and the solvency margin must always be larger than a specified amount called the guarantee fund, which is a fixed amount depending on the type of insurance the company provides. (Sandström, 2006)

The required solvency margin is specified as either (a) the greater of the adjusted premium index and the adjusted claims index during the current or previous financial year, or (b) the last year’s required solvency margin multiplied by a ratio concerning outstanding claims. However, if the
guarantee fund is greater than the above, the guarantee fund should be used as the required solvency margin (Sandström, 2006). This is illustrated in Figure 10 below.

**Figure 10. Calculating the required solvency margin under the Solvency I directives**

![Diagram showing the calculation of required solvency margin](image)

### 3.2 The new Solvency II regulations

The coming Solvency II regulations will provide an option to use a fundamentally new approach for calculating the required solvency margin. The idea is to let companies construct the models themselves and then ensure, through supervision, that these models are based on sound risk management principles (CEA & Towers Perrin, 2006). The insurance company must be able to explain the internal model to the supervisor, which, in turn, has to understand the model in order to approve it. Worth mentioning is that the insurance companies will probably be charged for the time that the supervisor has to spend on assessment⁴.

For companies that lack the ability and resources to develop internal models, a standard approach has been proposed. Solvency II is proposed to be in force from January 1st 2010. (CEA & Towers Perrin, 2006)

**Figure 11. Timeline for Solvency II**

![Timeline showing the development and implementation of Solvency II](image)

The timeline in Figure 11 shows how the authorities responsible for the Solvency II development have issued three calls for advice as well as three quantitative impact studies (QIS), of which the second one is currently being analysed. These initiatives aim to let the insurance companies and other relevant stakeholders submit suggestions and test models before the regulations are finalised to a draft in 2008. The final regulations are then planned to be implemented in 2009 or, more likely, 2010. (CEA & Towers Perrin, 2006)

⁴ Karin Lundberg Finansinspektionen, interview on October 19th 2006.
Just as with Basel II, which is a regulation for banks covered in Appendix A, Solvency II has a wider scope than solely establishing a solvency margin. The structure of Solvency II follows a three-Pillar structure as follows:

**Figure 12. The three-Pillar structure of Solvency II**

Source: Adapted from CEA & Towers Perrin (2006)

**Pillar 1**

Pillar 1 can be seen as a development of earlier regulations and focuses on the establishment of a sufficient solvency margin. An important addition is the concept of risk matching assets and liabilities, also known as Asset-Liability Management (ALM), and encouragement for companies to develop internal models, provided they could be verified. Since the development of internal models may be a heavy burden for smaller companies there will also be a standard approach following the same principles but with a higher margin due to lack of customisation. (CEA & Towers Perrin, 2006; Sandström, 2006)

The required solvency margin from earlier directives will be split into two levels called the *minimum capital requirement* (MCR) and the *solvency capital requirement* (SCR), illustrated in Figure 13 (Sandström, 2006). The MCR will be the absolute minimum level and below this level, the insurance company will face serious legal consequences (CEA & Towers Perrin, 2006). At the time of writing, this study there is a debate regarding how the MCR should be calculated.5

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The SCR defines the target capital level. If a company falls below this level some less serious legal action, such as demanding increased frequency of reporting, will be enforced by the supervisor. The SCR can be calculated using a standard approach or an internal model. At the time of writing it is widely agreed upon that incentives should exist for companies to develop internal models.\(^6\)

The regulations state that technical provisions are the sum of:

» A best estimate of the liabilities, which is the expected present value of future cash flows.

» A risk margin that covers the risk of the future cash flows.

**Pillar 2**

Pillar 2 complements Pillar 1 with qualitative requirements and defines the framework of supervisory control. Under Pillar 2 falls the supervision of internal risk management processes and aspects of operational risk. This means that the internal models developed under Pillar 1 will be verified according to principles defined in Pillar 2. (CEA & Towers Perrin, 2006)

There is currently a debate whether a standard approach will be sufficient to fulfil the requirements of Pillar 2 since a standard approach by definition is not customised to fit the organisation. To be ratified by the supervisor every aspect of a model should reflect the organisation and the model should consider all those risks important to the organisation.\(^7\)

According to many industry specialist the most challenging part of Solvency II will be to ensure the reliability and security of the models. Organisations must be able to show supervisors that the

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\(^7\) Thorsten Hein, Business Development Manager at SAS Institute. Interview on Oct. 10\(^{th}\) 2006.
model accurately reflects the organisation. To achieve this, sufficient data quality and data traceability become very important factors. These concepts are therefore defined below.

**Data quality**

Data are deemed of high quality if they correctly represent the real-world construct to which they refer. (Wikipedia, 2006)

It is clear that poor data quality has negative effects on the reliability of a model’s results; even if the model itself has been set up correctly, the results may still be incorrect. The next definition of data traceability is closely related to the often-used term “audit trail”.

**Data traceability**

A step-by-step record by which data can be traced to its source. (SAS Internal)

Thus, data quality and traceability are closely related; one cannot determine the quality without knowing its source or whether it has been altered in any way.

**Pillar 3**

Finally, Pillar 3 addresses disclosure requirements according what information should be given to the market. This information is important, as it will be used by external analysts and credit rating agencies. Hence, companies that are able to report more detailed information based on a ratified internal model will benefit from this by improving their credit rating.

**3.2.1 The traffic light system**

The Swedish supervisory authority Finansinspektionen is currently developing a model – the traffic light system, described in Figure 14 – to evaluate the exposure of insurance companies to financial risk. For a non-life insurance company the model consists of two spreadsheets that constitute a standardised effort to measure the risk. The model will be in force from January 2007. (Finansinspektionen, 2006)

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10 Ingrid Wrebo, Chief Actuary at AMF Pension. Interview on Oct. 6th 2006.
After the different types of risk have been assigned monetary values they are weighted together in the *Net total risk*, which also becomes a monetary value. This sum is then compared to the *Capital margin*. If the Net total risk is less then the Capital margin, a discussion with the supervisor will take place and appropriate measures will be issued. (Finansinspektionen, 2006)

It is most likely that the traffic light model will resemble a standard approach of Solvency II (Stölting, 2006) and the intention of Finansinspektionen is that the traffic light model should be a first step towards the Solvency II regulations\textsuperscript{11}.

### 3.3 Potential effects of Solvency II

As Baur & Enz (2006) from Swiss Re point out, any discussion today regarding the potential effects of Solvency II involves quite a bit of uncertainty. They identify two major reasons for this uncertainty:

- The details of the Solvency II regulations are still under discussion, which makes it near impossible to quantify any potential effects.

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\textsuperscript{11} Bengt von Bahr, actuary, and Katarina Höller, risk analyst at Finansinspektionen. Interview on Sep. 25\textsuperscript{th} 2006.
Even though Solvency II will impose tougher requirements than those under Solvency I, these only represent minimal requirements, and most European insurance companies follow significantly stricter standards. Consequently, the magnitude of the potential effects is not necessarily proportional to the changes in Solvency regulations.

Section 2.1.5 explained some concepts relevant to Solvency II, namely differential pricing, reinsurance and credit ratings. This chapter has also explained the meaning of solvency capital. These four areas constitute the potential effects, which will be evaluated in this study. A further explanation of each of them is given below, based on industry reports and discussions with SAS Institute representative Thorsten Hein.

3.3.1 Capital levels
Due to the structural similarities between Basel II and Solvency II, there has been a great interest in evaluating the potential effects from Solvency II on capital requirements and capital levels. The difference between requirements and levels is important – especially in the Solvency I regulations, where the requirements are explained as practically redundant and the actual levels among insurance companies are much higher.

Baur & Enz (2006) of Swiss Re state, “Solvency II will most likely not reveal major under- or overcapitalisation of the insurance industry as a whole”. This opinion is shared by Guy Carpenter & Mercer Oliver Wyman (2006) who explain that capital requirements will increase significantly through the transition from Solvency I to Solvency II, but also that the Solvency I requirements are much lower than the actual capital levels among insurance companies. Henrik Bjerre-Nielsen, chairman of CEIOPS, says in an interview by Stölting (2006) at Munich Re that different allocation of the available capital could be necessary, rather than more capital. This will be commented further when discussing effects on insurance prices in section 3.3.4.

3.3.2 Credit ratings
Although hard to evaluate, Guy Carpenter & Mercer Oliver Wyman (2006) explain that, unsurprisingly, the capital requirements of Solvency II will be much closer to the ones from rating agencies, although the latter ones are still expected to be higher. This is followed by a speculation regarding new efforts to link capital requirements to a so-called minimum rate adequacy, i.e. how much capital is needed to ensure that the insurance company’s credit rating does not fall below a certain level.

However, Jones, Rief & Pallec (2006) explain Standard & Poor’s do not foresee any major changes in the rating process because of Solvency II. Even though a rating agency is neither a regulator, nor a supervisor, the two have a lot in common. The rating process of Standard & Poor’s has nine elements, of which two – management and corporate strategy, and enterprise risk management (ERM) – can be related to Pillar 2 in Solvency II, whereas four further areas – capitalisation, investments, liquidity, and reserves – are rather linked to Pillar 1. The remaining three elements – competitive position, operating performance, and financial flexibility (the ability to raise new capital and liquidity when required) – will continue to differentiate the approaches used by supervisory and rating agencies, respectively.
3.3.3 Reinsurance

Baur & Enz (2006) explain the connection between reinsurance and Solvency II in a straightforward manner: “Reinsurance reduces direct insurers’ required capital by lowering the loss volatility.” The reinsurer can then benefit from better risk diversification, thus lowering the total cost. Still, they say that Solvency II’s effect on the buying of reinsurance is difficult to predict.

In the interview by Stölting (2006) at Munich Re, Henrik Bjerre-Nielsen relates reinsurance to the decision on how to comply with Solvency II; using a standard approach or an internal model. Those companies going for a standard approach, supposedly smaller ones, would in that way receive a higher capital requirement and therefore be willing to transfer risks to reinsurers having an internal model. The magnitude of this potential effect is also difficult to predict, however.

3.3.4 Insurance pricing

When it comes to Solvency II’s effect on insurance prices, the perspectives of the different industry reports differ somewhat. Baur & Enz (2006) say that “Solvency II will require adequate capital backing for the volatility of claims”, meaning that products with an above-average loss volatility would see an increase in their reserve for unexpected losses component (see section 2.2.1). Swiss Re has made an estimation based on the German, French, UK and Italian insurance markets, shown in Figure 15. The vertical lines represent the mean of the expected claims of the five lines of the respective market. The coloured bars indicate that property insurance is particularly prone to price increases due to high loss volatility. Similarly, motor insurance appears to require a smaller reserve than the average.
However, this analysis is based on the assumption that the insurance companies involved do not already hold sufficient amounts of capital for these lines of business. As Guy Carpenter & Mercer Oliver Wyman (2006) also point out, changes in capital allocation involves a conflict between what seems “academically correct”, i.e. from an actuarial point of view, and the pragmatic as well as political reality where significant modifications might be needed in systems and processes. Still, the authors emphasise that the rewards can be substantial in terms of underwriting, pricing and performance measurement.

3.3.5 Summarising the potential effects
The four areas described in the previous sections will be further evaluated in the study.
Based largely on the interview with Thorsten Hein\textsuperscript{12}, Figure 16 above visualises a potential framework for the connections and interdependencies between the probable effects of Solvency II listed in the previous sections.

The starting point of the figure is the first box under pillar two, which states that the model used must reflect the organisation, which seems reasonable considering it has been one of the primary objectives of the Solvency II project\textsuperscript{13}. It also puts high demands on the quality and traceability of data so that the supervisor can make sure that the information is valid, that it comes from within the organisation and that it has not been tampered with. This was, and still is, a common issue in Basel II implementations and is likely to be so in Solvency II as well\textsuperscript{14}.

The line from the starting point of the figure that points to the internal model box represents the assumption that an internal model must be used in order to meet regulatory demands regarding the ability of the model to reflect the organisation. This assumption seems reasonable in this case since we are looking at larger insurance companies only. Smaller companies are more likely to reach compliance using a standard approach\textsuperscript{13}.

The internal model then helps to improve risk management and measurement by providing a higher detail on data used to calculate the risk. Previously such data have often been aggregated.

\begin{footnotesize}
\textsuperscript{12} Thorsten Hein, Business Development Manager at SAS Institute. Interview on Oct. 10\textsuperscript{th} 2006.
\textsuperscript{13} Bengt von Bahr, actuary, and Katarina Höller, risk analyst at Finansinspektionen. Interview on Sep. 25\textsuperscript{th} 2006.
\textsuperscript{14} Karin Lundberg Finansinspektionen, interview on October 19\textsuperscript{th} 2006.
\end{footnotesize}
on a high level or sometimes even been based on guesses. The improved accuracy would then lead to better decisions regarding risk.

The new regulations could lead to more risk being transferred to a reinsurer if a company is unable to meet the capital requirements, but might on the other lead to less reinsurance coverage if diversification effects are discovered within the company or the capital requirements are easily met. Whichever way it goes there seems to be a close connection between the capital requirements and the amount of reinsurance needed.

The risk management affects the credit rating of the company, but companies that depend on a certain rating are also affected by the demands of rating agencies. This relation is visualised by the double-pointed arrow in the figure.

As explained previously in chapter 2.2.1 about differential pricing, the claims volatility might affect prices if a capital increment is necessary. This would then affect the customers attracted and the cost of claims from these customers.

All the effects listed here would continuously update the internal model and in this way they would all affect one another. Note that Figure 16 does not intend to predict the exact behaviour of an insurance company but rather show on the relations and interdependencies in a cause-and-effect manner.

**A possible roadmap for realising the benefits**

The benefits from Solvency II are likely to come gradually with most companies focusing on compliance issues at first. After compliance, the focus will be different depending on the nature of the individual insurance company. Companies dependent on their credit rating are expected to focus on these issues while others might be more interested in optimising their capital levels or the amount of reinsurance needed. The greatest opportunities will be seized by those firms that are able to change their daily operations and business decisions because of the more detailed information. Figure 17 below illustrates a possible roadmap for a Solvency II project where focus of the project over time shifts from a compliance issue to being more business-related.\(^{15}\)

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\(^{15}\) Thorsten Hein, Business Development Manager at SAS Institute. Interview on Oct. 10th 2006.
3.3.6 **Effects realised from Basel II**

So far, Basel II projects have mostly been concerned with the implementation of Pillar 1 and focus has been on building internal models for measurement of the credit risk. By doing so, banks have been able to lower their economic capital substantially and thus providing a strong incentive for Basel II projects. However, the more accurate measurement of credit risk has also provided the tools for better pricing of credit risk related products such as loans. According to Lindefeldt, Wahl & Co, a consulting bureau specialising in Basel II, many banks have realised that the business advantage of an internal model is far more than just the lowering of economic capital, and a Basel II solution can strongly improve the competitiveness of a bank\(^{16}\). Consequently, many banks have already begun to utilise the better risk measurement to improve the pricing of their products (SAS internal).

For further information on Basel II, refer to Appendix A.

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4 Research Methodology

Having presented the study’s purpose, theoretical framework and research questions, we will now present the research methodology that describes how the research questions will be answered and the study’s purpose be fulfilled. The chapter begins with a somewhat philosophical discussion leading to an overall methodology approach. This is followed by the choice of a proper research method, as well as concretising this method into how the research was designed and carried out. At the end, validity and reliability issues are mentioned.

4.1 Choosing an overall methodology approach

Methodology is concerned with how we come to know in a practical sense – the specific methods we use to understand our world better. It is there to validate our results and make sure that we are actually coming up with something new instead of just rephrasing common knowledge. In order to do so, one must go back to our ultimate presumptions of the world around us and how we fit into it, something that is called epistemology (Arbnor & Bjerke, 1997; Myers, 2006).

Before going into the details of epistemology, it needs to be made clear what type of research that was actually conducted. Myers (2006) states that research can be either quantitative, qualitative or both. Due to the nature of this study – investigating a broad, complex topic that affects a range of different organisations – performing a purely quantitative study would have proven problematic. In order to reveal interesting findings about Solvency II and its potential effects on insurance companies, discussions were needed rather than precise, scientific measurements. We have therefore focused on qualitative research.

Going back to the concept of epistemology, Orlikowski and Baroudi (1991) speak of it as “criteria for constructing and evaluating knowledge” that determine how the qualitative research shall be conducted. They continue by identifying three major underlying epistemologies for qualitative research, namely positivist, interpretive and critical whose characteristics are summarised in Table 3.
SOLVENCY II – A COMPLIANCE BURDEN OR AN OPPORTUNITY FOR THE SWEDISH NON-LIFE INSURANCE INDUSTRY?

Table 3. Epistemology characteristics for qualitative research

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Assumptions</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positivist research</strong></td>
<td>Testing earlier established theories</td>
<td>Reality is objectively given</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interpretive research</strong></td>
<td>Understanding phenomena through the meaning people assign to them</td>
<td>Reality is accessed only through social constructions</td>
</tr>
<tr>
<td><strong>Critical research</strong></td>
<td>Social critique</td>
<td>Reality is historically constituted and (re-)produced by people</td>
</tr>
</tbody>
</table>

Source: Compiled from Myers (2006)

Since this study is not concerned with social critique, we will focus on the choice between a positivist and an interpretive perspective. The purpose of this study has emerged gradually through discussions with different stakeholders such as SAS Institute, Accenture and Finansinspektionen. The process has been iterative in the sense that new stakeholders have been contacted, our frame of reference revised and the purpose rephrased several times. Therefore, the aim when entering the field has been to test theories developed or discovered in the earlier stages of our thesis. Considering possible effects from Solvency II is not a new idea, although there seems to be lack of empirical evidence that supports it. Therefore, judging from Table 3, we see that a positivist research approach best corresponds to our needs.

One could argue that different stakeholders are likely to have different views on the complex subject we have chosen to investigate. As Lee (1991) writes, an interpretive research approach acknowledges that one phenomenon can be interpreted differently by two individuals, and that this fact needs to be considered in the research. We have seen, for example, proof of interpretive research in the way we have dealt with changes to the purpose of the study as well as conflicting opinion of interviewees. The main reason for doing so is that any current assessment of potential effects of Solvency II is deemed somewhat subjective. In five to ten years time, a purely positivist, and perhaps quantitative, study should be feasible, while it certainly is not today.

In brief, this study is mainly guided by a positivist research approach, but it also has some elements of interpretive research.
4.2 Choosing a research method

The research method can be described as a strategy that takes the researcher from the epistemology described above to designing and carrying out the research. Even though several groupings of different methods are available, we will use a grouping suggested by Myers (2006), namely action research, ethnography, grounded theory and case study research.

Both action research and ethnography are mainly concerned with behavioural aspects performed in close collaboration with others, and it therefore does not apply to our thesis. As for grounded theory, it puts a lot of emphasis on theory development, rather than referring to existing theories. Even though grounded theory cannot be considered the main research method of this study, a large part of the theoretical framework used in the analysis phase was developed by the authors, rather than attempting to use an existing one. The main reason for this choice was that we could not find an existing framework that appeared to fit the purpose of our study.

Thus, even though this thesis bears some influence from grounded theory, the most suitable method is case study research. This becomes evident when referring to Yin (2003) who describes a situation when performing case studies is particularly useful:

A “how” or “why” question is being asked about a contemporary set of events, over which the investigator has little or no control.

This study is concerned with explaining how the Solvency II regulations will affect risk management in the Swedish non-life insurance industry, and whether these changes can result in opportunities for insurance companies. These are indeed contemporary events over which we have no control, referring to a “how” question. Thus, the method being used is case study research.

4.3 Choosing a research design

Yin (2003) speaks of the research design as being “the logical sequence that connects the empirical data to a study’s initial research questions and, ultimately, to its conclusions”. The design should have five major components:

» Study questions, i.e. whether they are of the type “how”, “why”, “what”, etc.

» Study propositions, aiming to specify what to study through a set of hypotheses, e.g., “non-life insurance companies need to improve their differential pricing because of competition from niche players”. These propositions also help in finding out where to find the information needed. Although not depicted here, such propositions have guided us in searching for relevant information sources and areas to investigate further.

» Its unit(s) of analysis, leading to the definition of what the “case” actually is. For us, the unit of analysis consists of a specific set of Solvency II-related topics discussed with a single organisation. For example, Finansinspektionen has been contacted several times discussing quite different topics, thereby resulting in several cases. Two of the insurance companies were also interviewed twice, but the set of topics was essentially the same on both occasions. Each insurance company is therefore attributed one case only. In order to analyse the case findings, some background information about each case involved has
been collected. This type of information should relate to the study propositions in order to avoid covering unnecessary details.

» Linking data to propositions and criteria for interpreting the study’s findings are not detailed by Yin (2003).

The concept of a “case” could have been defined differently, e.g. as the Solvency II implementation process in different organisations. However, Yin (2003) advises against such definitions due to difficulties in delimitations – where is the beginning and the end of the case?

As mentioned, a case study according to Yin (2003) implies that quite extensive background research should be conducted before each interview. We have used homepages of the organisations as well as annual reports for grasping the overall picture of the organisation, but Yin (2003) also asks for detailed background information about the individual being interviewed. Having this in mind, a more appropriate term for our case studies might be “mini case”, but in order to avoid confusion we will continue to use the term “case” while bearing the above reasoning in mind.

4.3.1 Case study design

According to Yin (2003), an important decision is that of using a single-case or a multiple-case design. The advantages of a single-case design are most applicable when it represents the critical, extreme/unique, representative/typical, revelatory or longitudinal case. In our study, the views on differential pricing and Solvency II seemed very likely to differ among the different stakeholders, which is why we felt that a multiple-case design was more suitable. Voss, Tsikriktsis & Frohlich (2002) add two more case study designs, namely retrospective cases and longitudinal cases, but due to time restrictions and the fact that Solvency II is a new topic, these additional designs are not suitable for our study.

When using a multiple-case design, Yin (2003) emphasises the importance of using replication logic, rather than a sampling logic where each case is treated the same way as a respondent in a survey. The idea of using replication logic instead, is that significant findings from one case should be investigated in other cases, hoping to make the findings more robust.

Figure 18 illustrates the multiple-case design we have used in our study. The dotted line is a feedback loop, which comes into effect when an important discovery is made during the course of the case studies, which calls for altering the basic conditions in the coming case studies.
Also, note in Figure 18 that the very first step is to develop a theoretical framework, since it states the conditions under which a particular phenomenon is (1) likely to be found, and (2) where it is likely \textit{not} to be found. This claim conflicts with the opinion of Eisenhardt (1989) who believes that theory building should begin with no theory and no hypotheses at all. She does conclude, however, that this ideal is impossible to achieve, but has a point in the fact that one should try to avoid bias in the early stages of research.

4.3.2 Define and design

As mentioned above, the theoretical framework provides a basis for further planning, executing and analysing the case studies. The remaining parts will be described according to the structure in Figure 18.

Select cases

Selecting an appropriate number of relevant cases is important for the success of a case-based study as well as its generalisability (Eisenhardt, 1989). Unlike survey-based research – where statistical theory provides exact measures for selecting the right sample – case-based research is qualitative in nature. Yin (2003) states that each case must be selected so that it either (a) predicts similar results, or (b) predicts contrasting results but for predictable reasons.

According to Yin (2003), the appropriate number of cases depends on the differences between the individual cases; if these differences are significant, fewer cases are needed than for a set with more subtle differences. This opinion is shared by Voss, Tsikriktsis & Frohlich (2002) who suggest that cases should either (a) be typical or representative, (b) be negative or disconfirming, or (c) have sharply contrasting characteristics that can highlight the differences being studied. When dealing with more subtle differences, five to ten cases should be used according to Yin (2003). As Figure
18 shows, contradictory case results will lead to the initial propositions being revised and retested with a new set of cases (Eisenhardt, 1989).

Before considering what set of cases is practicable, we begin by listing all organisations that could be of interest. The list below consists of the organisations we would have contacted and investigated if there had been no restrictions in time or resources.

<table>
<thead>
<tr>
<th>Example</th>
<th>Purpose</th>
<th>Potential problems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supervisors and associations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finansinspektionen</td>
<td>They are responsible for supervising Swedish insurance companies</td>
<td>No major problems</td>
</tr>
<tr>
<td>Försäkringsförbundet</td>
<td>All major insurance players in Sweden are members</td>
<td>No major problems</td>
</tr>
<tr>
<td></td>
<td>Represents Sweden in federal Solvency II groups</td>
<td></td>
</tr>
<tr>
<td>Supervisors in other European countries</td>
<td>Some countries have reached further than Sweden in Solvency II compliance</td>
<td>Hard to find the right persons to speak to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>May require extensive travelling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Language issues</td>
</tr>
<tr>
<td>Insurance associations in other European countries</td>
<td>Provide an overview of the situation for insurance companies in other European countries</td>
<td>Hard to find the right persons to speak to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>May require extensive travelling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Language issues</td>
</tr>
<tr>
<td>Pan-European organisations (CEIOPS, CEA, Groupe Consultatif)</td>
<td>Responsible for designing the Solvency II regulations</td>
<td>Hard to find the right persons to speak to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>May require extensive travelling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Language issues</td>
</tr>
</tbody>
</table>
## RESEARCH METHODOLOGY

### Insurance industry

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multinational companies</td>
<td>To get an international perspective on how well Swedish companies perform</td>
<td>Hard to get access to senior management</td>
</tr>
<tr>
<td>(e.g. Zürich)</td>
<td></td>
<td>May require extensive travelling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Language issues</td>
</tr>
<tr>
<td>Large, Swedish</td>
<td>Our focus is mainly on large, Swedish insurance companies</td>
<td>Hard to find the right persons to speak to</td>
</tr>
<tr>
<td>(e.g. Codan/Trygg-Hansa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-size, Swedish</td>
<td>Large Swedish companies identify these niche players as a significant threat</td>
<td>Less knowledge in Solvency II-related issues than in large companies</td>
</tr>
<tr>
<td>(e.g. Moderna Försäkringar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small, Swedish</td>
<td>Solvency II will affect all insurance companies, not just large ones</td>
<td>Smaller companies have not yet started to focus on Solvency II</td>
</tr>
<tr>
<td>Insurance customers</td>
<td>In the end, Solvency II should benefit the customers</td>
<td>Hard to investigate through case studies</td>
</tr>
</tbody>
</table>

### Industry experts

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution providers</td>
<td>Provide a technical perspective</td>
<td>May focus solely on problems for which they have products</td>
</tr>
<tr>
<td>(SAS Institute)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation consultants</td>
<td>Provide an implementation perspective</td>
<td>May focus solely on problems for which they have services</td>
</tr>
<tr>
<td>(Accenture)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advisory consultants</td>
<td>Provide a risk management perspective</td>
<td>May focus solely on problems for which they have services</td>
</tr>
<tr>
<td>(Ernst &amp; Young)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Clearly, we could not contact all of these organisations as part of our thesis – it became a matter of prioritisation. First, we excluded multinational insurance companies due to restrictions in time and resources. Even though many of these companies have offices in Sweden, senior management is generally located somewhere else. Conducting interviews over the phone could have been a viable option instead of travelling to European headquarters, but considering that the thesis only concerns the Swedish market it was decided that no such contacts would be made, even though, in retrospect, it might have proven useful to do so.
As for small Swedish insurance companies, these were also excluded for three reasons: (1) our purpose mainly applies to larger companies due to the connection to internal models, (2) it is very hard for us to know which of the numerous small companies to speak to, and (3) these companies have little knowledge in Solvency II. Neither was insurance customers considered, since they require different research methods such as surveys. Thus, we focused on large Swedish non-life insurance companies.

As for the other organisations, both Finansinspektionen and Försäkringsförbundet are important authorities in the Solvency II development in Sweden. In our experience, we could quite easily get hold of the right persons. We therefore saw no reason not to contact both these institutions. However, due to the same reason as with multinational companies, we did not contact any authorities similar to the Swedish ones in other European countries.

Finally, we had already established good relations with SAS Institute, Accenture and Ernst & Young. These companies have a great interest in the Solvency II developments and are able to provide a more business-oriented perspective for the Swedish insurance industry. It could have been useful to speak to more than one industry expert for each of the perspectives we have identified in Table 4, but we felt that doing so would not contribute enough to our findings in order to justify the time and resources needed.

Table 5 summaries the organisations and persons that constitute the case studies, except from the industry experts where the discussions held were less formal in nature. Our interview with Mårten Ajne is however to be considered a case study. He is an actuary consultant, i.e. providing an external viewpoint to insurance companies in actuarial matters, and previously worked as the Swedish government’s sole investigator evaluating a reformed solvency system in Sweden.

Table 5. The final selection of cases

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisors and associations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finansinspektionen</td>
<td>Bengt von Bahr</td>
<td>Actuary</td>
</tr>
<tr>
<td></td>
<td>Katarina Höller</td>
<td>Risk Specialist</td>
</tr>
<tr>
<td></td>
<td>Karin Lundberg</td>
<td>Supervision Specialist</td>
</tr>
<tr>
<td></td>
<td>Erik Elvers</td>
<td>Actuary</td>
</tr>
<tr>
<td>Försäkringsförbundet</td>
<td>Arne Sandström</td>
<td>Chief Actuary</td>
</tr>
<tr>
<td>Insurance industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Länsförsäkringar</td>
<td>Claes Thimrén</td>
<td>Risk Manager</td>
</tr>
<tr>
<td>If Skadeförsäkring</td>
<td>Simon Kristofersson</td>
<td>Senior Risk Analyst</td>
</tr>
<tr>
<td>Codan/Trygg-Hansa</td>
<td>Lars Jørgensen</td>
<td>Head of Regulatory Risk &amp; Compliance</td>
</tr>
<tr>
<td>Folksam</td>
<td>Jesper Andersson</td>
<td>Actuary</td>
</tr>
</tbody>
</table>
The previous discussion only concerned what organisations to contact, rather than what should be the selection of cases. Choosing the right individual to speak to in each organisation is as important as choosing the organisations. However, we were quite limited in our ability to choose among different representatives for two reasons: (1) there are generally very few persons in each organisation with good knowledge of Solvency II today, and (2) our personal network is very limited, which is why we mainly relied on referrals from SAS Institute and the organisations themselves. An initial ambition was also to speak to several people from each organisation, but as it turned out, one single person was often referred to by different informants as the only suitable interviewee for Solvency II matters. Thus, it was a matter of finding people with sufficient knowledge, rather than looking for people with a certain role in the organisation. This explains the difference seen in the roles of the insurance company representatives. Ideally, we would also have interviewed people with a different perspective; what would the CEO or the CIO of an insurance company have to say about Solvency II, for example?

**Design data collection protocol**

The focus of our study requires insight on current events in individual companies, which is why, as previously mentioned, interviews were our primary source of information. When Yin (2003) compares interviews with other types of information sources such as archival records and direct observations, interviews are considered both targeted and insightful. At the same time, they can potentially be biased, inaccurate or incomplete, depending on the interviewee as well as the researchers’ interviewing skills and the quality of the questions being asked.

It is always possible that the answers are somewhat biased because of the fact that the interviewee might see personal gains in presenting a certain perspective. For example, if Solvency II leads to increased budgets for risk management, the risk manager could certainly be advocating the new regulations for that particular reason. No formal measures have been taken to deal with this issue; it has rather been a matter of sensing whether the answer seems reasonable and, when it does not, asking follow-up questions. We did emphasise, however, that we are writing a Master’s thesis rather than producing a report ordered by SAS Institute and Accenture. We believe that doing so has had a positive effect on the attitude of the interviewees. One could also question whether the opinion of the interviewee is typical for the whole organisation, and sometimes the interviewee...
made it clear when the opinions put forward were his or her own and not necessarily representing those of the company. No explicit attempts have been made to investigate this prior or during the interviews. It is difficult to say what the consequences would be for our conclusions if other members of the organisation, primarily the senior management, were to have opinions different from those put forward during the interviews. Hypothetically, a company with both life and non-life divisions could conclude that Solvency II is very beneficial for the life insurance business and therefore see a different set of effects for the company as a whole. The opinions put forward in the case studies should therefore mainly be considered valid for non-life insurance.

Very few of our potential interviewees said they were able to allow for more than an hour for an interview. With such a limited timeframe, entirely open-ended interviews are hard to perform. Yin (2003) rather suggests focused interviews that are open-ended in nature but follow the case study protocol more strictly. The aim here is often to verify study propositions rather than exploring a topic from scratch. When performing such research it is very important to avoid leading questions but instead ask them in an unbiased way. This was considered during the interviews, by focusing on the general questions first without making it too obvious which potential effects were to be discussed later on.

The case study protocol should not be confused with a survey questionnaire, even though they both have the purpose of collecting data. Yin (2003) points out four general sections in a case study protocol:

» An overview of the case study project
   This section should include background information about the study, i.e. why it is being conducted, stakeholders, etc. A short summary of the study is also important, to be used whenever someone needs to be briefed.

» Procedures or rules on how to present and conduct the case studies
   As opposed to questionnaires or laboratory experiments, case studies are performed in a setting less controlled by the researcher. Such an environment requires preparation for how to gain access to key stakeholders, a clear schedule for data collection activities and how to handle unexpected events, for example if an interviewee turns out to be less willing to cooperate than expected.

» Questions, including a structuring of potential answers
   Yin (2003) suggests that the questions should be directed towards the researcher rather than the interviewee, in order to rather function as reminders during the interview. We feel, however, that such an approach is impractical in focused multiple-case interviews. It is of great importance that the findings from individual cases are comparable with others, and the time constraints do not allow for too many broad, open-ended questions.

» A guide for the case study report
   This last part mainly focuses on how the results from case studies should be documented. If done properly, a guide will reduce the risk of having to revisit the case study site.

Yin (2003) and Eisenhardt (1989) agree that the set of questions is the core of the protocol. They should specify the subjects to be covered, the questions to be asked and the data required. Eisenhardt (1989) mentions the funnel model for deciding on what questions to ask and when to
ask them. This model starts with broad, open-ended questions and then narrows them down to ones that are more detailed, as can be seen in the interview protocol enclosed in Appendix B.

4.3.3 Prepare, Collect and Analyse
Interviews should be conducted with two major goals in mind, namely to (1) follow the set of questions in the protocol, and (2) ask the questions in an unbiased manner. For example, a “why” question is often perceived as criticising by the interviewee and should therefore be reformulated to a “how” question that appears more friendly and non-threatening. (Yin, 2003)

Collecting and analysing data may seem to be best separated in time, but Eisenhardt (1989) emphasises the importance of allowing the two to overlap. The reasons for this are an earlier start of the analysis as well as creating a flexible data collection. Questions can be added or removed from the protocol and the same goes for interviewees, the goal being to investigate each case as thoroughly as possible rather than producing summary statistics. We did make sure, however, to have well-grounded reasons for making such alterations.

Conducting the case studies
In chapter 1.5 we decomposed the study’s purpose into two research questions. These questions were the guiding-star and used to form hypotheses which were then discussed in an openly fashion during the interviews. If a hypothesis was found to be incorrect, it was dropped or modified accordingly. At the end of the case study interviews a rather stable set of hypotheses had been developed, and even though the interviewees did not all give the same answer it should be clear that these were relevant questions to ask. Please see Figure 19.
All interviews were conducted by both authors, since multiple investigators enhance the creative potential of the study as well as the confidence in the findings and the possibility to discover unexpected findings (Eisenhardt, 1989). This was of great help during the analysis phase, since both authors were familiar with all cases. The drawback is of course that we could potentially have conducted more case studies using one interviewer instead of two. However, we still feel that none of the particularly interesting cases has been discarded due to the chosen interview setup with two investigators.

**Writing case reports**

Instead of recording the interview and then transcribing it, the protocol was written during the actual interviews. Even though the exact words of the interviewee could not always be entered, we considered our typing swift enough for easily capturing everything that was said.

Every case study resulted in a small report, or a *write-up* as Eisenhardt (1989) prefers to call it. Eisenhardt also says that these write-ups should be mostly descriptive but as detailed as possible. The idea is to become as familiar as possible with each case in order to facilitate cross-case
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comparison. Analysing the results is also important, since the findings must be considered in coming case studies, according to the replication logic described earlier. It is also important to realise as early as possible whether the interviewee needs to be contacted for follow-up questions.

After every interview, the write-up was sent to the interviewee for correction of any factual errors. None of these reviews led to important findings being revised.

4.3.4 Analyse and Conclude

Following the analysis of individual cases is the cross-case analysis. Eisenhardt (1989) and Yin (2003) both emphasise this part as the most important albeit difficult one in case study research. Yin (2003) points out five general strategies for analysing data, of which cross-case synthesis applies well to our multiple-case study. Lekvall & Wahlbin (2001) stress the importance of not interpreting cross-case synthesis as a search for "quasi-statistical findings" without considering the cases in their entirety. For example, using the argument “two of four interviewees mention reinsurance as a possible effect of Solvency II” as evidence without considering how it was mentioned and in what context would be an example of improper cross-case synthesis.

Eisenhardt (1989) speaks of a frame emerging from the different cases; an iterative process where individual case data is analysed and compared in order to establish a theory that fits with the case data. Our frame of reference provides the basis for knowing what to look for in the case studies, but these constructs were redefined and sharpened during the analysis phase, for example the model regarding potential effects of Solvency II created in section 3.3.5.

Where possible, the case study findings were compared to existing literature in order to increase internal validity (see below). For example, it is important that our model of what constitutes an insurance premium apply to the real world. If there are discrepancies, the theory may need to be modified. According to Eisenhardt (1989), such a modification is important for reaching credible conclusions, but it is also an opportunity, which can result in new insights and unexpected findings.

Finally, one needs to reach closure. Eisenhardt (1989) uses the term theoretical saturation, i.e. “the point at which incremental learning is minimal because the researchers are observing phenomena seen before”. We kept this concept in mind during the analysis phase.

4.4 Validity and reliability

Having a well-defined research design in place allows for a better discussion around the study’s validity and reliability. Yin (2003) speaks of four areas that should be considered in a case study, namely construct validity, internal validity, external validity and reliability:

» Construct validity is about having a clear picture beforehand of what actually drives the factors that one decides to investigate further. For example, what is actually meant by Solvency II’s impact on insurance pricing – what parts of the premium are concerned, and how? In order to ensure construct validity, we have used multiple sources of evidence, e.g. insurance companies, regulators and consultants.

» Internal validity aims to ensure that the relationships established in an explanatory study are valid, meaning that all relevant factors have been treated properly. In a broader sense,
internal validity addresses the problem of making inferences, i.e. concluding – based on one or several case studies – that a particular event resulted from some previous occurrence.

» **External validity** is concerned with generalising the findings of a study. When using a case study approach, generalisability is not achieved in the same way as when doing a survey where statistical theory ensures that the results can be applied to a larger sample. It is rather about allowing the study to be replicated in another environment, thereby testing the theory (Voss, Tsikriktsis & Frohlich, 2002). This is the same replication logic as described in the previous chapter, although in the context of a new study rather than a new case. The fact that we used a multiple-case approach helped to ensure external validity.

» **Reliability** means that if the same study were to be carried out again, one would obtain the same results. Even though we performed our case studies in a carefully prepared manner, we also allowed the interviews to be open-ended, in order to have more of a discussion rather than an interrogation. This surely affected the reliability of the study, but we felt that such an interview approach was necessary due to the newness of the subject, both to the authors and in general.
5 Case Studies

Having established a research methodology and a frame of reference, a set of hypotheses was identified and tested through a series of case studies with representatives of Swedish insurance companies, Finansinspektionen and other relevant organisations. In order to facilitate for the reader, each case study report ends with a summary of major findings from that particular case. These findings are then used in the next chapter – the analysis.

Even though the premises for the interviews were quite different, the case study reports follow a common structure based on the study’s research questions.

First is an introduction of the interviewee and the organisations he or she works in, followed by a general discussion about risk management and initiatives herein such as ERM and DFA. Some of the interviews, however, started with a discussion of the nature of the Swedish insurance industry. Then follows a Solvency II-specific discussion focusing on recent developments, other important initiatives such as the traffic light system as well as parallels to Basel II. Furthermore, the potential benefits of Solvency II and improved risk management were addressed according to the four main areas identified in our frame of reference: capital requirements, reinsurance, credit ratings and insurance pricing.

Case 5.5, the interview with Mårten Ajne, brought the attention to another perspective on Solvency II, namely that of its very existence, its raison d’être. He pointed out five reasons why Solvency II could fail to fulfil the high expectations. This interview was conducted before the last round of interviews with the insurance companies and added several interesting hypotheses to the study.
5.1 Bengt von Bahr & Katarina Höller, Finansinspektionen

Finansinspektionen (the Swedish Financial Supervisory Authority), is a public authority responsible for promoting stability and efficiency in the financial system as well as for ensuring an effective consumer protection. It authorises, supervises and monitors all companies operating in Swedish financial markets, including insurance companies.

Bengt von Bahr (BvB) works as an actuary and Katarina Höller (KH) as a risk analyst at Finansinspektionen. They both follow the developments of Solvency II and they are highly involved in the Swedish transitional framework the traffic light system.

This interview was conducted at an early stage of the research, even before the method and frame of reference were completed. Thus, it does not follow the same structure as the later interviews but still provides important insights on the interviewees’ view of Solvency II and the traffic light system.

5.1.1 Solvency II

It is obvious that Solvency II will involve a lot of work for Finansinspektionen, in particular concerning internal models. Finansinspektionen expects to be able to continue building on the experience from Basel II when dealing with Solvency II compliance (please refer to the interview with Karin Lundberg in section 5.2 for further information).

The level of interest for Solvency II differs greatly among insurance companies today. Some have designated groups working actively with Solvency II issues, but the progress often depends on a few real enthusiasts. BvB and KH expect the risk manager’s role to be increasingly important in bringing actuaries and asset/investment management together. They emphasise DFA models (ALM models for life insurance) as a very important means for providing a complete and accurate picture of an insurance company’s risks. Insurance companies today believe that 1–2 years of system development will be needed for compliance, where data quality and traceability are expected to be the two major issues. BvB and KH both have regular discussions with insurance company representatives regarding supervision-related issues and can thus be considered reasonably well informed about these developments.

Even though internal models are far more complicated to implement and evaluate, Finansinspektionen and other regulators support the idea of providing incentives to insurance companies for using internal models, mainly by lowering the Solvency Capital Requirement (SCR). The reason for this is that a standard approach will only provide a stereotype picture of an insurance company. BvB’s guess is that every large company will invest in an internal model, whereas smaller companies will not have the resources to develop and maintain such an advanced model. BvB and KH believe, however, that a standard approach will imply a larger market than the one for internal models, since every insurance company will have to calculate a best estimate and explain it to regulatory authorities. However, it is difficult to speculate before the details of the draft of the regulations are released on July 1st 2007.

BvB and KH then describe the traffic light system, a template-based supervisory tool developed by Finansinspektionen, which essentially is based on the same principles as Solvency II. A standard approach in Solvency II will most likely turn out as the traffic light system with a rating-
based capital requirement. Essentially, an insurance company either gets a red light, meaning that action will be taken by regulatory authorities, or a green light, meaning that no action is needed. However, a red light does not necessarily mean that something is wrong – Finansinspektionen rather wants to know why the company receives a red light. In the end, Finansinspektionen might require an action plan from the insurance company.

The traffic light system has been implemented in Swedish life insurance companies during 2006 and it is planned to come into effect for non-life insurance companies from January 1st 2007. So far, mostly the United Kingdom, Denmark, the Netherlands and Switzerland have been considered leaders in working with the kind of qualitative supervision that Solvency II is aiming for, but Finansinspektionen expects the traffic light system to help Sweden come in par with these countries.

5.1.2 Case highlights

» Finansinspektionen will rely on Basel II experience for Solvency II regulatory activities.

» Large insurance companies are expected to develop an internal model.

» There will be incentives for developing an internal model, mainly a lower solvency capital requirement (SCR).

» Some Swedish insurance companies have come quite far in their Solvency II projects, while others lag behind quite badly.

» DFA models will be a very important means for obtaining a complete view of a company’s risk situation.

» A standard approach in Solvency II will essentially be equal to the Swedish traffic light system, with the addition of a rating-based capital requirement.

» Data quality and traceability are expected to be major issues.
5.2 Karin Lundberg, Finansinspektionen

As described earlier, Solvency II is largely inspired by the Basel II accord for the international bank industry. Solvency II has therefore been referred to as "Basel II for the insurance industry" by some, while others do not approve of such a direct parallel. Clearly, there are many things to learn from the Basel II developments when trying to determine what will happen in regards to Solvency II. It is also important to highlight the areas where Solvency II can be expected as well as not expected to follow the same path as Basel II.

Karin Lundberg (KL) works at Finansinspektionen with a strong focus on Basel II, in particular internal models. This interview will focus on the similarities and differences between Basel II and Solvency II, as well as the expectations and outcomes of the two regulations. Due to the nature of this interview, the structure of the case study report differs from the others.

5.2.1 Basel II

In general, the banks have been very positive towards the basic ideas of Basel II. The goal has been to meet Basel II deadlines and to allocate the resources necessary for carrying out relevant projects. These investments – often major ones – have gained approval partly due to the strong business case that Basel II can provide. Studies have shown that Basel II can potentially free very large amounts of capital, which in itself has been enough to convince many banks.

Few of the banks realised the efforts Basel II would require. Different banks have had various levels of insight, but it was not until 1–2 years ago that they realised the size of the investments. Many banks have had risk classification systems for quite some time, which led them to believe that these systems were enough for Basel II compliance. However, this was not the case since the existing systems did not quantify risks in a sufficiently stringent manner. Some banks have appointed full-time employees responsible for structuring the documentation in the applications to Finansinspektionen. This has facilitated both parties’ work considerably.

Basel II has involved a lot of work for Finansinspektionen but consultants have not been used so far. This is partly due to their perceived lack of knowledge for evaluating internal models from the supervisor’s perspective, and partly because they may be somewhat biased from assisting the applicant or the applicant’s close competitors in developing internal models. Still, the existence and quality of data has been the major problem, as well as making senior management understand the magnitude of what needs to be done. Data quality is difficult for Finansinspektionen to evaluate, since such a review requires IT-related rather than statistical knowledge. The inspectors have relied on discussions with IT managers.

As regards to the internal capital adequacy assessment in Pillar 2, some larger banks have developed Economic Capital\(^{17}\) models, which are more easily evaluated by authorities. Smaller banks do not have such models, which forces Finansinspektionen to focus more on rather basic discussions on process improvements. It is, on the other hand, difficult for Finansinspektionen to demand that banks develop Economic Capital models, since there might other models just as

\(^{17}\) Economic capital is closely related to regulatory capital requirement (in Basel II or Solvency II); in both cases, the aim is to ensure that the company avoids becoming insolvent, but economic capital is something that financial institution themselves decide to focus on.
suitable. In any case, Finansinspektionen wishes to determine whether the bank has an enterprise-wide focus on risk management.

KL says that being a first-mover in terms of developing cutting-edge internal models has its advantages as well as its disadvantages. There has been a tendency that pioneering banks developed advanced models that today are surpassed by other banks who simply learned from the mistakes of first-movers. KL also points out that it can be more expensive to make changes to an existing system than to build an entirely new system. The problem is that these systems are essentially part of the banks’ core business and used by the front office in their customer relations.

**Pillar 1 compliance**

The first phase of the Pillar 1 work is practically complete after 1½ years of efforts. Finansinspektionen has mainly focused on ensuring that the banks’ processes are appropriate for reaching compliance. None of the banks met all the demands during Finansinspektionen’s evaluations. In Sweden, four large and four mid-size banks so far have applied for using the Internal Rating Based approach. This approach is particularly important for large banks due to the potential implication on their credit rating.

The assumptions made by each bank have a significant impact on the capital requirement. Finansinspektionen cannot allow extraordinarily high or low capital requirements that could offset competition among banks. Due to the somewhat unclear Basel II directives, KL points out that finding balance between, on one hand, that the banks should be allowed to use their own internal models and, on the other hand, ensuring a level playing field from a competitive perspective, is the most complicated problem facing Finansinspektionen.

**Pillar 2 compliance**

As for Pillar 2 in Basel II, KL points out that Finansinspektionen has focused on establishing a discussion with the banks rather than on formal regulatory demands. Even though the work with Basel II has come quite far, it is still a process that will span over several years; one cannot expect everything to change on February 1st 2007.

Finansinspektionen has conducted a pilot survey among Swedish banks, indicating that evaluating Pillar 2 compliance will be very different between large and smaller banks. The reason is quite simple – smaller banks use less sophisticated models. The Pillar 2 guidelines are so far quite open which implies that mainly qualitative evaluations can be carried out. The important thing today is to establish a dialogue around Pillar 2 together with the banks involved.

**5.2.2 Solvency II**

KL agrees that Solvency II supervision will be carried out in a similar manner as with Basel II. However, there are some differences, for example, that assumptions for internal models in Solvency II appear to be more loosely defined. This makes it harder for Finansinspektionen to evaluate the correctness of different models. KL also believes that the guidelines for internal models will be set so that it will be on average beneficiary to develop an internal model instead of using the standardised ones.
5.2.3 Case highlights

» The banks have been positive towards Basel II.

» Due to the potentially major reductions of capital levels, Basel II provides a strong business case to justify necessary investments.

» Few banks realised the effort Basel II would require. Many falsely believed that their existing systems would be sufficient in order to reach compliance.

» Even though Basel II has implied a significant workload for Finansinspektionen, consultants have not been used due to the lack of personnel with both sufficient knowledge and no bias towards the bank being investigated.

» The availability of high quality data is the biggest obstacle for banks, along with convincing senior management that Basel II is important enough to justify significant investments.

» Being a first-mover among banks in complying with Basel II has had both advantages and disadvantages.

» Finansinspektionen needed 1½ years for controlling Pillar 1 requirements, and none of the banks involved met all the demands from the beginning.

» The most complicated problem facing Finansinspektionen is finding balance between, on one hand, that the banks should be allowed to use their own internal models and, on the other hand, ensuring a level playing field from a competitive perspective.

» Solvency II supervision will be carried out similarly to that of Basel II, but it seems as though the assumptions for internal models in Solvency II are more loosely defined, making supervision more complicated.
5.3 Arne Sandström, Försäkringsförbundet

Försäkringsförbundet (the Swedish Insurance Federation) is the trade organisation for Swedish insurance companies. Its members account for more than 95 percent of the Swedish insurance market and include all the insurance companies interviewed during the case study phase. Among other things, Försäkringsförbundet has established a set of guiding principles for the Swedish insurance market.

Arne Sandström (AS) is the chief actuary at Försäkringsförbundet and involved in the Solvency II working groups on a European level. He has also written one of the few books on the subject of solvency regulations.

5.3.1 The Swedish insurance industry

AS says that mutual companies have a somewhat different view from public limited companies; the collective view is more natural when the policyholders own the company itself, as is the case with Länsförsäkringar and Folksam. Mutual companies are largely run in the same way as public limited companies such as If Skadeförsäkring and Codan/Trygg-Hansa. There are some organisational differences, as well as the fact that profits in mutual companies are given to the insured rather than to stockholders.

5.3.2 Solvency II

The solvency demands that are used in practice today are somewhat off track since a more prudent estimate of liabilities is punished with a higher solvency margin rather than the other way around. Swedish insurance companies have therefore shown a positive attitude towards improving risk management.

A survey performed by CEA (the European Insurance and Reinsurance Federation), with 440 participating companies, indicated that there is a risk awareness today which is likely to increase as Solvency II progresses. As for the use of internal models, no clear trends can be seen except for the fact that some large companies implement them and others do not, while smaller companies have a wait-and-see mentality. These smaller companies would most likely benefit from sound Solvency II compliance due to the better understanding of risks as well as increased transparency and rigidity in processes, but at the same time, they find it hard to set aside the resources needed.

Participating in the Quantitative Impact Studies is important, AS says, since they prepare the companies for the coming Solvency II framework. Before Solvency II goes final, there will also be some intermediary partial frameworks such as the traffic light system introduced in Sweden by Finansinspektionen. AS therefore believes that these companies will have a clear advantage, over those who decided not to participate, in complying with Trafikljuset and the coming Reformed Solvency System, issued by Finansdepartementet, which will come into force by 2008. It is somewhat unclear, however, whether the final Solvency II regulations will be ready by 2009–10; AS says it might take until 2012–13. In such a case, the Reformed Solvency System in Sweden will provide a good intermediary until the EU regulations are finalised.

The greatest challenges for insurance companies are, as AS sees it, similar to Basel II, i.e. ensuring sufficient data quality and traceability in all systems. He believes Swedish insurance companies are well aware of these problems and that they have started to address them. Another important
issue is to involve senior management and convince them to set aside enough resources, since internal models could be very expensive.

5.3.3 Potential effects
Solvency II uses new methods for calculating a best estimate of liabilities, which results in a lower capital requirement. The solvency margin is expected to be higher, but this increase will not offset the decrease entirely. The exact effect cannot be determined today, however, since it very much depends on the guidelines provided in the final framework.

AS says that the perhaps most important effect from Solvency II is that it highlights the importance of risk management in insurance companies; Solvency II becomes a means for better understanding of the business. Risk management needs to be made a senior management issue, and some companies are on their way to do so by appointing a Chief Risk Officer who reports directly to the CEO. A similar trend has been seen in Switzerland, a leading country in terms of insurance industry regulation. Operational risks, for example, has previously not been a big issue for insurance companies, but this is about to change. For example, 16 insurance companies – fifteen in the UK and one in Australia have created, together with SAS Institute, a database for measuring and analysing operational risks.

5.3.4 Case highlights

» Smaller companies can probably improve their risk management more than large companies can through Solvency II compliance.

» The major challenges regarding Solvency II are data quality and traceability as well as getting management support for the investments needed.

» The capital requirement, i.e. the Solvency capital level, as indicated in Figure 13, is expected to become lower under Solvency II.

» Solvency II highlights risk management and puts it on the agenda of senior management.
5.4 Erik Elvers, Finansinspektionen

It was on Arne Sandström’s advice that Erik Elvers (EE) at Finansinspektionen was contacted. EE has a great deal of experience from actuarial pricing in the Swedish non-life insurance industry and he was involved in a Solvency II working group regarding non-life Pillar 1 requirements.

This interview was dedicated entirely to discussing the potential effects from Solvency II on insurance pricing, the reason being that the study had risk-based insurance pricing as its main theme at the time. However, these findings are important in realising where Solvency II does not contribute to significant improvements.

5.4.1 The Swedish insurance industry

On our question about a potential difference between mutual and public limited companies, EE says that mutual companies are not profit-driven in the same way. Rather, they are driven by the human need for insurance. However, this conceptual difference does not affect pricing decisions, according to EE, since an undifferentiated pricing policy would attract unprofitable customers and repel the profitable ones according to the principles of adverse selection, analogous to what we described in chapter 2.2.1 about differential pricing.

EE mentions a situation from the late 1960s when Saab turned to Skandia, a large non-life insurance company at the time. Saab wanted Skandia to develop Saab-specific liability insurance for motor vehicles, in order to compete with main competitor Volvo’s own insurance solution “Volvia”. Saab insisted that the insurance should not take into account the no-claims bonus used by other insurers. This bonus is determined by the number of years without damage claims from the insured. The decision led to young, inexperienced Saab owners buying the new insurance, which, in turn, left Saab and Skandia with an unusual high level of claims. This is a clear example of adverse selection resulting from inadequate insurance pricing.

5.4.2 Potential effects

EE makes a very important point in that the improved risk management resulting from Solvency II would most likely not affect the level of differentiation in insurance pricing that can be obtained. Solvency II addresses insurance, market, credit and operational risks on an aggregate, company-wide level, whereas insurance pricing focuses on the characteristics of individual policyholders. The greatest problem for actuaries if they wish to improve risk-based price differentiation is finding more data and constructing models to analyse it.

The question is why insurance companies should not be able to reap the same benefits in terms of improved pricing, as was the case for banks with Basel II. According to EE, there are two major reasons for this. First, premium pricing is the very core business for insurance companies, while the same cannot be said for product pricing in banks, implying that the potential for improving pricing is greater in the bank industry. Second, the financial flows are different in the two cases. Banks both lend money to and borrow money from their customers, while non-life insurance companies charge a premium from the customer in order to compensate for possible future payments. Basel II calls for a better matching of assets and liabilities, allowing for a better matching of the lending and borrowing associated to a specific bank customer. In the end, the bank can focus pricing on customers rather than products. Therefore, this parallel between Solvency II and Basel II simply does not hold.
5.4.3 Case highlights

» Solvency II cannot be expected to result in improved differential pricing, i.e. estimating the expected claims cost of the insurance premium.

» Even though banks have been able to improve their pricing due to Basel II, the same effect does not hold for Solvency II.

- Insurance companies have always had risk-based pricing as their core business, while the same cannot be said for banks.

- The financial flow between banks and their customers involve both lending and borrowing, and the better matching of assets and liabilities resulting from Basel II can be directly applied to the pricing related to individual customers. This is not the case in insurance companies.
5.5 Mårten Ajne, Global Associated Actuaries

Mårten Ajne (MA) works as an actuary consultant at GAA Global Associated Actuaries AB. He was previously employed by Codan/Trygg-Hansa whose life-insurance business was acquired by SEB. Today, he is still the appointed actuary for one of the life subsidiaries, Gamla Livförsäkringsaktiebolaget SEB Trygg Liv. He was also the investigator appointed by the Swedish Government in preparing the report “Principles for a modernised solvency system for insurance companies”, SOU 2003:84, in 2003.

The initial focus of this interview was to discuss potential effects from Solvency II with someone knowledgeable in the field but without personal interest in these matters. However, the discussions took a different turn and instead concerned valid justification for Solvency II’s existence, its raison d’être.

5.5.1 The raison d’être of Solvency II

When starting the discussion about Solvency II, MA questions whether the new regulations will ever be completed. This comes as quite a surprise, but he points at several reasons why the entire effort could in fact fail.

First, MA says that Swedish non-life insurance companies simply do not need Solvency II. This is mainly because corporate clients, rating agencies and other non-governmental stakeholders have historically put enough pressure on the insurance companies in order to drive the necessary change already during the late 1990s. Initiatives such as Enterprise Risk Management have always been driven by potential benefits for the business, while technological progress has created new opportunities.

Secondly, the final deadline has been pushed twice – first from 2008 to 2010, and recently from 2010 to 2012 with some even saying that 2014 is more realistic. Considering that the idea of Solvency II was raised already in 1999, the project has already been going on for quite a long time without a definite end.

Thirdly, the member countries of the European Union have very different views on the insurance industry; some are clearly market-oriented while others apply detailed regulation by local government. Moreover, the most influential members – mainly the United Kingdom, Germany and France – would never approve a set of regulations that implies obvious drawbacks for their own respective insurance industries.

Fourthly, there seems to be quite some uncertainty regarding important assumptions, which form the basis of Solvency II. MA, for example, has not yet seen – even when challenged – a clear definition of the “best estimate” requirement when valuing insurance obligations in the technical provisions, the very foundation in every assessment of an insurance enterprise. Other unclear areas include classification and definition of risk, for example the notoriously difficult operative risk, unknown probability distributions and risk metrics of these unknown distributions.

Fifthly, Solvency II should primarily protect the insurance customers against a situation where the insurance company cannot meet its obligations. However, as MA points out, Solvency II would
not have had any noticeable effect on the bankruptcies or other crises, which have happened to
insurance companies in the EU.

What will then happen to Solvency II? MA points out that working towards a more sophisticated
and accurate risk management is desirable in itself, but that Solvency II in the end will not be
necessary to achieve it. Therefore, MA believes that Solvency II might end up being the least
common denominator of different member-state initiatives in the EU, for example, the traffic
light system in Sweden, thereby avoiding the embarrassment of what would be perceived as a
failure.

If all the five reasons above are correct, one might ask why the Solvency II project has not been
terminated already. MA’s explanation to this is simply that stakeholders involved have strong
incentives to continue working with Solvency II. Consulting firms and solution providers see
opportunities to provide products and services to insurance companies. Authorities such as
Försäkringsförbundet are given a great deal of responsibility and acknowledgement in a pan-
European project. Supervisors such as Finansinspektionen are judged by the number of
bankruptcies, indicating that they would welcome an increased mandate, thereby becoming a
regulator rather than a supervisor. The insurance industry finds an opportunity to protect their
market position through higher barriers of entry, such as increased capital or system
requirements. Finally, terminating Solvency II would obviously be a failure for the EU
commission itself, defining a decade of efforts wasted and creating redundancies.

Every stakeholder has something to win from Solvency II, in particular if the insurance
companies decide to develop and implement internal models. At the same time, some have a lot
to lose if it were to be terminated. Therefore, even if Solvency II fails to show real progress in the
coming years, it is likely to carry on for quite some time before any of the decision-makers
involved would consider slowing down the project.

5.5.2 Case highlights

» It is possible that Swedish non-life insurance companies do not need Solvency II to
  improve their risk management.

» The deadlines for Solvency II have been pushed several times, indicating that the whole
  project is somewhat off track.

» There is a chance that Solvency II may not happen or simply become the least common
denominator of different national regulations.

» There is no uniform definition of the best estimate of technical provisions.
5.6 Lars Jørgensen, Codan/Trygg-Hansa

Since 1999, Trygg-Hansa is fully owned by Danish insurance group Codan that, in its turn, is owned to 70 percent by UK-based Royal & SunAlliance, one of the world’s largest insurance groups.

Lars Jørgensen (LJ) is head of regulatory risk & compliance at Codan/Trygg-Hansa, which encompasses the Nordic and Baltic regions.

The interview with LJ was conducted towards the end of the study where most hypotheses had been formed and the questions asked followed the regular protocol. Nevertheless, an important perspective on regulations for large insurance groups was added.

5.6.1 Risk management

Even though supervisors in Denmark and Sweden require that insurance companies have a consistent risk management function, they say nothing of how to achieve it. LJ says that the main reason for Codan/Trygg-Hansa to invest in risk management is the return on these investments – simply put, sophisticated risk management is priorities because it is economically viable, not because of the demands from regulators and supervisors.

Nevertheless, LJ explains that a company can benefit from having a well thought-out compliance strategy. For example, the Danish regulations are much more detailed than Swedish ones regarding governance, while the opposite holds for risk management. Codan/Trygg-Hansa therefore tries to find a “best of breed” between Danish and Swedish regulations.

5.6.2 Solvency II

Codan/Trygg-Hansa, as well as Royal Sun Alliance as a whole, welcomes increasingly realistic regulatory demands through Solvency II, mainly in setting capital requirements. Today there are 25 people working part-time with Solvency II-related issues at Codan/Trygg-Hansa, structured into a steering committee and a working group. There is a similar working group at Royal Sun Alliance, and the two of them work very closely together.

Although LJ emphasises that Codan/Trygg-Hansa fully supports the Solvency II initiative, the company did not participate in the first two Quantitative Impact Studies, simply because there was not enough time. Royal Sun Alliance is listed on the New York Stock Exchange, which requires the whole group, including Codan/Trygg-Hansa, to comply with the Sarbanes Oxley regulations regarding accounting and reporting practices. No other insurance company in the Nordic region has had to do this, which explains why Codan/Trygg-Hansa chose not to participate. However, LJ affirms that Codan/Trygg-Hansa will participate in the third QIS.

It is decided that Codan/Trygg-Hansa will invest in an internal model for Solvency II. The two major reasons behind this decision are, firstly, an improved quantification and documentation of important risks and, secondly, a lower capital requirement by ensuring that the company will not be punished with a capital add-on in Solvency II.

LJ prefers not to reveal any details on the models used at Codan/Trygg-Hansa other than the fact that no DFA model is running today. There are, however, some plans and basic concepts for such
a model and Codan/Trygg-Hansa has a rather strong actuarial workforce of 25 people to assist in such an implementation.

When asked about data quality and traceability, LJ affirms that these problems are minor at Codan/Trygg-Hansa compared to other insurance companies. LJ previously worked at TrygVesta and describes their problems related to data quality and traceability as far greater than those experienced at Codan/Trygg-Hansa. The reason, LJ says, is that Codan/Trygg-Hansa has to use similar systems to Royal Sun Alliance in the United Kingdom where insurance regulation is stricter than in the Nordic region. According to discussions held in Denmark, LJ states that Codan/Trygg-Hansa are approximately two years ahead of other Nordic insurance companies in terms of data quality and traceability because of their work with other regulations.

5.6.3 Potential effects
Even though the capital requirements will increase in Solvency II, LJ says that the capital levels will remain unchanged in Codan/Trygg-Hansa. The Solvency I requirement is practically redundant; Finanstilsynet, the Danish supervisor, recommends capital levels of at least twice the Solvency I requirement, and QIS tests indicate that even three times the requirement is desirable.

Codan/Trygg-Hansa is well reinsured through a wide portfolio consisting of covers from most large reinsurers. LJ explains that the Solvency I regulations allow reinsurance to reduce solvency capital levels, but there are so called compensation levels which have not yet been set for Solvency II.

They current A rating of Codan/Trygg-Hansa is well enough, says LJ. He sees no reason to try to improve it, even though the risk management in place would probably qualify for a higher rating. The main barrier for a higher rating is the amount of capital – stepping up to AA would simply require too much capital for it to be economically viable.

When discussing internal models, LJ points out their potential effect on insurance pricing. Solvency capital implies a significant cost at Codan/Trygg-Hansa, which should ideally be distributed to insurance products according to the risk of each product. This is not done today at Codan/Trygg-Hansa, which is why LJ sees an internal model as an opportunity to achieve an accurate capital allocation.

5.6.4 The raison d’être of Solvency II
In practice, Solvency II will not impose any major changes to Codan/Trygg-Hansa due to the company’s well-run risk management division. LJ says, however, that not all insurance companies are as stable and that Solvency II could have significant implications for these companies. Even though the insurance industry is quite homogenous in Europe, the governments sometimes have different views on insurance. The regulations in Denmark and Sweden are already quite sophisticated. LJ therefore expects the effect of Solvency II to be more significant in southern and Eastern Europe.

LJ agrees that there are no clear instructions today for calculating the best estimate of technical provisions. If two fully competent actuaries are asked to provide a best estimate in the very same company, their answers will surely be different, LJ says, adding that this will always be the case –
the very core of insurance is uncertainty, and even if this uncertainty is transferred, it will not disappear.

Codan/Trygg-Hansa expects the Solvency II regulations to come into force by 2012, based on the opinion of Henrik Bjerre-Nielsen, LJ’s previous manager at Codan/Trygg-Hansa who is now the chairman of CEIOPS.

Solvency II will also help to prevent insurance bankruptcies by imposing higher requirements on risk management and demanding involvement from senior management. For example, LJ believes the bankruptcy of Danish insurance company Plus Forsikring – requested after Finanstilsynet discovering the company was insolvent – could have been avoided if Solvency II had been in place. Still, no regulation can prevent intentional mismanagement.

LJ adds one important aspect of Solvency II: the cost of supervision. It is very expensive, especially for a company such as Royal Sun Alliance, to pay for supervisory review in every single country where it operates. LJ therefore hopes that a coherent framework such as Solvency II will allow one single review to take place for the whole group, which would then save a lot of money.

5.6.5 Case highlights

» Business value is the primary objective of risk management while regulatory compliance is second.

» Codan/Trygg-Hansa will use an internal model for Solvency II

» Codan/Trygg-Hansa does not have a running DFA model today.

» Lower capital requirements and improved risk management are the major reasons for Codan/Trygg-Hansa to choose an internal model

» Codan/Trygg-Hansa fully supports the Solvency II initiative and the way towards a uniform supervision within the EU. They expect this will simplify and reduce costs for compliance for a multinational company like theirs. At present, these costs are significant.

» Codan/Trygg-Hansa perceives itself as well prepared for Solvency II after working with other regulations such as Sarbanes Oxley.

» Data quality and traceability provides a minor problem to Codan/Trygg-Hansa because they have had to comply with stricter regulations from the UK due to their relationship with Royal & SunAlliance.

» Codan/Trygg-Hansa does not expect Solvency II to have any effect on their capital levels.

» For Codan/Trygg-Hansa, it is hard to improve the credit rating from A to AA simply by better risk management. A lot more capital is also needed.

» Codan/Trygg-Hansa views an internal model as an opportunity to achieve a more risk-based capital allocation.

» Codan/Trygg-Hansa is uncertain of the effects of Solvency II on reinsurance.
5.7 Jesper Andersson, Folksam

Jesper Andersson (JA) has worked as an actuary at Folksam for six years, after completion of his studies in mathematics and computer science at Stockholm University. Today he is one of the employees most involved with Solvency II at Folksam.

The interview with JA was conducted towards the end of the study where most hypotheses had been formed and the questions asked followed the regular protocol.

5.7.1 Risk management

Risk management at Folksam is dominated by the asset side of the balance sheet, i.e. capital management. JA believes this is the case for most non-life insurance companies, mainly because senior management understands asset risks, such as fluctuation in stock prices, whereas insurance risks are not as easily explained. This situation is not likely to change due to Solvency II, or in the traffic light system, especially for Folksam with its large life insurance business where capital management plays a very central role.

Folksam does not work actively with Enterprise Risk Management today, even though the need for such initiatives might very well increase in the future, partly since Solvency II emphasises a similar enterprise-wide perspective on risk. Still, ERM is “extremely” difficult, according to JA. He does not give the current mathematical models for ERM much credit, simply because the reality is much more complicated. He has not yet heard of a truly successful ERM implementation, but still feels that there is a potential and that Folksam should look more seriously into the potential benefits of ERM.

5.7.2 Solvency II developments

Folksam has had a wait-and-see approach to Solvency II rather than taking an active role in the process, even though the activity has increased since the founding of a Solvency II working group during the autumn of 2006. The group consists of the Economic Director, several actuaries, the accountant, and representatives from capital management and some subsidiary companies. Before the working group existed, JA followed the developments of Solvency II for the last three to four years, having informal discussions with his colleagues when considered necessary.

Folksam has not participated in the two first Quantitative Impact Studies, even though some calculations have been run. Some of JA’s colleagues have attended seminars with other European mutual insurance companies, but they have not been seen as very rewarding. However, JA says that Folksam is considering joining the QIS3, but he also points out that Finansinspektionen has a tendency to always demand full participation and detailed feedback, although it might not always be necessary. JA says that Folksam could limit the QIS-related tests to some insurance branches or subsidiary companies.

On the question whether Folksam plans to use a standard or an internal model for Solvency II, JA is somewhat uncertain. Folksam is a small company compared to some of the German, British and Swiss giants, and JA says that internal models are mainly of interest for these companies. Even though Folksam might very well start developing an internal model, JA believes, it could not be implemented before 2012. There is a wait-and-see approach here too, since there is nothing to compare with – what are the real benefits of an internal model compared to a standard
approach? JA points out that if a standard approach would turn out unfavourable to Folksam’s business – as a worst case, that using it, Folksam were considered insolvent – then the situation would of course be different. This would force Folksam to develop an internal model of some sort, but as long as the details regarding this issue are still unknown, the question will not receive much attention at Folksam.

As for DFA, JA is not very impressed so far; he first came across the concept in 1989, and according to him, nothing major has happened since. He considers it too complex and demanding a lot of work to make the model fit into the organisation. DFA might work better for a less complicated insurance business than that of Folksam, with reinsurance, labour union contracts, and so on. Still, he sees DFA as the only viable option for an internal model in Solvency II.

Data quality and traceability does not appear to be a big problem at Folksam, according to JA, since internal audit already puts enough pressure on the company to deal with these issues. When modelling future insurance claims, there needs to be a visible trail to where the data come from. JA believes that the data needed for the traffic light system or a Solvency II standard approach already exist, even though some data might need to be slightly restructured.

As for insurance regulation other than Solvency II, the current focus is the International Financial Reporting Standards, IFRS, even though these are not as urgent for mutual companies as they are for public listed ones. IFRS can be considered quite closely related to Solvency II since there are demands for increased reporting related to risk management. The consequences from IFRS can most easily be seen in the annual report; If Skadeförsäkring, currently complying with IFRS, has a ten-page description of risk management for their non-life insurance business, while Folksam, not currently complying with IFRS, has less than one-and-a-half page for their non-life and life insurance businesses. Another important set of regulations is the traffic light system, but so far it has only concerned life insurance.

### 5.7.3 Possible effects

Folksam has a relatively low solvency ratio today; a guarantee loan from the life business has saved the non-life business from not being able to meet the current requirements. JA describes Folksam’s amount of capital to be near the current requirement, but the Solvency I regulations are unfavourable to Folksam since they do not consider asset types or diversification effects. Folksam keeps a high level of low-risk assets as well as a well-diversified insurance portfolio, which is why the traffic light system and, eventually, Solvency II will surely be an improvement.

Folksam keeps a high level of non-proportional reinsurance to protect mainly against catastrophes. As for the potential impact of Solvency II on reinsurance, JA points out that the regulations are somewhat unclear on this issue, but that the expected impact is low. This is mainly due to the “standard” nature of Folksam’s reinsurance contracts, so JA believes that the impact on insurance companies with non-standard contracts, for example Länsförsäkringar and If Skadeförsäkring, could be more noticeable. Still, reinsurance companies and, especially, reinsurance brokers such as Guy Carpenter and Benfield are very enthusiastic about Solvency II; the latter ones are of course interested in selling models and advisory services.
Having a BBBpi rating from Standard & Poor’s (the “pi” stands for “based on public information”), Folksam stands out as the only large Swedish non-life insurance company without an A rating. Being a mutual company with few or no big, industrial clients, Folksam does not give much attention to credit ratings.

Today, the solvency capital held by Folksam is not a cost that is allocated. Neither is the reinsurance, but it is a relatively small cost and can be more easily associated with different insurance products. Solvency capital, on the other hand, represents a major cost and JA therefore feels that Folksam could find ways to allocate it.

5.7.4 The raison d’être of Solvency II

In reality, the Swedish insurance industry does not really need Solvency II, JA says, while his experience from the rest of the European market is too little in order to give an opinion. There is no real need for the improvements suggested by Solvency II; so far, investments in improved risk management have not been driven by regulation but rather by uncertainties in the financial markets.

JA appreciates that Solvency II puts focus on risk-related competence, something that is clearly advantageous to actuaries. There might be a need to hire more people with a deep understanding of risks. Still, he is personally quite doubtful towards Solvency II; he sees a blind faith in what the models in Solvency II will be able to achieve in the end. The efforts so far seem promising, but in order to make Solvency II useful to insurance companies there will have to be simplifications. Despite such simplifications, the models will clearly be better than the percentage-based models of today, but the question is how far Solvency II can reach in the end.

Solvency II could facilitate supervision for international insurance companies, since the need for country-specific supervision is expected to decrease. This could potentially lead to these large companies more easily establishing themselves on the Swedish market, due to its oligopoly situation and high profit levels. For a company such as Folksam, having no plans of international expansion, this is clearly a threat rather than an opportunity resulting from Solvency II.

JA sees both positive and negative aspects in more centralised regulation and supervision. There are significant differences between insurance markets in Europe; for example, the scope of third-party liability insurance, i.e. car insurance, is very different in Sweden compared to Finland. Therefore, JA doubts that large international insurance companies will be able to reduce their need for supervision. At the same time, giving more responsibility to local supervisors would put a lot of pressure on these authorities to have enough and accurate competence in-house.

JA believes in 2012–2013 as a likely start for Solvency II implementation. His general view is that the project will surely turn out interesting, but that the real contributions or effects will be minor. Therefore, JA says, it is better to wait and see what happens. The main problem with Solvency II is the lack of clear incentives. When he speaks with other employees at Folksam, they mostly consider Solvency II a burden that will imply an increased workload. Basel II, with its reduced capital levels, had a strong business case to convince senior management and shareholders. Even though the Solvency I regulations need improvements, Solvency II still lacks such a strong business case.
Calculating the best estimate of technical provisions constitutes a major problem for Solvency II due to the various assumptions that have to be made. First, future claims need to be estimated based on historical claims. These need to be adjusted for inflation, regulatory changes, new insurable damages or injuries, and other factors involving significant uncertainty. Establishing an altogether unbiased mathematical model is therefore impossible. Even though Solvency II can establish guidelines for discount rates, inflation assumptions and similar factors, but these have a relatively small impact on the final result.

There are a couple of bankruptcies among reinsurance companies, such as Folksam International, but JA cannot see how Solvency II would have prevented any of the mismanagement that caused the bankruptcies. The same goes for the Swedish insurance company Salus Ansvar that bankrupted in 2002. The financial crisis in the early 1990s was a hard blow for Swedish insurance companies because of their extensive credit insurance contracts. Both Codan/Trygg-Hansa and If Skadeförsäkring had such insurance products in subsidiaries, which were put into bankruptcy. Still, Solvency II would not have prevented this since the underlying cause was a crisis in the credit market.

5.7.5 Case highlights

» So far, Folksam has no ERM initiatives.

» Folksam has had a wait-and-see approach to Solvency II so far and has not participated in the quantitative impact studies.

» Folksam has not yet decided whether a standard approach or an internal model will be used.

» Folksam does not currently work with DFA but believes it is necessary for a Solvency II internal model.

» Folksam expects that the capital requirement under Solvency II will be lower than with current standards.

» Folksam does not regard regulatory capital as a cost but believes that doing so might be beneficial.

» Folksam does not regard data quality and traceability as major issues.

» Folksam is unsure of the impact Solvency II will have on its reinsurance coverage.

» The credit rating is not particularly important to Folksam.
5.8 Claes Thimrén, Länsförsäkringar

The non-life division of Länsförsäkringar is the largest one in Sweden with a market share of 30 percent. Claes Thimrén (CT) works as risk manager in Länsförsäkringar’s management team. Before joining Länsförsäkringar, he graduated from Stockholm School of Economics and worked for Nordea, the Ministry of Finance and Handelsbanken.

CT was interviewed twice, since the first interview took place before the final report structure was in place, whereas the second one was conducted towards the end of the empirical phase. This case study report is a synthesis of the two interviews.

5.8.1 Risk management

Qualitative issues of risk management have received more attention at Länsförsäkringar, which is partly connected to Finansinspektionen’s report “General Guidelines Regarding Governance and Control of Financial Undertakings” published in 2005. The essence of this report is that all financial institutions should have a central function for risk control, which reports to the board and senior management. CT concludes that this has often not been the case; instead, different risks have been considered separately rather than weighted together.

It should be pointed out, however, CT says, that ERM is more than this. Standard & Poor’s now include qualitative and organisational aspects of ERM in their rating process, meaning that not only the model affects the rating. ERM is now one of the 7-8 main criteria influencing the rating. CT believes that Länsförsäkringar will work more and more consistently with ERM, partly driven by Solvency II.

In general, new projects in risk management are initiated internally, rather than because of outside pressure from regulators, supervisors or rating agencies. The ALM model for Länsförsäkringar’s life insurance business is one example, with the initiative coming from senior management.

For the last two years, a first version of a DFA-based internal model for non-life insurance has been developed. The use of the DFA model is so far limited to calculating a total risk for Länsförsäkringar as well as investment optimisation. Lack of data also acted as a constraint on how the model could be used.

5.8.2 Solvency II

There is no specific Solvency II project at Länsförsäkringar, but rather a group formed in early 2006 consisting of nine persons with different competences who discuss specific Solvency II-related issues. Länsförsäkringar has participated in Quantitative Impact Studies 1 and 2, and plans to participate in QIS3; generally, one tries to follow the Solvency II developments as closely as possible. Still, though, Solvency II cannot be said to be on the management agenda of Länsförsäkringar today. If one were to ask for the regional managers’ opinion of Solvency II, they would probably not have one, and neither would the senior management of the Länsförsäkringar group, even though they decided on the implementation of a DFA model.

CT sees Solvency II as leading to more freedom under responsibility, which is perhaps most evident in the less restricted investment rules. Today’s regulations for investments are stricter in
Sweden than what is required from the EU. In essence, Solvency II should lead to more qualitative regulation and supervision, and Länsförsäkringar holds a positive view on this.

The developments of Solvency II are considered in the internal DFA model for non-life insurance, but there has not yet been a formal decision on whether Länsförsäkringar will use an internal model or a standard approach in Solvency II. Judging from the specifications of the Solvency II standard approach, CT suspects that Länsförsäkringar will have to change several things in order to get their current internal model approved. For example, the overall structure needs to be explained in detail as well as the reasons for choosing the parameters used in the model. According to CT, such parameters are sometimes based on what is believed to be correct, which makes them hard to verify by supervisors. CT explains that partial internal models are allowed, as long as they model at least 80 percent of the total risks. Other than this, there are few restrictions on internal Solvency II models, unlike Basel II, where internal models are rather concerned with estimating certain parameters in a given function.

Having an internal model provides the freedom to adapt the model to your own organisation, but at the same time the responsibility of ensuring that the quality and traceability of data are sufficient. CT says that Länsförsäkringar have not yet decided on whether to develop an internal model or not, since the regulations are not yet complete. Moreover, it is likely that an internal model will lead to a better understanding of risks, while also being a guarantee of quality for example to rating agencies such as Standard & Poor’s and Moody’s.

Länsförsäkringar could consider adapting the DFA model to Solvency II if it turns out being economically viable. The regional companies having less capital reserves might be interested in an internal model provided they could lower their capital requirement and have the model approved by Finansinspektionen. One benefit, which is difficult to prove at start, is the learning that comes from developing and implementing an internal model. Within Länsförsäkringar’s bank, several examples of such learning have been realised.

When the regional companies need actuarial services, such as advice on internal models, they buy these services from Länsförsäkringar AB. This would imply that internal models in the regional companies become technically similar enough to allow them to be collectively approved Finansinspektionen, but qualitative aspects, such as senior management support, would have to be investigated separately.

The cost of Solvency II compliance is so far unknown and depends largely upon the decision of what type of model to use. CT’s guess is that the cost of an internal model in Solvency II will be of similar size as in Basel II. However, Länsförsäkringar has not yet taken care of the potential problems regarding data quality and traceability. The Basel II project in the Länsförsäkringar bank has dealt with these issues, and CT believes they will receive more attention in the insurance business during 2007. Potentially, the lessons learned from the Basel II project could be applied when trying to solve the issues related to Solvency II, but such knowledge transfer will not happen automatically. There might be some technical similarities between the Solvency II and Basel II projects at Länsförsäkringar, but apart from this, banking and insurance are too different in their nature for CT to see any other synergies.
5.8.3 Potential benefits

Some of the regional insurance companies in Länsförsäkringar consider Solvency II a compliance issue, while others are more interested in the potential benefits. This has a lot to do with the fact that some of the regional companies are better capitalised. It is likely that these companies will need clear benefits other than lowering the capital requirement before investing in an internal Solvency II model. CT also points out that the Länsförsäkringar group is very well capitalised relative to other insurance companies in Sweden; even though the regional companies have capital reserves that differ in size, CT expects the reserves to be enough for Solvency II compliance.

Länsförsäkringar currently holds a Standard & Poor’s A rating. This rating is more important for the bank in Länsförsäkringar than for the insurance business due to Länsförsäkringar’s customer base with mainly private individuals and small companies. When asked if Länsförsäkringar’s large capital reserves could help the company to reach an AA rating, CT says that even though capital levels have an impact on the rating, they are less significant than might be expected – qualitative aspects are just as important.

Due to the structure of Länsförsäkringar, with its 24 regional companies, there is an internal system for handling reinsurance where the reinsurance covers of each regional company are collected to a single portfolio. CT agrees that Länsförsäkringar holds high levels of both capital and reinsurance, but justifies it by saying that the company simply wishes to even out its insurance risks. The Solvency I regulations allow for a reduction of the solvency requirements through reinsurance. However, this has little effect due to the low capital requirements. This may lead to reinsurance becoming more important as the higher capital requirements of Solvency II come into effect since it may be easier for companies to buy reinsurance than to increase their capital levels. Such a development is unlikely for Länsförsäkringar, however, since the company most likely has sufficient capital. CT also mentions the possibility that reinsurance becomes more expensive because of the higher capital requirements in Solvency II. If this becomes reality, Länsförsäkringar may very well reduce their reinsurance cover and instead rely on their strong capital base.

The people working actively with DFA in Länsförsäkringar have considered a risk-based allocation of the cost of solvency capital, i.e. an explicit capital cost component in the insurance premium, but this idea has not yet gained management approval. It is difficult to estimate what the effect on insurance premiums would be, but CT says the concept is at least worth a try. Allocation today is solely based on the actuaries’ experience, but even though there are no mathematical models supporting it, CT believes that especially Länsförsäkringar’s non-life insurance business does it quite well.

5.8.4 The raison d’être of Solvency II

According to CT, Solvency II is needed due to the many differences in regulation between EU countries; something needs to be done in order to achieve a level playing field. This is not particularly important for Länsförsäkringar, since the company only operates in Sweden, but others have a greater interest in this matter. The differences between insurance markets in separate EU countries are perceived as large today. For example, technical provisions are calculated and reported differently, making comparison practically impossible. There have been
attempts from foreign insurance companies to enter the Swedish market, competing in particular for industry insurance. With its focus on individuals and small companies, Länsförsäkringar does not feel very threatened by such moves; knowing people all across the country is central to Länsförsäkringar’s success, and this cannot be easily copied by new entrants. CT rather feels that the attempts by Swedish banks, Nordea, for example, to offer private insurance is a more obvious threat to Länsförsäkringar.

Solvency II also puts focus on more sophisticated risk management, which is a good thing in itself. However, it is perhaps the owners rather than the regulation that should be the main advocators of such improvements. So far, the traffic light system has had a greater effect than Solvency II, simply because it is already in force; if a senior manager hears that Solvency II “might come into effect by 2012”, he or she will not take much notice. CT attended a recent CEA meeting and got the impression that the Solvency II process is in full swing, with 2010 or 2011 as their stated deadline. Judging from this, CT feels that 2012 should at least be realistic.

The best estimate corresponds to the expected value, but it is still unclear which methods will be allowed to calculate it, whether different methods will be allowed and, if so, how the results from different models can be compared. Still, even if the best estimate is hard to calculate, at least it is defined as the expected value. CT calls this an advance from today’s unspecified margins. Even though actuaries might claim that calculating the best estimate is too dependent on individual methods and assumptions, CT points out that these obscurities could very well be rooted in old habits and the lack of a clear definition of what is actually sought.

CT says that many company crises are caused by mismanagement, which makes it hard for regulation such as Solvency II to prevent bankruptcy. Neither would Solvency II have helped the many credit insurance companies that went into bankruptcy in the 1990s.

When finally discussing a potential situation where Finansinspektionen would act as both regulator and supervisor, CT says it would not be desirable – regulation should rather take place on a European level.

### 5.8.5 Case highlights

- ERM is one of several criteria that affect the credit rating.
- In general risk management initiatives in Länsförsäkringar are initiated internally.
- Solvency II is currently one of the drivers of ERM at Länsförsäkringar.
- Länsförsäkringar has developed a DFA model to calculate aggregate risk and investment optimisation on a group level.
- The DFA model could potentially be adapted to a Solvency II internal model if the incentives are large enough.
- The current DFA model is not used for capital allocation but Länsförsäkringar sees this as a potential opportunity.
- The view on Solvency II differs within the Länsförsäkringar group were some see the regulation as a compliance issue while others are interested in potential benefits.
- Länsförsäkringar has not yet decided if they should use a standard or internal model.
» Data quality and traceability are major concerns if an internal model is to be implemented.

» The Basel II and Solvency II projects are perceived as different but with a common denominator in the technical challenges regarding data quality and traceability.

» Länsförsäkringar expect they have enough capital to meet the new requirements.

» Reinsurance may become more expensive due to higher demands on capital reserves in reinsurance companies.
5.9 Simon Kristoferson, If Skadeförsäkring

Simon Kristoferson (SK) holds a M.Sc. in Engineering from the Royal Institute of Technology in Stockholm and has previously worked in the reinsurance industry as well as at Finansinspektionen. He started working for If Skadeförsäkring in 2002 and now works as a senior risk analyst.

SK was interviewed twice due to the change in the thesis’ purpose. Most of the discussions about actuarial pricing have been omitted, except for the parts where SK and his colleague Petter Petterson dismissed these theories.

5.9.1 Risk management

Today, If has a strong commitment to risk management and has over the last couple of years made several improvements in respect of risk management. In order to obtain a holistic view of risks, Enterprise Risk Management, a centralised group risk management function called If Risk Control Committee (IRCC) was established in mid 2005. According to SK, ERM is still under development in the insurance industry. It has also received increased attention in the market after Standard & Poor’s release of new ERM guidelines in late 2006. There tends to be a convergence between regulation and rating agency guidelines, even though If’s solvency capital level has so far been driven by to the stricter rating agency guidelines. In addition, the traffic light system is expected to receive more attention also for non-life companies when coming into force in 2007.

If has come quite far in developing an internal DFA model which is today used mainly for insurance and market risks. Credit and operational risks are not implemented but may need to be considered in order for the model to be approved as an internal Solvency II model.

5.9.2 Solvency II

At If Skadeförsäkring there is a Solvency II working group consisting of risk management and actuarial representatives as well as the Chief Risk Officer. In total, SK says they are six or seven people and that their competences cover all the risk types included in Solvency II.

For If’s part, it is too early to say whether the company will apply for using a full internal model, but the initial goal is to have a complete internal model in place well in time of the new solvency rules coming into force. SK is positive towards the recent developments where partial internal models will be allowed to a larger extent than was earlier indicated. SK believes that the process of getting the model approved by Finansinspektionen can be quite tough. He is also concerned whether Finansinspektionen will have the resources needed to complete the approval process in reasonable time. He also wonders if external consultants such as the large audit firms be used, and how much insurance companies will have to pay for this approval process.

In any case, SK says that Solvency II will require that current systems be updated. If Skadeförsäkring is already doing quite a lot, but there is room for improvement such as a formalised process that calculates cash flows and the market value of technical provisions for DFA models, as well as improving data quality and traceability. The fact that If Skadeförsäkring has yet to begin the systems development directly related to Solvency II makes it hard for SK to predict how much is actually left to do. The systems development is particularly complicated for If Skadeförsäkring due to its history of many mergers and acquisitions; today there is one system for
each country and another system that handles aggregated results. A restructuring is likely to have to take place in order to reach compliance for an internal Solvency II model, since data quality and traceability are hard to justify in If Skadeförsäkring’s centralised system.

5.9.3 Potential effects

At If, Solvency II is not expected to impose any dramatic changes to the business as such. Some managers believe that product development and competition within the industry can be somewhat affected, but as for Solvency II’s view on how insurance companies should be run, If are already in line with those thoughts. In all If believes that Solvency II will give incentives to improved risk handling and that this will generally be beneficial from a strategic and economic point of view.

Solvency requirements of today are considered low by If and are below both internally estimated economic capital and the rating capital requirements. SK believes that neither the Solvency II Solvency Capital Requirement will govern If Skadeförsäkring’s capital levels in the end; rather, rating agency demands will probably be more conservative. As for Solvency II’s effect on an insurance company’s rating, SK sees no such effects.

SK describes If as a company with relatively little reinsurance, having approximately 5 percent of the total gross premiums of 35 billion SEK reinsured. However, SK also confirms that If would feel confident in buying less reinsurance backed by more sophisticated risk management. There have also been initiatives in comparing reinsurance to comparable financial products on the investment side, since these products may very well prove to reduce risk for a lower cost. When asked about Solvency II’s impact on If’s reinsurance protections, SK’s guess is that the effect for If will be limited, if any.

SK says that Solvency II could potentially help insurance companies achieve a certain credit rating, but probably no better than BBB – higher ratings require more than simply complying with Solvency II.

SK doubts that Solvency II can improve insurance pricing through a more precise estimation of expected claims costs, since the data needed needs to be more detailed than is needed for Solvency II. However, If is using its DFA model for allocating solvency capital to close to 50 sub portfolios, where “Swedish private property insurance” could be one example. This type of allocation definitely has a noticeable effect, since the cost of solvency capital is a significant element of the premiums. A more detailed allocation could be possible, but would also increase complexity, require additional computing power as well as significant efforts from the people involved.

5.9.4 The raison d’être of Solvency II

SK’s opinion is that reasonable levels for risk measurement and other parameters need to be established in Solvency II, but that the essence of the regulations is sound. They lead to more sophisticated risk management in Swedish and European insurance companies and level the playing field, which is another important aspect. Still, there are many differences in Europe, such as the fact that the United Kingdom are ahead of many other nations due to their FSA regulations, while for example France has a quite different view on how to measure some risks.
As for the Solvency II deadline, SK has heard of 2012–2013, but it recently appears to have been pushed back slightly. The deadlines for the framework directive in 2007 and the regulation in 2008 will most likely be ready in time – regulators are very clear on this. In the end, 2010 might be too optimistic as a final deadline, SK says, but 2012 seems reasonable.

There is no universally accepted procedure for calculating the best estimate; Solvency II rather aims at establishing a common set of guidelines. SK believes that agreement can be reached on parameters such as the definition of the risk-free rate of return etc., while the actual methods for calculating the best estimate cannot be expected to be fully regulated. Reserving always involves uncertainty; the only thing you can do is to follow well-established actuarial methods and allow for a second review through internal audit.

Due to the very limited number of insurance company bankruptcies, SK cannot say whether Solvency II would have had an impact on these. He agrees that qualitative issues such as mismanagement is the most common reason for such crises to happen, and says that regulation such as Solvency II could help improve the processes that aim to prevent these issues.

5.9.5 Case highlights

» If Skadeförsäkring currently runs an ERM initiative.
» Capital requirements are in practice set by rating agencies.
» DFA is today used to model insurance and market risk.
» The DFA model could be adapted to serve as an internal model for Solvency II but it is uncertain whether this would be worth the cost and effort.
» If Skadeförsäkring has not yet decided if a standard approach or an internal model will be used.
» Although If Skadeförsäkring is continually working to improve their systems, Solvency II is expected to require intensified efforts regarding issues such as data quality/traceability.
» Solvency II cannot improve the estimate of expected claims cost.
» If Skadeförsäkring currently use a DFA model to distribute capital cost on different subgroups which affect pricing on a high level.
» The cost of capital could be distributed to a product level but this would require improvements to models, systems and hardware.
» At If Skadeförsäkring, the cost of capital is significant which is why an improved distribution of capital could potentially have significant effects on prices at the margin.
» Better risk management could reduce the need and cost of reinsurance.
» Solvency II is expected to require system updates to ensure data quality and traceability.
After presenting all case studies and a short summary of relevant findings in each case, this chapter is concerned with the more in-depth cross-case analysis. This analysis will be structured according to the set of hypotheses used during the research. However, these hypotheses have not remained unchanged during the empirical phase; some have been added, others re-written or removed. This has been an iterative analytical process, according to what is described in section 4.3.2, and is therefore described in more detail in the next section. Then follows the cross-case analysis and, finally, a set of conclusions.

6.1 A retrospect of the study’s purpose and hypotheses

This study has changed its direction several times during the twenty weeks of completion. The work has consistently been guided by a set of hypotheses derived from various sources, but these hypotheses have changed too. The reason for including this section in the analysis chapter is that the adding, removing and altering of the study’s purpose is an integral part of the analysis. A brief explanation for every change is given here, and a more elaborate one in the following cross-case analysis.

6.1.1 Initial purpose and hypotheses (week 1–2)

After 1½ weeks of studying Solvency II-related articles and speaking to SAS Institute representatives, the choice between a standard approach or an internal model appeared to be one of the most important and difficult decision for insurance companies. Coupled with the recent developments in risk management, and inspired by the many risk management success stories from SAS Institute, this area also seemed to be very important for the insurance industry.

Considering the fact that the actual implementation of Solvency II lies in a quite distant future, there were, and still are, few people with real insights in what Solvency II is and its consequences. Much of the early ideas therefore had to be taken from Basel II, since the two sets of regulations are very much alike in their basic structure, and since both SAS Institute and Accenture have worked actively with Basel II. It could be seen there that many banks were sceptical to begin with, taking a wait-and-see stance rather than being a first-mover. Today, however, it has been seen that some banks that chose to create sophisticated models early on for risk management and Basel II compliance could in fact see some first-mover advantages in that decision.

These findings were summarised into four main hypotheses:

Insurance companies have not yet decided whether a standard approach or an internal model will be used for Solvency II.

The challenges in supervision and compliance are similar in Basel II and Solvency II.

Data quality and traceability are large concerns for all insurance companies, and as a consequence major system investments are necessary.

Furthermore, the study’s purpose was stated as follows:

To provide an overview of the current situation for Swedish insurance companies regarding Solvency II, resulting in a set of describing factors.
To determine – based on the characteristics of the individual company – whether the Solvency II solution should be based on a standard approach or an internal model.

In other words, the aim was to find a model that could describe how Swedish insurance companies should comply with Solvency II in the best possible way. This would be done considering factors such as Solvency II awareness, progress, systems and risk management practices in a cross-section of Swedish insurance companies, both smaller and larger ones. The results were also supposed to be continuously compared with developments related to Basel II.

6.1.2 First revision (week 2–4)
The choice between an internal model and a standard approach is indeed important, but as the work progressed it rather seemed that the lack of clear opportunities resulting from Solvency II was really where the shoe pinched.

Hypotheses:
- Insurance companies view Solvency II largely as a compliance burden and do not see any potential benefits.
- The progress with the preparation for Solvency II is different between companies and depends on if the company has enthusiasts among its employees.

A new purpose was put forward:
- To investigate the opportunities of Solvency II for the Swedish insurance industry, and how these opportunities can be realised from a systems perspective.

The concept of a systems perspective was closely related to SAS Institute’s business – could a SAS-based Solvency II solution be said to realise any opportunities, or could it only be expected to be used in order to reach compliance? In the light of Basel II, where the reduction of regulatory capital is by far the strongest incentive for internal models, a similar opportunity was expected for Solvency II. The differences in required capital levels also provided the strongest argument in the choice between an internal model and a standard approach.

This first revision was the basis for the first two interviews at Finansinspektionen and Länsförsäkringar. As these interviews indicated, however, the level of solvency capital could not be expected to decrease significantly as a consequence of Solvency II.

6.1.3 Second revision (week 5–10)
Without reduced capital levels as a viable argument for investing in expensive Solvency II models, a new discussion was held with SAS Institute in order to find other potential opportunities worth investigating. One effect from Basel II that seemed interesting was that improved risk management practices had made possible a more sophisticated risk-based price differentiation, since the credit risk plays a central role in the pricing of bank products. Could the same reasoning be applied to Solvency II?

It certainly appeared so, since the price of insurance products is derived from analysing the probability of a particular insurance customer incurring a loss due to a certain event. There were also indications that Swedish insurance companies were somewhat lagging behind in attaining a sufficient price differentiation which, in the long run, could become quite troublesome.
New hypotheses:

» System improvements needed for Solvency II can be used to improve the actuarial pricing process i.e. estimating the expected value of claims costs.

» Swedish insurance companies need to a more differentiated pricing in order to stay competitive.

A theoretical grounding was found mainly in the work of Nobel laureate George Akerlof, who explained why insufficient price differentiation is harmful to insurance companies and customers in the long run. These theories mainly applied to non-life insurance to individuals (as opposed to corporations).

The purpose of the study was therefore rephrased as follows:
To explain how Swedish non-life insurance companies can attain a more differentiated retail insurance pricing by complying with Solvency II.

### 6.1.4 Third and final revision (week 11–present)

After 1½ months of further investigation, including several case interviews, the study’s purpose and hypotheses once again had to be revised. The improved risk management resulting from Solvency II compliance could indeed affect insurance prices, but not through further differentiation of expected claims costs. It was mainly through discussions with non-life actuary Erik Elvers, currently at Finansinspektionen, that the hypothesis concerning actuarial price differentiation was dismissed. He pointed out that the availability of data regarding accidents and customer properties is the main constraint on the level of price differentiation that can be attained in the actuarial pricing process. The following interview with Simon Kristoferson at If Skadeförsäkring Skadeförsäkring became the final nail in the coffin.

However, they both mentioned DFA models as the viable option for a Solvency II internal model. Such a model could also be used for the other type of risk-based price differentiation mentioned in section X, namely that of allocating the solvency capital as a reserve for unexpected losses in the insurance premium.

Some new hypotheses related to the dismissal of the earlier purpose were derived:

» Solvency II is just one part of a broader risk management perspective

» DFA can be used to model risk and implement Solvency II internal models.

» DFA models can be used do distribute the cost of capital and this way affect pricing.

» In practice, capital requirements are set by rating agencies rather than regulators.

Fortunately, even though risk-based price differentiation had been the main theme of the study for six weeks, some other areas were investigated as well. These were derived from different reports on Solvency II as well as a discussion with SAS Institute representative Thorsten Hein. The aim was to investigate the potentially most important effects of Solvency II.

Five hypotheses regarding the potential effects of Solvency II:

» Solvency II will affect the capital levels of insurance companies.

» Solvency II will affect the amount of reinsurance that insurance companies have.
Solvency II will affect the credit rating of insurance companies.  
Solvency II will affect the pricing of insurance.  
Solvency II will lower the total capital requirement for insurance companies.

**The purpose was then stated as follows:**

- To explain how the Solvency II regulations will affect risk management in the Swedish non-life insurance industry, and whether these changes can result in opportunities for insurance companies.

Even though this purpose has been preserved, some hypotheses were added during the following interviews, most notably after the discussion with Mårten Ajne. He was quite sceptical towards the whole concept of a new Solvency regulation and pointed out several occurrences to prove his standpoint. These were summarised into four hypotheses which were tested during the last four interviews.

- Swedish non-life insurance companies do not need Solvency II to improve their risk management.
- There is no definition of best estimate for technical provisions and this is a major obstacle in the Solvency II project.
- Solvency II does not reduce the likelihood of insurance company default compared to previous directives.
- The recurring pushing of the deadline for the Solvency II project indicates that closure as the way it was intended from the start will not be reached.

One last hypothesis was then added after speaking to Lars Jørgensen.

- Insurance companies, mainly international ones, can benefit from economies of scale regarding compliance costs in Solvency II.

### 6.1.5 Summary of hypotheses

This having been said, the final set of hypotheses is as depicted in Figure 20. The evolvement of the hypotheses over time is summarised in Appendix C.
In order to evaluate the potential effects of Solvency II on the Swedish non-life insurance industry, a theoretical framework was developed in section 3.3.5 based on industry reports and early interviews. This and the following two sections will evaluate the model itself, by systematically examining its different components and comparing their underlying assumptions with empirical data from the case studies, resulting in a revised framework.

### 6.2 Evaluation of the potential effects of Solvency II

In order to evaluate the potential effects of Solvency II on the Swedish non-life insurance industry, a theoretical framework was developed in section 3.3.5 based on industry reports and early interviews. This and the following two sections will evaluate the model itself, by systematically examining its different components and comparing their underlying assumptions with empirical data from the case studies, resulting in a revised framework.
Finding 1: An internal model is not a prerequisite for Solvency II compliance, but a standard approach cannot realise the potential benefits of Solvency II.

The point of departure in Figure 21 above is that the suggested potential effects of Solvency II depend on how an insurance company decides to comply with the regulations, more specifically whether the company chooses a standard approach or an internal model. Other than Codan/Trygg-Hansa, who already has decided to use an internal model, the insurance companies in the study wait with their decisions. Central is the weighing of costs against benefits where all parties seem to agree that significantly higher costs are involved if an internal model is chosen while the benefits are rather uncertain. Finansinspektionen believes that only larger companies will have the resources to develop internal models and that it is important to have strong incentives for doing so. Since these incentives are not yet certain, a proper cost-benefit analysis cannot be conducted, and until the Solvency II regulations are final most insurance companies will probably continue to postpone their decision.

At the time when the assumption was formed the regulators had clearly stated that either a standard approach or an internal model was to be used and that it would be no middle way in between. Thus using a model which used customised elements only where it was beneficiary for the company would not be allowed. This has since been revised and partial models are now supposedly to be accepted. This reduces the chances that companies will use purely internal models and also reduces the need for accurate data from within the organisation and may in this way reduce investments in IT.
Even though all but one case study indicate that the decision regarding model has not yet been made, it is still reasonable to believe that many large insurance companies will decide to implement a complete or partial internal model. The fact that DFA has been referred to as the most viable option for an internal model supports this claim, since three of the four large insurance companies in Sweden show interest in DFA and one of them has already implemented such a solution.

Thus, the empirical results do not support that Pillar 2 requirements will necessarily result in an internal model being implemented by the insurance company. The arrow indicating a causal relationship between Pillar 2 requirements and the internal model is therefore omitted in Figure 22 below.

Finding 2: Data quality and traceability are expected to pose problems to many insurance companies, although some claim to have these issues under control.

There is a widespread understanding that Solvency II compliance requires major investments in order to secure sufficient data quality and traceability. From the two companies in the study that do not regard this as a problem, one of them – Codan/Trygg-Hansa – has significant experience in this field because of their ownership structure. This structure requires them to comply with the British regulations, considered to be among the toughest in Europe and also to largely reflect the demands that Solvency II will put on the issues of data quality of traceability. Therefore, Codan/Trygg-Hansa can be considered credible in this matter, and perhaps even when claiming to be two years ahead of most other Nordic insurers. Interestingly, Finansinspektionen mentions that most companies will need one to two years in order to fix these issues.

The other company claiming to have these issues under control – Folksam – cannot be said to have the same credibility as does Codan/Trygg-Hansa. According to the company spokesman, internal audit has traditionally put emphasis on these questions. However, Folksam has not participated in the quantitative impact studies and has no experience regarding DFA models. Neither can Folksam draw from the experience of Basel II, like Länsförsäkringar with its bank.
division, where these matters became much more important than anticipated by the banks themselves.

**Finding 3: An internal model for Solvency II can be realised through the adaptation of Dynamic Financial Analysis.**

When discussing the potential effects of Solvency II, one must first of all determine what will cause these changes and, eventually, make them happen. As stated in the previous finding, it is reasonable to say that an internal model is a sound basis for further discussion. It was previously said that the internal model would then help to improve risk management in the insurance company, which, in turn, would provide the basis for realising the potential benefits of Solvency II. This was mainly based upon the industry reports mentioned in section 4.3.2, and even though this claim is not false, there is a need for clarification – “risk management” is simply too broad.

Internal models and Dynamic Financial Analysis were discussed with all four insurance companies in the case studies. Even though none of the companies explicitly said that an internal model would be realised through DFA, Folksam called DFA “the only viable option for an internal model”, while both Länsförsäkringar and If Skadeförsäkring asserted that their DFA models could very well be adapted to Solvency II. So far, however, the benefits of such an adaptation are uncertain while the costs seem to be quite significant. Codan/Trygg-Hansa – the only company involved having decided to use an internal model – preferred not to discuss the details of what type of model to be used, even though DFA was being investigated.

As we shall see, the potential effects of Solvency II discussed later in this chapter also partially rely on a sophisticated model such as DFA being implemented. Therefore, the previous statement that *an internal model helps to create improved risk management* has been changed to *an internal model being realised through dynamic financial analysis*, as shown in Figure 24.
Figure 24. An internal model may well be realised through Dynamic Financial Analysis

PILLAR 1
Measurement of assets, liabilities and capital

PILLAR 2
Supervisory review process

Internal model

Realised through

Dynamic Financial Analysis

Model must reflect the organisation

Demands for data quality and traceability

Improved systems and processes

Please note that the above suggested alteration does not imply that Solvency II leaves the risk management in Swedish non-life insurance companies unaffected. This is further discussed in the next finding.

Finding 4: Solvency II’s impact on risk management in insurance companies will depend on the level of sophistication of the current risk management practices.

Saying that Solvency II will have a positive effect on the risk management of insurance companies does not seem like a very bold claim, and it was also part of the initial analysis model of this thesis. However, a different opinion was raised during the interview with Mårten Ajne – that Swedish non-life insurance companies simply do not need Solvency II to improve their risk management.

Risk management in insurance companies is influenced by several stakeholders such as regulators, supervisors, shareholders, customers and competitors. Each one of these puts pressure to improve risk management, and among the insurance companies in this study there is a tendency that the stronger influences or the more stakeholders an insurance company has, the more advanced is the risk management function. The regulations in Sweden are considered to be among the better ones in the European Union and this provides a relatively high common ground in risk management. Codan/Trygg-Hansa and If Skadeförsäkring, which are publicly traded and internationally active companies, have stakeholders, and by that incentives, that the two mutual companies lack.

In both Codan/Trygg-Hansa and If Skadeförsäkring it seems as the components of Solvency II that may add business value are already, or planned to be, implemented, and that the risk management initiatives are driven by other stakeholders than supervisors. Regarding the progress towards Solvency II compliance, it is clear that it depends not so much on whether the company has interested employees as whether stakeholders put pressure on the company to improve its risk management. The companies best prepared, here Codan/Trygg-Hansa and If Skadeförsäkring, also receive the most pressure from rating agencies, shareholders and foreign regulators. Solvency
SOLVENCY II – A COMPLIANCE BURDEN OR AN OPPORTUNITY FOR THE SWEDISH NON-LIFE INSURANCE INDUSTRY?

II is a part of a larger risk management perspective where those companies in the forefront already have many of the components in place which the new regulations require.

Finding 5: Internationally active insurance companies can potentially benefit from economies of scale regarding their cost of supervision in Solvency II.

First of all, the way Solvency II is viewed clearly differs among the insurance companies involved in the study. The one being most positive towards Solvency II is Codan/Trygg-Hansa. Here, Solvency II is considered an opportunity to cut supervision costs by having to comply with only one framework in all of Europe. Länsförsäkringar also acknowledges such an effect, but since the company is present only in Swedish market there is no real opportunity for reducing supervision costs; in the long run, it could instead be negative because of the reduced barriers of entry for EU-wide expansion.

For companies with little international focus, Solvency II is more likely to impose a higher cost of supervision than the previous regulations. When compared to Basel II, supervision may be even more time-consuming and costly due to the way that internal models are expected to be more loosely defined in Solvency II, as explained by Karin Lundberg at Finansinspektionen.

Figure 25. Solvency II is likely to increase the cost of supervision for some companies, while reducing it for others

Due to the complexity of an internal model, it will surely affect the cost of supervision for an insurance company and this to a much greater extent than a standard approach would have done. This is represented by a new arrow in Figure 25.

Finding 6: Solvency II cannot be expected to have any major impact on reinsurance for Swedish non-life insurance companies.

Although many reinsurance companies are very enthusiastic about Solvency II the insurance companies in this study do not believe that it will have any significant impact on their reinsurance programs. It has been speculated that the new regulation will make it more attractive to use reinsurance as a substitute to solvency capital but this is still to be decided and will be certain when the directive is finalised. More reliable risk management can on the other hand also lead to less reinsurance being bought, as pointed out by If Skadeförsäkring, while Länsförsäkringar
mentions that reinsurance coverage may become more expensive if reinsurers are required to increase their capital margin.

It is possible, as it was stated previously, that small insurance companies will increase reinsurance coverage under the new regulations in order to transfer risk to reinsurers which can benefit from internal models which the smaller companies lack the resources to develop. There have been no evidence supporting this during the case studies however and this line of reasoning is therefore omitted. Possibly the companies in the study are too large to be interested in such solutions.

Figure 26. Solvency II cannot be expected to have any major impact on reinsurance

The lack of evidence for reinsurance being affected by Solvency II causes the framework to be updated.

Finding 7: The capital requirements of Solvency II will have little effect on those companies that today depend on a credit rating from rating agencies.

As it has been described earlier, the regulations currently in force, Solvency I, provide a minimum level of capital required in the EU. This level is considered far too low by supervisors and therefore they require considerably more capital than this to give approval for an insurance company. The companies in the study all agree that their capital levels most likely will not be affected by the new regulations. All companies except Folksam acknowledge that they are dependent on an investment grade rating and thus have to follow the recommendations set by rating agencies. The requirements for a sufficient credit rating will even in the future be higher than that of regulators making the capital requirement of Solvency II redundant for those companies.

At the same time, the capital requirement under Solvency II will probably be slightly lower than the capital level required by supervisors today, in particular if a lower level can be motivated in a convincing way, most notably through the use of an internal model. According to Folksam, which is the company with the least capital, this could facilitate the development of an internal model if a standard approach would show that they were to become close to insolvent.
The alteration proposed in Figure 27 above is concerned with the matter of cause and effect; even though an internal model for Solvency II is most likely realised through DFA, other options could turn out to be equally viable. It therefore seems more appropriate to connect the effect on the solvency capital required to the internal model rather than to DFA since there are likely to be other options available than DFA when building an internal model.

**Finding 8: Solvency II cannot be expected to have any major impact on the credit ratings of Swedish non-life insurance companies.**

The insurance companies in this study all have an investment grade rating which is quite high. The three companies that hold an A rating agree that the demands from the rating agencies in most areas will be tougher than those for compliance with Solvency II.

The extent to which the credit rating can be improved depends on whether Solvency II will be a driver of change for improved risk management or not and this is more likely to happen in companies with poor risk management and lower credit ratings. The only company in the study that could possibly improve its credit rating is Folksam and they have no particular interest in doing so.

Even though Solvency II cannot be expected to have any major impact on the credit rating, the regulations are still important in the assessment done by the rating agencies. Therefore, no changes are done to the analysis model.

**Finding 9: Having a DFA-based internal model for Solvency II cannot be expected to lead to improvements in the actuarial pricing process.**

From the discussion with Erik Elvers it becomes clear that the pricing effect derived from Basel II cannot be directly applied to Solvency II. The initial focus of this report was that Solvency II could improve pricing for insurance much because banks using internal models under Basel II had been able to give more differentiated prices to their customers. Banks found that the internal
models improved the measurement of credit risk on a customer level. This gave banks the opportunity to give customers prices based on more extensive and accurate information.

For non-life insurance companies on the other hand, the most important part of the premium is the expected value of the claims cost which is an estimate based on the amount of data that is available. In order to put customers in different price segments a certain number of observations are needed, something which will not be improved by Solvency II. Even if the estimate of expected claims costs can be improved and done in a more systematic way, a better system will not provide more observations. Furthermore the estimation is the core competency of an insurance company and what actuarial analysis is all about, hence it is not likely to be affected by new solvency regulations.

Finding 10: Having a DFA-based internal model for Solvency II can affect insurance prices through more accurate allocation of the cost of solvency capital.

As mentioned in Finding 3, an internal model for Solvency II can be realised through Dynamic Financial Analysis, since DFA allows for the solvency capital to be calculated using sophisticated methods. Solvency II aims to ensure that the solvency capital correctly reflects the true risk of an insurance company. One important aspect in terms of insurance risk is the volatility of claims – even though predictions are made by highly skilled actuaries, reality has a tendency to turn out to be somewhat, at times considerably, different.

When Solvency II requires that the volatility of claims is covered by the solvency capital, this provides an incentive for insurance companies to consider the capital add-on in their pricing process. According to the reasoning in section 2.2.1, the volatility of claims corresponds to the reserve for unexpected losses in the insurance premium. Thus, insurance companies can affect the level of capital reserves by selling insurance with more or less volatility in the claims. This should emphasise a more cost-oriented view of the solvency capital reserves.

A DFA-based internal model for Solvency II is well suited for allocating solvency capital to a certain level of detail, i.e. different divisions, insurance products, and so on. This process is closely tied to that of calculating the required solvency capital in the first place, also handled by the DFA model. In the end, this could affect insurance prices, although the potential impact of Solvency II on pricing is uncertain and not likely to be substantial.

Whether or not Solvency II can be said to influence pricing of an insurance company depends largely on whether the new regulations are driving a distribution of the cost of solvency capital. Of the four insurance companies participating in this study, only one, If Skadeförsäkring, uses a DFA model to distribute the capital cost, but not on a very detailed level. Codan/Trygg-Hansa and Länsförsäkringar both regard the solvency capital as a cost but do not have systematic approaches for the distribution towards product groups, and both acknowledge that a DFA-based internal model could achieve proper cost allocation. Folksam does not seem to regard the solvency capital as a cost, but believes it might be beneficial to start doing so.

Possibly a first-mover could gain a competitive advantage by pushing the cost of capital all the way to the product level. This has occurred to the actuaries at If Skadeförsäkring although they are not sure whether it would be worth the effort since such a model would be complex and require significant system investments.
Finding 11: The implications of more accurate allocation of the cost of solvency capital are not easily evaluated in terms of risk-based differential pricing.

The two previous findings were both concerned with the potential effect Solvency II could have on insurance pricing. However, such discussions must be taken further so that effects on customer behaviour and, in the end, the company profits can be evaluated at least holistically.

Section 2.2.1 was concerned with the concept of differential pricing and its relevance for the insurance industry. Figure 28 below shows an excerpt of the previously shown illustration of how premium levels are affected by a differentiation of the expected claims cost and the reserve for unexpected losses, respectively. However, Finding 9 explains that insurance companies are already well aware of how to calculate the expected claims cost and differentiate the premium levels in order to avoid adverse selection. What is left is then to achieve further differentiation through a more precise allocation of the capital cost resulting from a certain amount of solvency capital, which is illustrated in Figure 28.

![Figure 28. Illustrating the most likely impact of Solvency II on insurance pricing](image)

The next step is to evaluate how this type of differentiation will affect the insurance company from a broader perspective – how will customers react and what will happen to profit levels of the insurance company? More precisely, could insurance companies become prone to adverse selection as a result of poor differentiation of the capital cost for solvency capital? Adverse selection refers to the situation when an disproportionately large amount of high-risk customers seek insurance cover, forcing insurance companies to raise prices, creating a vicious circle of even higher prices and fewer customers with lower risk levels.

Differentiating the reserve for unexpected losses is based on the volatility of claims regarding divisions, insurance products, or other groupings. The estimation by Baur & Enz (2006) described in section 3.3.4 suggests that property insurance in Germany, France, Italy and the UK should be backed with more-than-average levels of capital, while motor insurance should need less capital. Even though the reasons for these discrepancies are not explained in more detail, the important point to make is on which level these estimations are made. In order for adverse selection to occur in this situation, a single customer, or a small group of customers with practically identical risk profiles, would consider the volatility of their own action – a somewhat absurd idea. Firstly, they need to be aware of their own volatility; secondly, they need to evaluate
the way their actions affect their volatility and, in the end, the insurance premium. To put it simply: adverse selection does not occur as a result of poor differentiation of the cost of solvency capital.

Even though adverse selection will not occur, there are still other potential effects of the differentiation. However, an attempt to discuss these in more detail becomes pure speculation, since several pieces of the puzzle are missing:

» It is unknown how large a share of the insurance premium that corresponds to the cost of solvency capital.

» Neither is it known how well the insurance companies allocate this capital cost today, meaning that the potential for further differentiation cannot be properly assessed.

» Even though DFA can systematise the cost allocation, it appears that it cannot be done to any level of detail.

» Implementing or adapting a DFA model for allocation of the cost of solvency capital appears to be quite costly. In addition, such a change would also directly affect the pricing process, something that could potentially lead to several practical and political issues.

» If an insurance company were to achieve a more detailed differentiation, the reaction from existing or potentially new insurance customers would still be uncertain, and so would the economic implication of their reactions.

The above reasoning does not imply any major changes to the analysis model, although the fact that effects are very hard to evaluate should be reflected. Therefore, the arrow leading from "Insurance Premiums" to "Customers attracted/lost" has been dashed according to Figure 29.

![Figure 29. Changes in insurance premiums have an uncertain effect on the customer base](image)

**Finding 12:** Valuable experience can be drawn from Basel II projects regarding technical aspects and compliance issues.

Both Basel II and Solvency II are highly qualitative regulations, something that puts great authority and responsibility in the supervisor. Finansinspektionen claim that they will use their experience from Basel II supervision for those parts of Solvency II were this is most appropriate. Länsförsäkringar also mentions that a knowledge transfer from their bank division will be conducted in order to learn from the Basel II experience.

The expertise of Finansinspektionen mainly covers statistical and mathematical issues and they found it hard to evaluate important technical aspects such as data quality and traceability where they relied on discussions with IT managers. These aspects are the parts of the Basel II directives
that can be directly applied to Solvency II while the particular details are industry-specific and it is reasonable to assume that this technical part of the supervision will be conducted in the same way.

Experience from Basel II indicates the importance of a well thought-out compliance strategy and that banks which had full time personnel structuring applications to the supervisor might have benefited from this by saving time that the supervisor bills the company. This is another area where Basel II experience can be beneficiary since the application process will most likely be the same even though the content will differ.

The insurance companies that can recognise the areas where Solvency II and Basel II are similar as well as where they differ and can utilise the experience from Basel II projects will surely benefit from this in their Solvency II projects. Of course, this does not mean that an internal bank division is necessary; Basel II consultants with an understanding of the insurance industry can also be used for this knowledge transfer.

Finding 13: It is uncertain whether Solvency II actually will protect the insurance holders.

The purpose of solvency regulations is partly to protect the insurance holders from insurance company bankruptcy but among the interviewees only one can specifically point out a situation where Solvency II would have prevented such a thing from happening. Most insurance company crashes seem to have been caused out of poor management and although Solvency II aims to set standards to put risk management on the agenda at top executive level these processes will do no good if they are intentionally circumvented.

This study does not examine the causes of previous bankruptcies within the insurance industry and it would therefore be bold to claim that Solvency II will not prevent this from happening. It is noted however that most interviewees do not see this as a primary effect although this is one of the reasons for even having a solvency margin.

Finding 14: The definition of how the best estimate of technical provisions should be calculated is a major obstacle in reaching closure in the Solvency II project.

The best estimate of technical provisions constitute the major part of the assets that have to be held by an insurance company and thus it is absolutely crucial that this is conducted in a similar manner in order to ensure comparability between different companies. Mårten Ajne believes that the definition of best estimate is fundamental to the Solvency II project and that a lack of this shows that the project will be unsuccessful. Others argue that there will always be high level of uncertainty and that the important thing is that well established methods are followed. Even the methods to be used seem highly uncertain though, and if Solvency II is to provide the even playing field and comparison between different companies across borders within the European union that is intended this is clearly a problem. A wide definition as a compromise between different national interests would give the national supervisors the power to decide which methods are acceptable. This situation should be considered as a failure for the Solvency II project since it would mean that supervisors can interpret the regulation very differently. One may argue that this scenario seems highly probable taking into account the recurring pushing of the deadline which clearly indicates the problems in reaching consensus. While others still have
high hopes that a compromise eventually will be found. Clearly any interested parties in the Solvency II project will keep close track of this issue as the regulations develop further.

### 6.3 Summarising the analysis

In this section, the original and revised framework are presented together with the findings that caused the framework to change. Some of the findings are not easily connected to a certain change in the analysis framework and have therefore not been included in the first two figures. The last figure, however, presents all findings and how they relate to the hypotheses.

**Figure 30. The original framework with relevant findings highlighted**

![Diagram](image)

Figure 30 shows in what way findings 1, 6, 8 and 9 have affected the original model.

- **F1**: An internal model is no longer considered mandatory to fulfil Solvency II.
- **F6**: The effects on reinsurance are uncertain and was removed from the updated framework.
- **F8**: Since credit rating agencies have a wider perspective than Solvency II the regulations are not expected to have any significant impact on the credit rating.
- **F9**: An internal model are not expected to improve the actuarial pricing process and estimate of the expected claims cost.
The revised framework in Figure 31 shows how the changes from the original framework are connected to findings 3, 4, 5, 7, 10 and 11.

» F3: The internal model can be realised through Dynamic Financial Analysis (DFA) and the new framework focus on the effects of DFA instead of the rather imprecise term “improved risk management” used in the original framework.

» F4: Demands from the supervisor regarding data quality and traceability, the development of a DFA model and possibly demands from credit rating agencies are forces that facilitate the improvement of processes and systems.

» F5: Internationally active insurance companies can potentially benefit from economies of scale regarding their cost of supervision in Solvency II.

» F7: The Solvency II capital requirements are probably redundant for those companies that are dependent on a strong credit rating and the new framework was updated accordingly.
F10: Through DFA the capital cost can be allocated more precisely and in that way affect the premiums.

F11: The effects of an improved allocation of the capital cost on prices and customers are hard to evaluate. A more systematic allocation does not necessarily result in price changes.

6.3.1 Connecting the study’s hypotheses to its findings
Finally, Figure 32 lists all hypotheses and findings. Some of the hypotheses have been coloured in grey, meaning that they turned out to be false. The lines connecting the hypotheses and findings indicate that, for example, Finding 4 relates to hypotheses 5, 6, 12 and 16.

These connections also imply the findings’ relation to the two research questions and the purpose of the study, as shown in the next chapter.
### Hypotheses

- **H1.** Insurance companies have not yet decided if the standard approach or an internal model will be used for Solvency II.
- **H2.** Data quality and traceability are large concerns for all insurance companies, and as a consequence major system investments are necessary.
- **H3.** The challenges in supervision and compliance are similar in Basel II and Solvency II.
- **H4.** System improvements needed for Solvency II can be used to improve the actuarial pricing process i.e. estimating the expected value of claims costs.
- **H5.** Insurance companies view Solvency II largely as a compliance burden and do not see any potential benefits.
- **H6.** The progress with the preparation for Solvency II is different between companies and depends on a few enthusiasts among its employees.
- **H7.** Solvency II will affect the capital levels of insurance companies.
- **H8.** Solvency II will affect the amount of reinsurance that insurance companies have.
- **H9.** Solvency II will affect the credit rating of insurance companies.
- **H10.** Solvency II will affect the pricing of insurance.

### Findings

- **F1.** An internal model is not a prerequisite for Solvency II compliance, but the standard approach cannot realise the potential benefits of Solvency II.
- **F2.** Data quality and traceability are expected to pose problems to many insurance companies, although some claim to have these issues under control.
- **F3.** An internal model for Solvency II can be realised through the adaptation of Dynamic Financial Analysis.
- **F4.** Solvency II’s impact on risk management in insurance companies will depend on the level of sophistication of the current risk management practices.
- **F5.** Internationally active insurance companies can potentially benefit from economies of scale regarding their cost of supervision in Solvency II.
- **F6.** Solvency II cannot be expected to have any major impact on reinsurance for Swedish non-life insurance companies.
- **F7.** The capital requirements of Solvency II will have little effect on those companies that today depend on a credit rating from rating agencies.
- **F8.** Solvency II cannot be expected to have any major impact on the credit ratings of Swedish non-life insurance companies.
- **F9.** Having a DFA-based internal model for Solvency II cannot be expected to lead to improvements in the actuarial pricing process.
- **F10.** Having a DFA-based internal model for Solvency II can affect insurance prices through more accurate allocation of the cost of solvency capital.
- **F11.** The implications of more accurate allocation of the cost of solvency capital are not easily evaluated in terms of risk-based differential pricing.
- **F12.** Valuable experience can be drawn from Basel II projects regarding technical aspects and compliance issues.
- **F13.** It is uncertain whether Solvency II actually will protect the insurance holders.
- **F14.** The definition of how the best estimate of technical provisions should be calculated is a major obstacle in reaching closure in the Solvency II project.
7 Conclusions

This chapter summarises the results from the analysis with a starting point in the two research questions. These results are then brought together in an evaluation of the study’s purpose.

7.1 Conclusions regarding the current state of Solvency II

The beauty of the Solvency II initiative is that, when completed, it will truly stand as the crown jewel of the European single market for insurance.

Allessandro Iuppa, President of the National Association of Insurance Commissioners

With such an enthusiastic claim, one could expect non-life insurance companies in Sweden to be jumping up and down in excitement. As we have seen, this is not really the case, which becomes even more evident when looking at the findings related to the study’s first research question in Figure 33.

Instead, we have seen how the deadlines in the timetable for Solvency II have repeatedly been pushed. It was initially said that a draft regulation would be ready during 2006 and that that implementation would take place between 2008 and 2010. The final draft is now to be issued in July 2007 and would it be pushed again this would raise serious questions regarding the future of the project. The final deadline is currently most commonly referred to as sometime around 2012 to 2014.
It is therefore not very surprising that non-life insurance companies in Sweden are characterised by a general wait-and-see mentality towards Solvency II. So far, the details, requirements and implications of Solvency II are far too uncertain for the companies to throw themselves into large-scale implementation projects.

At the same time, regulators and supervisors stress the importance of staying up to date regarding Solvency II developments. The quantitative impact studies have proven an important means for insurance companies to stay up to date and assess important aspects. However, a consensus regarding the calculation of technical provision has not been reached, and as a consequence the results from the second QIS have been noticeably delayed, further adding to the delays described above.

Still, there seems to be no doubt that the issues around the quality and traceability of data will become as important in Solvency II as they are to banks in the process of complying with the Basel II accord. As previously mentioned, the opportunity to significantly reduce capital requirements provided a very strong incentive for banks to invest in internal models for Basel II compliance. Even though insurance companies see no such incentive, the decision whether a full or partial internal model will be implemented does not seem too far away; Codan/Trygg-Hansa has even decided to implement one in order to avoid the risk of a regulatory capital add-on.

The advocates of Solvency II have pointed to how the regulations will improve risk management practices among European insurance companies. The interview with Mårten Ajne contradicted this claim, rather saying that most European, and definitely the Swedish, insurance companies do not really need Solvency II to improve their risk management, since the incentives to do so are already in place. On the whole, his assertion proved correct – Solvency II may very well promote sound practices, but when compared with today’s situation among Swedish non-life insurance companies, the actual changes in risk management practices are not likely to be substantial.

The conclusions presented here may appear to suggest that Solvency II will not have any effects on Swedish non-life insurance companies whatsoever. As we shall see, this is not the case, but the effects highly depend on how Solvency II compliance is planned to be reached.

## 7.2 Conclusions regarding potential effects of Solvency II

During the course of this study several potential effects of Solvency II have been discussed. Some of these were originally adopted from Basel II, others were suggested by various reports on the subject and a few became evident during the case studies. All combined, the relevant findings are depicted in Figure 34 below.
F1. An internal model is not a prerequisite for Solvency II compliance, but the standard approach cannot realise the potential benefits of Solvency II.

F5. Internationally active insurance companies can potentially benefit from economies of scale regarding their cost of supervision in Solvency II.

F6. Solvency II cannot be expected to have any major impact on reinsurance for Swedish non-life insurance companies.

F7. The capital requirements of Solvency II will have little effect on those companies that today depend on a credit rating from rating agencies.

F8. Solvency II cannot be expected to have any major impact on the credit ratings of Swedish non-life insurance companies.

F9. Having a DFA-based internal model for Solvency II cannot be expected to lead to improvements in the actuarial pricing process.

F10. Having a DFA-based internal model for Solvency II can affect insurance prices through more accurate allocation of the cost of solvency capital.

F11. The implications of more accurate allocation of the cost of solvency capital are not easily evaluated in terms of risk-based differential pricing.

F13. It is uncertain whether Solvency II actually will protect the insurance holders.

The potential effect that first comes to mind when comparing Solvency II to Basel II is that about the level of solvency capital. Basel II allowed banks to lower their capital requirements considerably and it is natural that one would assume a similar path for insurance companies. Solvency II, on the other hand, will raise the regulatory capital requirement substantially, but since the present regulatory requirements are practically redundant in comparison to demands from national supervisors, the new requirement will in fact come close to what is actually being held by the average company. The capital requirement will also be different depending on whether a standard approach or an internal model is to be used by the insurance company. Just how large the difference will actually be provides an important incentive for companies to develop an internal model; for Codan/Trygg-Hansa it was the one most decisive factor.

However, for companies depending on a strong credit rating it is the requirements from rating agencies rather than regulators and supervisors that set the upper level for capital reserves. This means that these companies will not change their amount of reserve capital unless the Solvency II
requirements become higher than those of rating agencies, something which is highly unlikely. Even though the new regulations are highly qualitative in nature, the chances of improving the credit rating will in most cases be small since rating agencies also consider other factors than those of Solvency II.

Another way than that of capital reserves to avoid insolvency is through the use of reinsurance. The effects of Solvency II on the amount of reinsurance being bought are hard to predict. This study found no indications that it would become more or less attractive under the new regulations, although some sources had initially suggested that it might become more attractive.

A further effect that banks have been able to realise under Basel II is that the improved measurement of credit risk led to a better estimate of the probability of default and, as a result, improved price differentiation. In the beginning of the study it was assumed that insurance companies would be able to improve their pricing in much the same way by improving the estimate of expected claims. It was found, however, that the expected claims cost can not be improved simply by better methods and systems, much because the amount of initial data is insufficient for further differentiation.

Instead it was found that the pricing can be improved by allocating the cost of the solvency capital, something which is currently not done in a systematic way in most cases. This sort of allocation is best done with DFA, a tool and methodology to make various sorts of simulations on a non-life insurance company. DFA can also be used to simulate the amount of reserve capital needed and by this way provide the basis for an internal model. The allocation of reserve capital with DFA may affect prices on the margin, but the actual effects are hard to predict and even harder to generalise.

Finally, the effect that one might argue would be most important for solvency regulations would be to reduce the likelihood of an insurance company becoming insolvent. Surprisingly enough this effect is something that was not agreed upon by the participators of the study which claimed that mismanagement is the cause of many bankruptcies and that this is hard to improve with the aid of regulations.

7.3 Conclusions regarding the purpose of the study

This final section summarises the conclusions from the two research questions in order to be able to discuss the study’s purpose, as shown in Figure 35.
CONCLUSIONS

Figure 35. The two research questions connected to the study’s purpose

To explain how the Solvency II regulations will affect risk management in the Swedish non-life insurance industry, and whether these changes can result in opportunities for insurance companies.

What is the current state of the Solvency II project in the Swedish non-life insurance industry?

What effects regarding risk management will Solvency II have on the Swedish non-life insurance industry?

Considering what has been said so far, it does not seem very surprising that insurance companies show a cautious attitude towards Solvency II. They approve of the basic principles of Solvency II, but on the other hand – who would disapprove of the idea of making sure that the solvency capital is more accurately linked to the risks of an insurance company? More important is the question how Solvency II will actually affect the European insurance industry or, more specifically in this thesis, the Swedish non-life insurance industry.

To begin with, it appears that many of the changes sometimes attributed to the coming Solvency II regulations have already occurred, simply because there have already been incentives for such changes. At the same time, regulators are struggling to reach agreement around important aspects, most notably the calculation of technical provisions. Saying that Swedish non-life insurance companies do not need Solvency II seemed quite bold at start, but considering its limited expected impact on risk management, there is a good deal in that. The most obvious exception is the increased demands for ensuring the quality and traceability of data.

Solvency II is about to enter a critical phase, since a draft regulation is planned to be issued in mid-2007. Regulators have persistently claimed it will be issued in time, and it would therefore be a hard blow to the credibility of Solvency II if this draft were to be delayed, like the results from the second quantitative impact study, for example. If the difficulties in reaching consensus cannot be solved in reasonable time, Solvency II could fail to become the unifying force for a European single market for insurance.

However, these problems are mainly headache for regulators and supervisors – insurance companies are more concerned with whether Solvency II will require new investments and whether any opportunities can be realised. Similar to Basel II, the most anticipated effects are the ones concerning capital levels and, to some extent, pricing. As mentioned, however, Solvency II will not allow for any significant reductions of regulatory capital; in some cases an increase is rather anticipated. As for the pricing process, insurance companies have already come a very long way in achieving a risk-based price differentiation, and even though Solvency II can in some cases facilitate further differentiation, the actual effects on customers and profit levels are nearly impossible to predict.
This said, it is unlikely that insurance companies would be willing to invest as heavily in Solvency II as banks have done in Basel II. The improvements in risk management and potential opportunities simply do not provide a strong enough business case.

### 7.4 Key messages

The conclusions of the study have been summarised into four key messages below.

- The actual changes in risk management practices are not likely to be substantial among Swedish non-life insurance companies.
- Even though the solvency capital requirements will increase, the actual levels of capital held are more likely to remain unchanged, depending on whether a standard approach or an internal model is used.
- The most notable investigated effect of Solvency II comes from DFA-based allocation of regulatory capital, but the actual effects on prices, customer behaviour and profitability cannot be predicted today.
- Today, it seems unlikely that insurance companies would be willing to invest as heavily in Solvency II as banks have done in Basel II.
8 Discussion

As the final chapter, this discussion focuses on the reliability of the study as well as some suggestions for further research within the area of Solvency II.

8.1 Reliability and generalisability

The findings, conclusions and key messages of this study are well grounded in theoretical and empirical studies. However, they are deliberately formulated to reflect the degree of uncertainty in the development of the Solvency II regulations.

The perhaps most striking reliability issue of this study is its limited number of interviews. Quite often, interesting discoveries have had to be based on the opinions of only one or two individuals. Furthermore, no explicit attempts were made to ensure that these individuals’ views reflect those of their respective organisations. The most obvious measure would have been to interview more than one person from each organisation. Another measure, although less feasible, would have been to interview regulators, supervisors, insurance companies and consultancy firms in other European countries. This is discussed in more detail in the next section regarding suggestions for further research.

As for the study’s generalisability, it is difficult to apply these results to other parts of the European insurance industry, or to completely new fields. The main reason for this constraint is that the focus has purely been on the Swedish non-life insurance industry. Even an apparently obvious parallel to the Swedish life insurance industry is not possible due to the study’s delimitations, although these were very much reasonable when decided upon.

8.2 Suggestions for further research

As mentioned in the previous section, this study has only considered the Swedish non-life insurance industry, both in its purpose and methodology. Broadening the focus to include either the Swedish life insurance industry or other European non-life insurance companies would not only shed some light on these segments, but also provide an interesting perspective on the findings of this study. For example, if non-life insurance companies in Germany were to foresee a different future regarding Solvency II than the one presented here, the combined results could reveal interesting findings.

Solvency II is under current development, implying that the conditions for further research are most likely to change accordingly. When the regulations are final – or at least the draft – there will be more room for tangible measures. The number of people working actively with Solvency II should also increase, and so should the involvement from senior management. These factors combined will allow for further research, for example by attempting to quantify the potential effects on insurance pricing, something that turned out to be unfeasible today.

The banks will also continue to work with Basel II, resulting in more and more tangible measures. A more detailed comparison of the effects from the two regulations should therefore be possible to do in a few years.
Finally, this study has only concentrated on effects that can be related to the business of SAS Institute and Accenture. Political implications and necessary changes in work processes have therefore been excluded, even these areas could prove just as important to the European insurance industry.
9 References


REFERENCES

Appendix A  The Basel II accord

The purpose of the Basel capital accords is to ensure the stability and soundness of the international banking system by regulating how banks should relate to risk. Since the regulations governing risk for the insurance industry in many ways resemble those of the banking industry, and since the basic idea of Solvency II is based on Basel II, it is plausible that the developments regarding regulations, systems and implementation issues that lies ahead of the insurance companies will be similar to the ones the banks are facing right now. In Sweden the supervisor for Basel II, Finansinspektionen, will also supervise Solvency II. From this perspective a brief description of the Basel accords is given.

1988 Capital Accord (Basel I)

The Basel I accord was designed to establish minimum levels of capital mainly in relation to credit risk; i.e., the risk of loss due to the counterpart not being able or willing to pay the debt to the bank. (Sandström, 2006)

In brief, the accord requires the capital base to be at least 8 percent of the sum of risk weighted assets. It specifies roughly how the capital base should be composed and uses standardised weights to reflect the risk of different types of assets. The higher the risk class of the assets the greater is the capital base required: (Sandström, 2006)

$$\frac{\text{CapitalBase}}{\sum r_jA_j} \geq 0.08$$, Where $r_j$ is the risk weight of the asset $A_j$

In 1996 an amendment that also considered market risk was released which caused the formula to be slightly modified. (Sandström, 2006)

Although the simplicity of Basel I made it possible to compare banks in different markets and regions it was considered unsophisticated and inadequate by 1999 when the first steps towards a new regulation were taken. (Sandström, 2006)

Basel II

The Basel II accord has a much wider scope than the previous accord and is based on three Pillars, as shown in Figure 36. As we can see the structure is similar to Solvency II which is in fact based on Basel II. (Sandström, 2006)
The first Pillar provides directions on how banks should calculate minimum capital requirements, also called economic capital. Just as the previous directive it provides standardised formulas for doing so but it also introduces the option to use internal models if these can be approved by the supervisor. Banks have the option of using a standard approach or an internal model for every risk class that is to be measured. (Sandström, 2006)

The second Pillar concerns the supervisory process that should take place in order to secure that the banks have sound internal processes concerning risk assessment. This part of the regulations sets qualitative standards for the processes that determine the capital level that is needed over time. Two important principles of the second Pillar are: (Sandström, 2006)

> **Principle 1**: “Banks should have a process for assessing their overall capital adequacy in relation to their risk profile and a strategy for maintaining their capital levels”

> **Principle 2**: “Supervisors should review and evaluate banks’ internal capital adequacy assessment and strategies, as well as their ability to monitor and ensure their compliance with regulatory capital ratios. Supervisors should take appropriate supervisory action if they are not satisfied with the result of this process.”

The third Pillar states what kind of information about a bank’s risk profile that should be given to the market. The purpose is to improve disclosure giving a more transparent view of the risk that a bank is exposed to. (Sandström, 2006)
Appendix B  Interview protocol

This interview protocol, unfortunately in Swedish, was used during the Codan/Trygg-Hansa case study. Although the other protocols differ in some aspects, the general structure was the same and so were most of the questions asked.

Bakgrund

» How does Solvency II contribute to better risk management in Swedish non-life insurance companies?

» How does better risk management resulting from Solvency II create opportunities for Swedish non-life insurance companies?

» What are the challenges in complying with Solvency II?

Inledning

Börja med att berätta om oss själva och examensarbetet. Vi undersöker vilka effekter Solvens II kommer att få på den svenska sakförsäkringsmarknaden.

I mailet skrev vi att följande skulle diskuteras:

» Din bakgrund och nuvarande roll i Codan/Trygg-Hansa samt vad ägarstrukturen har för betydelse för arbetet inom Regulatory Risk & Compliance, mer specifikt inom Solvens II.

» Era nuvarande fokusområden inom Regulatory Risk & Compliance. Är det Solvens II, nya riskmodeller såsom DFA eller andra områden?

» Er syn på Solvens II – svårigheter, möjligheter samt relation till riskhantering i övrigt.

» Potentiella effekter som Solvens II kan få på verksamheten gällande kapitalkrav, återförsäkring, kreditrating och prissättning.

» Betydelsen av Solvens II – vad tillför det egentligen?

Frågor

Om Lars och företaget

Förklara: Först skulle vi vilja veta lite mer om din bakgrund och och företaget Codan/Trygg-Hansa.

» Vad har du för bakgrund (främst tidigare anställningar och roller inom Codan/Trygg-Hansa)?

» Vilken roll har du inom Codan/Trygg-Hansa?

Allmänt om Solvens II och riskhantering

Inled öppet för att smalna av mot slutet. Öppna frågor till en början sedan specifikt för varje effekt vi tror oss se. Avsluta med hela Ajne-grejen.
» Vilka är för närvarande era viktigaste områden inom Risk Management?
  - Vilka krafter är mest drivande bakom dessa initiativ? Är det kunder, kreditinstitut, statliga myndigheter?
  - Har ni avslutat några andra större initiativ de senaste åren?

» Hur ser ni på Solvens II?
  - Är Solvens II främst en Compliance-fråga, eller ligger det snarare under Risk Management?
    ▪ _Om svaret är otydligt för oss:_
      Är Solvens II något ni vill uppfylla med minsta möjliga insats, eller ses det som ett prioriterat område med potentiella affärsmöjligheter?
  - Finns det någon arbetsgrupp för Solvens II inom Codan/Trygg-Hansa? Om ja, vilka ingår där och hur länge har den funnits?
  - Har ni arbetat aktivt med Solvens II, deltagit i QIS:arna etc?

» Man pratar mycket om ERM idag, hur jobbar ni med det?
  - Vad är det ni vill uppnå i första hand?
  - Varför började ni arbeta med det – är det era intressenter som ställer krav?
  - Ser du någon koppling mellan ERM och Solvens II?

**Modell för Solvens II och DFA**

_Ta reda på hur de ser på standard- eller intern modell samt om de använder DFA-verktyg idag. Ta reda på hur de ser på begreppen spårbarhet och datakvalitet._

_Förklara:_ Vi är intresserade av att diskutera potentiella effekter av Solvens II, men först måste vi veta mer om era nuvarande och kommande modeller för riskhantering.

» Har ni funderat över vilken approach ni ska ha till Solvens II, standard- eller intern modell?
  - Vilka för- och nackdelar ser ni med respektive typ av modell?
  - Vad mer behöver ni veta för att kunna bestämma er för en viss typ av modell?
  - Vilka implikationer tror ni att valet av modell får?

» Gör ni simuleringar med DFA-modeller idag?
  - Vilka tillämpningar har i så fall DFA-modellen?
  - Planerar ni att utöka den till att även innefatta andra saker?
    _Fiska lite efter fördelning av kapitalkostnad._
  - Har ni övervägt att använda DFA-modellen för Solvens II?

» Vilka svårigheter ser ni med att få er modell godkänd?
Om detta inte nämns spontant:
Inom modellerna för Basel II var datakvalitet och spårbarhet/audit trail viktiga egenskaper. Hur ser ni på detta? Kan ni på ett trovärdigt sätt visa att er data är riktiga? Kan ni visa vem och när som ändrat i era modeller?

Diskutera kring effekter
Förklara: Solvens II kommer troligtvis att ställa krav på omfattande investeringar. Därför anser vi det vara intressant att undersöka om man kan se några tydliga fördelar eller möjligheter med att satsa på en sofistikerad lösning för Solvens II.

» Hur tror du att Solvens II kommer att påverka Codan/Trygg-Hansa?
   - Hur ligger ni till gällande kapitalnivåer – kommer ett höjt solvenskrav att påverka er?
» Hur pass beroende är ni av en god kreditrating?
   - Är denna styrande för hur mycket kapital ni håller samt era riskhanteringsprocesser?
   - Finns det en möjlighet att ett uppfyllande av Solvens II skulle kunna förbättra er kreditrating?
» Hur pass återförsäkrade är ni idag?
   - Hur sköts återförsäkring inom Trygg-Hansa/Codan/Royal Sun Alliance?
   - Det finns indikationer på att SII kommer att ta större hänsyn till återförsäkring än tidigare vid beräkning av kapitalkravet.
   - Kommer detta att påverka er återförsäkring?
» Solvenskapitalet innebär ju en kostnad för försäkringsbolaget. Hur fördelas denna kostnad på olika försäkringsprodukter?
   - Skulle denna fördelning kunna göras mer systematisk?

Solvens II – att vara eller att inte vara
Förklara: Vi har till viss del börjat ställa oss frågande till hur viktigt Solvens II egentligen är för europeiska försäkringsbolag. Detta skulle vi vilja diskutera med dig

» Vad är egentligen nytt med Solvens II?
   - Det verkar som att försäkringsbolag redan gör vad som marknaden kräver eller det som skapar affärsmöjligheter. Behövs då ett regelverk?
» När tror du att Solvens II kommer att gälla i ”skarp version”?
   - Deadline har flyttats, först från 2008 till 2010 och nu från 2010 till ”tidigast 2012”. 

B-3
Hur skiljer sig försäkringsmarknaderna i olika EU-länder?

- Har de olika regeringarna samma syn på hur försäkring ska drivas respektive övervakas?
- Är det med Solvens II som med övriga initiativ; att Storbritannien, Tyskland och Frankrike i slutändan styr vad som får beslutas?

Är du insatt i vilka antaganden som ligger till grund för Solvens II, främst ”best estimate”-kravet som gäller när man värderar försäkringsåtaganden i de försäkringstekniska avsättningarna?

- Anser du att riktlinjerna för dessa antaganden är 1) tydliga, 2) realistiskt tillämpliga?
  Förklara eventuellt att vi fått indikationer på att det är välligt svårt – så gott som omöjligt – att komma överens om en enda uppsättning definitioner som ska gälla för alla europeiska försäkringsbolag, och att detta kommer att rubba hela den kvantitativa grunden för Solvens II.
- Hur ska man hantera operativa risker?

Kommer Solvens II att minska risken för kriser eller konkurser bland europeiska försäkringsbolag?

- Vilka är de vanligaste orsakerna till kris/konkurs?
### Appendix C  Summary table of hypotheses

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Insurance companies have not yet decided whether the standard approach or an internal model will be used for Solvency II.</td>
<td>3</td>
<td>Agree</td>
</tr>
<tr>
<td>2. Data quality and traceability are large concerns for all insurance companies, and as a consequence major system investments are necessary.</td>
<td>2</td>
<td>Disagree</td>
</tr>
<tr>
<td>3. The challenges in supervision and compliance are similar in Basel II and Solvency II.</td>
<td>1</td>
<td>Agree</td>
</tr>
<tr>
<td>4. System improvements needed for Solvency II can be used to improve the actuarial pricing process i.e. estimating the expected value of claims costs.</td>
<td>3</td>
<td>No Answer</td>
</tr>
<tr>
<td>5. Insurance companies view Solvency II largely as a compliance burden and do not see any potential benefits.</td>
<td>2</td>
<td>Disagree</td>
</tr>
<tr>
<td>6. The progress with the preparation for Solvency II is different between companies and depends on a few enthusiasts among its employees.</td>
<td>3</td>
<td>No Answer</td>
</tr>
<tr>
<td>7. Solvency II will affect the capital levels of Insurance companies.</td>
<td>1</td>
<td>Agree</td>
</tr>
<tr>
<td>8. Solvency II will affect the amount of reinsurance that insurance companies have.</td>
<td>3</td>
<td>No Answer</td>
</tr>
<tr>
<td>9. Solvency II will affect the credit rating of insurance companies.</td>
<td>1</td>
<td>Agree</td>
</tr>
<tr>
<td>10. Solvency II will affect the pricing of insurance.</td>
<td>3</td>
<td>No Answer</td>
</tr>
<tr>
<td>11. Solvency II will lower the total capital requirement for insurance companies.</td>
<td>1</td>
<td>Agree</td>
</tr>
<tr>
<td>12. Solvency II is just one part of a broader risk management perspective.</td>
<td>3</td>
<td>No Answer</td>
</tr>
<tr>
<td>13. DFA can be used to model risk and implement Solvency II internal models.</td>
<td>1</td>
<td>Agree</td>
</tr>
<tr>
<td>14. DFA models can be used to distribute the cost of capital and this way affect pricing.</td>
<td>3</td>
<td>No Answer</td>
</tr>
<tr>
<td>15. In practice, capital requirements are set by rating institutes rather than regulators.</td>
<td>3</td>
<td>No Answer</td>
</tr>
<tr>
<td>16. Swedish non-life insurance companies do not need Solvency II to improve their risk management.</td>
<td>1</td>
<td>Agree</td>
</tr>
<tr>
<td>17. There is no definition of best estimate for technical provisions and this is a major obstacle in the Solvency II project.</td>
<td>3</td>
<td>No Answer</td>
</tr>
<tr>
<td>18. Solvency II does not reduce the likelihood of insurance company default compared to previous directives.</td>
<td>3</td>
<td>No Answer</td>
</tr>
<tr>
<td>19. The recurring pushing of the deadline for the Solvency II project indicates that closure as the way it was intended from the start will not be reached.</td>
<td>3</td>
<td>No Answer</td>
</tr>
<tr>
<td>20. Insurance companies, mainly international ones, can significantly reduce their cost of supervision through Solvency II.</td>
<td>3</td>
<td>No Answer</td>
</tr>
</tbody>
</table>