

# **How External Requirements Affect the Insurance Industry**

An Investigation on Swedish Insurance Companies' Adjustments to Solvency II

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**KTH Industrial Engineering  
and Management**

Master of Science Thesis  
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# Hur Externa Regelverk Påverkar Försäkringsbranschen

En Studie på Svenska Försäkringsbolags  
Anpassningar till Solvens II

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Approved 2016-06-16	Examiner Cali Nuur	Supervisor Staffan Laestadius
	Commissioner SI Consulting	Contact person Tore Tullberg

### Abstract

The financial sector stands for an important part of society's fundamental infrastructure and national economy. Previous financial crises indicate the importance of having a well-regulated financial market. Former directives of regulating the insurance industry had insufficient solvency regulations and were lacking in risk management. Therefore, the regulatory framework Solvency II, the successor to Solvency I, has been established on the European market. The objective of Solvency II is to ensure consumer protection by ensuring insurance companies properly reflect the risks their businesses are vulnerable to.

The regulatory framework Solvency II came into force in the turn of 2015/2016. However, it has been on every insurers' agenda for years and preparations have been done. It is therefore of interest to investigate how Swedish insurance companies have adjusted to Solvency II at an early stage after the transition.

This has been investigated by conducting interviews with mainly Chief Risk Officers and Risk Managers at Swedish insurance companies. As a complement, a questionnaire was distributed to asset and capital managers, having insurers as customers, regarding their perception of insurers' changes in investment behaviors.

The findings of this study imply that insurance companies have had a compliance focus to adopt the regulation rather than a business focus. No indications of adjustments to corporate business strategy has yet been noticed. However, some companies have developed a risk culture within the organizations. The extensive reporting and calculations of capital that Solvency II entails, has lead to implementations of new systems and processes for companies. It is further noticed that Swedish insurance companies use the standard model for calculating the capital requirements. Solvency II has lead to increased understanding of the trade-off between capital, risk, and return by holding a risk-adjusted capital. Also, an increased engagement of employees in the risk management process has been noticed. The companies are aligned with the ORSA process, since it is one of the requirements, and are aware of the potential benefits the ORSA process can contribute to. Lastly, this study indicates an improved risk awareness and culture within the insurance companies by educating existing employees and employing new competent employees.

**Key-words:** Solvency II, Insurance Company, Business Changes, Organizational Changes, Capital Requirements, Risk Management, Low-Frequency and High-Impact Risks.



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### Sammanfattning

Den finansiella sektorn står för en viktig del av ett samhälles fundamentala infrastruktur och ekonomi. Tidigare finanskriser har visat på vikten av att ha en välreglerad finansiell marknad. Försäkringsbranschens tidigare direktiv saknade en tillräcklig solvensreglering och hade brister inom riskhantering. Detta ledde till uppkomsten av Solvens II, efterspråkaren till Solvens I, och etablerades på den europeiska marknaden. Syftet med Solvens II är att säkerställa konsumentskydd genom säkerställande av att försäkringsbolagen ordentligt reflekterar riskerna som de är utsatta för.

Regelverket trädde i kraft vid årsskiftet 2015/2016. Försäkringsbolagen har under flera år kunnat förbereda sig för Solvens II men har inte varit skarpt läge förens nu. Det är därför av intresse att undersöka hur de svenska försäkringsbolagen har anpassat sig till Solvens II vid ett tidigt skede efter övergången.

Detta har gjorts genom att genomföra intervjuer med framförallt riskchefer på svenska försäkringsbolag. Ett frågeformulär var även distribuerat till fond- och kapitalförvaltare som ett komplement till undersökningen gällande deras uppfattning om försäkringsbolagens förändrade investeringsbeteende.

Det som framkom under denna studie var att försäkringsbolagen har haft ett efterlevnadsfokus snarare än ett affärsfokus. Inga indikationer om att företagen har anpassat sin företagsstrategi till följd av Solvens II kunde påvisas. Däremot hade några företag utvecklat en riskkultur inom organisationen. Den omfattande rapporteringen och beräkningen av kapital som Solvens II kräver har lett till att företagen implementerat nya system och processer. Det framkom även från undersökningen att de svenska försäkringsbolagen använder sig av standardmodellen för att beräkna kapitalkraven. Solvens II har också resulterat i en ökad förståelse för avvägningen mellan kapital, risk och avkastning genom att hålla ett riskanpassat kapital. Även ett ökat engagemang hos anställda i riskhanteringsprocessen har noterats. Företagen har utvecklat en egen risk- och solvensanalys, ORSA, och är medvetna om dess fördelar. Slutligen, denna studie visar på att företagen har utvecklat en ökad riskmedvetenhet och skapat en riskkultur genom att utbilda existerande personal och genom nyanställningar.

**Nyckelord:** Solvens II, Försäkringsbolag, Affärsförändringar, Organisationsförändringar, Kapitalkrav, Riskhantering, Låg-frekventa och Hög-påverkande risker.

## ABBREVIATIONS

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*This section includes the abbreviations used in the report.*

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CEIOPS	Committee of European Insurance and Occupational Pensions
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CIO	Chief Information Officer
CRO	Chief Risk Officer
EC	European Commission
EIOPA	European Insurance and Occupational Pensions Authority
EU	European Union
FSA	Financial Supervisory Authority
GDP	Gross Domestic Product
MCR	Minimum Capital Requirement
ORSA	Own Risk Solvency Assessment
SCR	Solvency Capital Requirement
VaR	Value at Risk

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# 1. INTRODUCTION

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*In this chapter, the research is introduced and the reasons to why this investigation is of interest are presented.*

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The chapter is structured to firstly introduce the *Background* to the problem followed by a *Problem Formulation*, and this research's *Purpose* and *Research Questions*. Furthermore, the *Delimitations and Limitations* forming the scope of investigation, and the *Contribution* of this study to research are presented. Finally, the chapter contains an *Outline of the Thesis*.

## 1.1 Background

The financial sector stands for an important part of society's fundamental infrastructure and the national economy (Svensk Försäkring, 2013). It is essential for the modern welfare by linking companies, individuals, and society together through the conversion of savings to investments, management of risks, and enablement of payments and other financial transactions in an efficient manner (Sveriges Riksbank, 2013). The financial crisis in 2008 caused instability in the financial market and market failure (Buckham et al., 2010, European Commission, 2014). Financial stability is defined as "the financial system can maintain its fundamental functions and also has resilience to disruptions that threaten these functions" (Sveriges Riksbank, 2013, pp. 6). Market failure is defined as "a situation where, in any given market, the quantity of a product demanded by consumers does not equate to the quantity supplied by suppliers" (Library of Economics and Liberty, n.d.). During the market failure, firms did not reflect the risk on the price of their products. This caused firms not to be able to accomplish their long-term obligations. From a societal point of view, this market failure was detrimental. In order to prevent the collapse of the financial system, state aid was provided by European governments between 2008 and 2012, which amounted to EUR 1.5 trillion corresponding to more than 12 percent of 2012's total Gross Domestic Product, GDP, in the European Union (European Commission, 2014). The market failure caused by the financial crisis was the occurrence of a malfunctioning financial system attributable to unregulated or poorly regulated markets. It demonstrated the necessity to review the financial sector's regulatory frameworks in order to increase financial stability and reduce the probability of a future financial crisis to occur in Europe (European Commission, 2014, Buckham et al., 2010, Klein, 2013).

The direct effects of the financial credit crisis in 2008 on the insurance industry were limited. In comparison to banks, insurance companies are less vulnerable to short-term shocks due to holding their investments for a longer time period. In addition, insurance companies generally have diversified investment portfolios and the low correlation between assets and liabilities differ from the banking industry, which were reasons the insurance industry sustained the financial banking crisis (Eling and Schmeiser, 2010). Schich (2009) argues that the insurance industry had a stabilizing effect during the financial credit crisis. However, there were noticeable effects of the banking crisis on the insurance industry. The main effect was on insurers' investment portfolios caused by the drop in market capitalization of bonds and stocks. The benefit for insurers is that this portion of their investment portfolios is usually relatively low.

Some companies were affected worse than others and one of the most prominent examples was one of the largest insurance corporations at that time, American International Group, AIG. The corporation was on the way to experience default before the liquidation was prevented by the US government's interference by lending USD 150 billions. The underlying reason the company ended up in this position was insufficient risk management (Schich, 2009, Eling and Schmeiser, 2010). This clearly indicates the weaknesses of previous regulations.

In 2015, Swedish insurance companies generated SEK 322 billions in premium income and invested SEK 4,000 billions in the global economy (Svensk Försäkring, 2013). This substantial impact on the financial market promotes the importance of having a well-functioning regulated system to enhance financial stability. Regulators of the insurance industry had, long before the emergence of the financial crisis in 2008, recognized the inadequate solvency regulations and risk management within the sector. Previous directives did not embrace all risk types and the required capital to be held did not reflect the risks associated with a certain product sold by an insurer. Risks that are more difficult to estimate, such as catastrophic events, are major causes of failure in the insurance industry. Catastrophes are events having a low-frequency to occur while the impact of it is large (Klein, 2013), in this thesis referred to low-frequency and high-impact events. It includes events caused by natural phenomenon or human beings (Klein, 2013). Since catastrophic events occur more irregularly compared to risks that follows a foreseen pattern, the losses for the insurance companies due to these events are much more problematic (Viscusi and Born, 2006). If companies fail to forecast catastrophic events, the company could experience a substantial loss in the event of a catastrophe, which may cause bankruptcy. Klein (2013) considers a dramatic increase of the awareness and anxiety of catastrophic risks over the past two decades due to the increased frequency of weather related natural catastrophes and heightened threat of terror attacks. The 9/11 attacks had an immediate negative effect on the stock prices and caused insurance companies to devalue assets, which influenced the financial stability (Klein, 2013).

Regulators have advocated an improved supervision of the industry (Buckham et al., 2010, European Commission, 2014). The European Commission together with the European Insurance and Occupational Pension Authority, EIOPA, have formulated a set of requirements, named Solvency II for the insurance industry in order to reduce the risk of default. The objective of Solvency II is to ensure that insurance companies properly reflect the risks in the price by applying a risk-adjusted pricing model and to enhance financial stability. This is important for insurance companies since it secures that a company has assets to pay its policyholder within a contingency (European Commission, 2015b, Buckham et al., 2010, European Commission, 2014).

SI Consulting, the commissioning company behind this study, is specialized within compliance and supports banks and insurance companies to ensure they comply with new regulations at EU level. By being continuously updated on frameworks of technical issues for the financial sector they can provide knowledge within requirement management, test management, and projects (SI Consulting, 2015). It is therefore of interest for SI Consulting to support this thesis.

## **1.2 Problem Formulation**

As mentioned in the background, the financial crisis in 2008 demonstrated the consequences of a lack of risk-adjusted capital and risk management in the banking sector. Companies misjudged the amount of capital to hold to cover the risks. Similar tendencies were seen in the insurance industry and regulators had recognized inadequate solvency regulations and risk management before the emergence of the financial crisis in 2008. Solvency II aims to improve the risk management and capital hold by firms to cover their risk in order to prevent future financial crisis. The objectives are to enhance consumer protection and to promote financial stability.

Many studies have investigated the effects of capital requirements. Some studies suggest that capital requirements have a positive effect on enhanced financial stability (e.g. Fiordelisi and Mare, 2013, Berger and Bouwman, 2013). However, some authors believe that regulatory frameworks are not efficient in enhancing the financial stability (e.g. Hakenes and Schnabel, 2011, Zhou, 2013). Economist Intelligence Unit (2012) argues that many insurance companies are critical to the regulations due to their perception of already having sufficient capital to cover their exposed risks. Siegel and Morbi (2015) confirm this stating that state most insurers perceive the industry to be over-capitalized or at least adequately capitalized. However, regulators have recognized a need to enhance consumer protection and financial stability by increased capital requirement to cover the risks and increased risk management (Buckham et al., 2010, Berger and Bouwman, 2013).

Insurance companies have been able to prepare for the implementation ever since 2009 when Solvency II was launched. The outcome of the implementation on their businesses becomes evident after the full implementation has occurred. The problem is that it is not known yet if Solvency II fulfills its objectives. Since the implementation of Solvency II was in the turn of the year 2015/2016, it is not known whether it creates enhanced financial stability and consumer protection by securing that insurance companies have assets to pay its policyholders within a contingency. Also, the capital required within Solvency II may not be sufficient to cover the losses from catastrophic events.

## **1.3 Purpose**

The purpose of this study is to investigate how insurance companies have adjusted to Solvency II at an early stage after the transition. Since it has been required by European insurance companies to adopt these requirements, it is of interest to investigate how these adjustments have affected insurance companies. This study investigates impacts on business and organizations, adaption to the capital requirement, and effects to their risk management. In addition, opportunities and challenges within organizations due to Solvency II are investigated.

An additional purpose of this thesis is to investigate how insurance companies manages low-frequency and high-impact risks in the context of Solvency II. Since the frequency of these catastrophes has increased (Rutberg, 2015, Klein, 2013), it is of interest to investigate how insurers manage this type of risks.

## 1.4 Research Question

The main research question for this thesis is:

*How have insurance companies adjusted to Solvency II at an early stage?*

Sub research questions used to address the main research question are:

1. *How has Solvency II impacted insurance companies' business and organizations?*
2. *How have insurance companies adapted to the capital requirement imposed by Solvency II?*
3. *How has Solvency II affected the management of risks?*

## 1.5 Delimitations and Limitations

The regulatory framework Solvency II changes the European insurance industry and is expected to have a global impact (Schwarz et al., 2011). However, this study is delimited to explore the effects on the Swedish insurance industry due to the availability and the interest of the commissioning company. The study is delimited to life and non-life insurance companies excluding occupational pension insurers. This is due to occupational pension insurers do not need to apply Solvency II in the current situation. Furthermore, the research has a qualitative approach and no mathematical calculations in regard to capital requirements are included in this report.

Solvency II affects the insurance industry as a whole, including companies and individuals. This study is narrowed to study the trends and changes within the industrial level. By investigating the largest life and non-life insurance companies on a functional level, this increases the understanding of the effects on an industrial level. Blomkvist and Hallin (2015) define the functional level as concerned with perspectives on processes and production with focus on organizational structure, logistics, and supply chain. Large companies are investigated since these cover a large portion of the insurance industry and are therefore indicative for the whole industry. Large companies are defined by the company's premium income. In this study, large companies are defined as having a minimum of 1.5 percent market share in terms of total premium income.

## 1.6 Contributions

This thesis contributes to literature by investigating how external requirements affect the insurance industry and how insurance companies adjust to these requirements. It contributes to literature within social science since the subject, Solvency II, not hitherto has been investigated thoroughly on a scientific level due to the implementation of Solvency II recently occurred. This study further contributes to the evaluation of whether the requirements of Solvency II is sufficient to reduce the probability of default by making insurance companies more aware of the risks associated with their business. In addition, this study investigates the risk management of low-frequency and high-impact events for insurance companies.

This study provides an analysis of the Swedish insurance industry after the full implementation of Solvency II. From an industry perspective, this study generates deeper understanding for risk management in insurance companies, which is valuable for insurers, and fund and asset

managers that have insurers as customers. Besides this, consultant firms can increase their understanding in order to adapt their strategy to give more valid advisory to their clients through getting an insight in insurance companies' current and expected future difficulties. The results and conclusions of this study contribute as one aspect for SI Consulting to get a deeper understanding of the industry and thereof opportunities to adapt their business after a possible change in demand within their clients and in addition, possibilities to reach new clients.

## 1.7 Outline of the Thesis

The *Introduction* chapter presented the background to the problem and why this investigation is of interest. The purpose to the research was further explained as well as the research questions aimed to bring deeper knowledge within the subject. Lastly, the delimitations and contribution of this study were described. The remainder of the report firstly covers the fundamental knowledge of the subject in an *Introduction to the Insurance Industry* chapter. Thereafter, the research design and approach are described together with the methods used for the empirical data collection in the *Method* chapter. Later, a thorough investigation of existing literature is critically discussed in the *Literature Review* chapter and involves firstly a background followed by the main themes of this thesis that are *Business and Organizational Changes*, *Capital Requirements*, *Risk Management*, and *Low-Frequency and High-Impact Risks* to address the research questions. Furthermore, the results from the empirical data collection, both from interviews and questionnaire, are collected in the chapter of *Results from Interviews and Questionnaire*. The results are structured with the same categories as the literature review. The empirical results from the study are then discussed with the literature in the *Analysis and Discussion* chapter in order to establish the main findings, implications and further findings, which are then compiled in the *Conclusion* chapter. An illustrative outline of the thesis with the including sub-sections is shown in Figure 1 below.

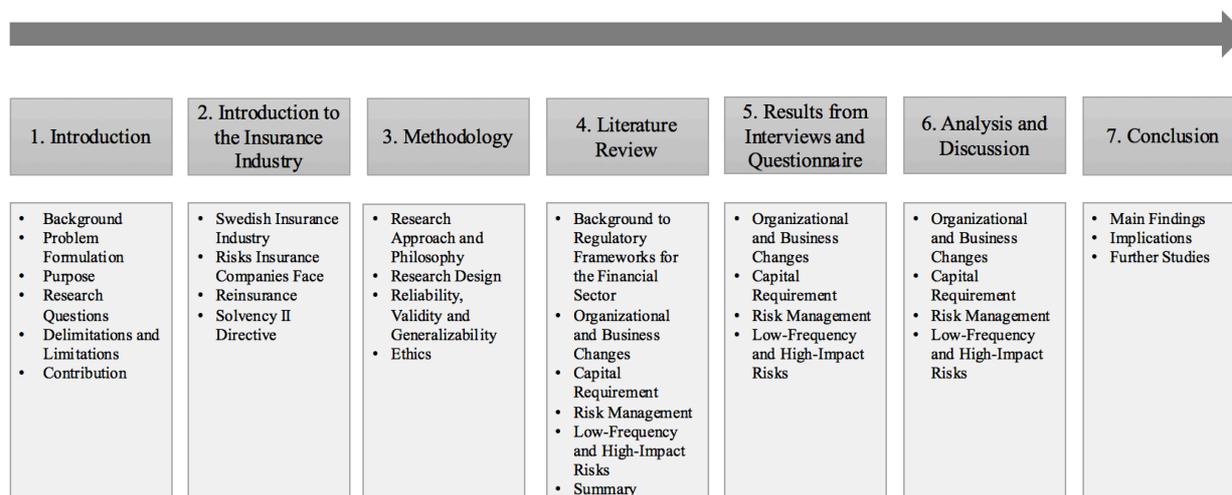


Figure 1: Outline of the thesis

## 2. INTRODUCTION TO THE INSURANCE INDUSTRY AND SOLVENCY II

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*To understand the insurance industry, it is essential to have insight in the fundamentals of the insurance industry. This chapter aims to provide these insights as well as shortly introducing the regulatory framework Solvency II.*

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The chapter is structured to firstly introduce the *Swedish Insurance Industry* and its role in society. Furthermore, the *Risks Insurance Companies Faces* are described that are the underlying reason of the imposed regulations, which is based on its key components and main risk categories. The subsequent sub-chapter describes *Reinsurance* and its role in the insurance industry. Finally, the *Solvency II Directive* is explained with its policymakers, objectives and three-pillar structure.

### 2.1 Swedish Insurance Industry

Insurance companies are major investors in the global economy by managing their customers' capital. The role of insurance companies is to act as an intermediate financially in the allocation of capital (Buckham et al., 2010). At the end of 2015, Swedish insurance companies' investment assets amounted to SEK 4,008 billion. This represents 69 percent of the stock market value in 2015. The capital is mainly invested in shares, mutual funds and fixed income securities, but also in real estate and infrastructure (Svensk Försäkring, c.2015a).

According to Insurance Sweden, the Swedish insurance industry constitutes of 369 registered insurance companies (Svensk Försäkring, 2013). There are two types of insurance companies, life insurance and non-life insurance companies. The transferred risks life insurers bear is connected to the policyholder's life and health. Life insurances are also usually a type of saving. Occupational pensions insurers are a certain type of life insurers, which are not regarded in this report due to not applying the Solvency II regulations. Within non-life insurance, there is a variety of insurance products covering a variety of risks, such as property, liability, legal expenses, assault, and travel (Svensk Försäkring, c.2015b). The majority of non-life insurance companies are small local companies. The market is concentrated to a few large companies where the five largest companies account for 83 percent of the market in terms of premium income. In comparison, the five largest companies in the life insurance industry constitute of 59 percent of the total premium income (Svensk Försäkring, 2013). Appendix A contains a list of the eleven largest life and six largest non-life insurance companies in Sweden together with the market share of each company.

### 2.2 Risks Insurance Companies Face

Insurer Solvency Assessment Working Party (2004, pp. 26) defines risk as *“the chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood.”* The risks life and non-life insurance companies face must be evaluated in order to meet the Solvency II regulations. The restriction on an insurance company for insuring a particular risk is that it needs to be identified in order to be able to price it. This is due to that many of the risks an individual can be exposed to are not possible to insure since the

uncertainty is fundamental. For both insurers and policyholders to benefit from the contract, an insurable risk needs to be identified in comparison to the uncertainty of measurable consequences. This means that the risks must be defined with concern to a specific series of events that occur within a specific timeframe. Therefore, the most important parameters to consider for each hazard during the risk modeling are Volatility, Uncertainty, and Extreme Events (Insurer Solvency Assessment Working Party, 2004, Buckham et al., 2010), which are further explained in the following sub-section 2.2.1. Through these specifications, the insurance company is able to increase the potential efficiency through the merger of risk. The total risk for each participant in the merge decreases as the number of participants increases, which also leads to lower premium. This is due to the risks are spread through diversification across geographical locations, sectors of the economy, and risk objects (Buckham et al., 2010). Henceforth, the major risk types insurance companies are exposed to are explained in the subsequent sub-section 2.2.2.

### **2.2.1 Key Components of Risk**

According to the Insurer Assessment Working Party (2004), *Volatility*, *Uncertainty*, and *Extreme Events* are the key components of risk insurers need to consider particularly for each hazard during the modeling of risks as mentioned previously.

#### ***Volatility***

Insurer Assessment Working Party (2004) refers to the volatility as the risk of a random variation in the frequency or in the severity of an unforeseen event. It reflects that the risk diverges from its expected or average result. The volatility of the average claim amount decreases as the independent insured risk increases; this means that the risk is diversifiable (Insurer Solvency Assessment Working Party, 2004).

#### ***Uncertainty***

Uncertainty means the risk within the used models for estimating the requirements or other processes are miss-specified, often called ‘model error’ risk according to Insurer Solvency Assessment Working Party (2004). Uncertainty also refers to the risk that the parameters within the used models are misestimated and can change over time. The risk of uncertainty is not reduced if the size of the portfolio increases, which means that the risk is non-diversifiable (Insurer Solvency Assessment Working Party, 2004).

#### ***Extreme Events***

For a company as a whole, stresses such as extreme events are associated with high-impact and low-frequency (Insurer Solvency Assessment Working Party, 2004). These events can be hard to imagine since those often have never occurred earlier. These require special considerations since the fluctuations might be so extreme that independent management strategies are needed. The extreme events can affect the fluctuations of any risk to be much higher than what is expected and modeled. The extreme events are one-time shocks and the loss value of it is usually difficult to estimate accurately. This leads to that the amount of capital to hold to cover these risks is also hard to define (Insurer Solvency Assessment Working Party, 2004).

## 2.2.2 Major Risk Types

The five major risk types according to the Insurer Solvency Assessment Working Party (2004) are *underwriting risk*, *market risk*, *credit risk*, *operational risk* and *liquidity risk*. These risks, except the liquidity risk, are the foundation of the capital requirement within the Solvency II and are followed up by either a standard model or an internal model. These models are further explained in section 2.4.3 under Pillar I. In this case, the risks are presented separately but they do not always occur exclusively (Buckham et al., 2010).

### *Underwriting risk*

*Underwriting risks* are identified by the insurance company and are covered by the insurance contracts that are sold. This means that all contracts underwrite a risk with uncertain occurrence, which are charged by a premium in return (Insurer Solvency Assessment Working Party, 2004). The underwriting risks mean the risk of losses for which the insurance outcome is different than expected (The Economic Times, n.d.). The underwriting risks an insurance company is associated with include both the risks of insufficiently assessing the risk categories and the processes of selecting and approving the risks to be insured (Insurer Solvency Assessment Working Party, 2004). It is possible to make more predictable underwriting results if standardized contracts are used for smaller risk types and the underwriting risks can therefore be more homogenized. In order to avoid potential financial losses, the first consideration to minimize underwriting risks is to set criteria for the risks that need to be selected and approved. The accepted insurance contract needs thereafter to be priced sufficiently to support obligations that might arise from them. By putting attention to product design in order to avoid unanticipated risk exposures, it is possible to decrease the risk of selection and pricing (Buckham et al., 2010).

### *Market risk*

In general, the *market risks* are related to the changes in value of invested assets (Insurer Solvency Assessment Working Party, 2004). Market risk is the most important factor for life insurance companies. This depends on the duration of funds needs to be consistent with the long-term obligations. It is not possible for an insurer's investment portfolio to exactly reflect its liabilities since the future payouts are unknown. A financial institution's vulnerability to market risk can be formulated in terms of loss distribution, more known as *Value at Risk*, *VaR*. This is defined as the most substantial loss that might occur over a specified time period with a certain probability. VaR is affected by factors such as *interest rate*, *equity prices*, *property prices*, *currency prices*, and *concentration risk* (Buckham et al., 2010).

The largest impact on the value on all different types of financial instruments is the *interest rate*, which affects both liabilities and assets. It is the most dominant risk driver for bonds and fixed income securities, on the asset side, while also having a major impact on the value of liabilities. Since non-life insurers underwrite short-term contracts, the assets are more commonly hold for a longer duration compared to the liabilities. Therefore, an increase in interest rate is harmful to the equity value due to a larger decrease in the value of assets compared to liabilities. For life insurers, on the other hand, it is more common to have unmatched portfolios with liabilities of long-duration. This means that the specific product set of an insurer influences the net impact. However, there are instruments that makes it possible to hedge the risk of interest rate (Buckham et al., 2010). Furthermore, there is a risk of a decline in value of *equity*, *property* and *foreign*

*exchange currency* as a result of changed prices in equity and property and also of changed foreign exchange rates. There are developed instruments for hedging foreign exchange exposures and equities. However, there is not a market for hedging property instruments due to the general varying characteristics of property risks, which makes them often regarded as unhedgeable. *Concentration risk* emerges, on the asset side, due to a lack in investment diversification crosswise economic sectors and geographical areas. Similarly, concentration risks for the liability side refer to a lack in the diversification of the business within policy type, underlying risk coverage or geographical area (Buckham et al., 2010).

### ***Credit risk***

A significant part of an insurer's investment portfolio consists of bonds where the largest part is within corporate bonds. The *credit risk* is the counterparty's default risk on securities in the investment portfolio. This is due to the insurance company has a vulnerability to counterparties, such as mortgagors, in form of reinsurance contracts or derivatives. Within credit risk is also settlement risk, which is the risk caused by a time delay between valuation and settlement of a security. The settlement risk is therefore associated with the risk of a change in value. An investment portfolio's credit risk is defined in terms of a loss distribution corresponding to credit VaR or VaR of market risk. In addition, insurers can use reinsurance, further explained in section 2.3, to transfer their risks, which results in that reinsurance default risk constitutes of an important source of credit risk vulnerability. The insurance company's solvency might be threatened by the reinsurance default during an occurrence of a catastrophe. It is therefore essential to make careful and thorough considerations of the reinsurer's financial stability. To be able to maximize the level of coverage per reinsurer, the consideration should be done in accordance to credit ratings and diversification among other reinsurers (Buckham et al., 2010).

### ***Operational risk***

*Operational risk* refers to the risk caused by incomplete or failed internal processes, systems, external events or people, which result in losses. Also, legal risks are included in the operational risks meanwhile strategic, business and reputational risks are excluded. The broad definition of operational risk entails challenges with quantifying the risks reliably. This is due to the lack of internal data on losses on this risk type that may prevent reliable estimation of probability distribution functions. Additionally, the actual loss consequence due to a specific event is usually difficult to quantify exactly. It is also a challenge to distinguish operational risk events from market, credit and underwriting risks since it often overlaps the other risk types. For instance, it might be impossible to distinguish operational losses caused by insufficient or failed underwriting processes from underwriting losses in practice (Buckham et al., 2010). An insurance company therefore needs to evaluate the portion of the underwriting losses that is really a result of inadequate or incorrect underwriting processes (Insurer Solvency Assessment Working Party, 2004).

Operational risks differ from other risks when it comes to risk and return. The difference is that a higher operational risk does not increase the return on equity as financial risks typically do; rather it destroys the corporate value since it is connected to the risks within operations rather than the financials. It is essential to understand the operational risk characteristics in the business processes, systems and products. Continuous update of these is therefore needed (Buckham et

al., 2010). The operational risks that are identified to have a large negative impact on the business should be managed by having continuity plans in place (Buckham et al., 2010), meaning a plan for the organization to follow when sudden events occur that disrupt the continuity of the business (Intrieri, 2013). Meanwhile, insurance should be taken into account as a hedge against high-impact and low-frequency event that possibly could generate in catastrophic losses (Buckham et al., 2010).

### ***Liquidity risk***

*Liquidity risk* is the risk arising from insufficient liquidity for an investment that can neither be bought nor sold quickly enough to minimize or avoid losses. There are two types of liquidity risk, namely *asset liquidity risk* and *funding liquidity risk*. *Asset liquidity risk* means the risk of not managing a transaction at an assumed market price. It is affected by illiquid or distressed markets and occurs when an asset is sold in order to meet the requirements of a funding but not realizing its expected value. For life insurance companies, asset liquidity risk is of special importance due to their long-term investment timeframe that could pose a challenge to manage a transaction at an assumptive market price. Non-life insurance companies are normally not exposed to asset liquidity risk in the same manner as life insurers since their assets and policies are of a shorter duration. However, liquidity stresses are noticed within a decrease in renewal of contracts or sales of new contracts since these are of short-term for non-life insurers, or substantially in the appearance of a catastrophic event due to the vulnerability to this (Buckham et al., 2010). *Funding liquidity risk* arises due to the interest to meet claims or redeem deposit (Buckham et al., 2010). It is when an insurer is unable to meet its obligations immediately (Drehmann and Nikolaou, 2010).

Liquidity risk differs from the other risk types in the sense that liquidity risk is managed within the risk management of Pillar II, which is further explained in section 2.4.3, in Solvency II. However, the liquidity risk is normally highly correspondent to one or more of the other four risk types. This is due to changes within market conditions, credit conditions, and policyholder behaviors have an impact on the liquidity risk. Integrated analysis on the possible impact on cash flow pattern is therefore needed for liquidity risks (Buckham et al., 2010).

## **2.3 Reinsurance**

Reinsurance is a risk management tool for insurance companies due to the ability to transfer the risk to another party. Reinsurance reduces the required capital to be held due to the ability to mitigate risks and to reduce the amount of assets (Insurer Solvency Assessment Working Party, 2004). Buckham et al., (2010) explain the diversification of catastrophic risks leads to the reinsurer reduces the key components of risks, as mentioned previously, uncertainty, volatility and extreme risk. To decrease the pressure on capital and to increase a more stable profit stream, insurance companies can carefully use reinsurance to shift their risk off the balance sheet (Schwarz et al., 2011). Since the capital hold by an insurer is calculated as the difference between assets and liabilities, reducing the assets by paying for a premium to the reinsurer would reduce the amount of capital hold (Schwarcz, 2015, Botzen et al., 2010).

The role of reinsurance companies is to secure insurance companies' future payments to their policyholders. This means that the risk that an insurer has written is transferred partly to the reinsurance company that charges a fee in return (Bank of England, 2015). Reinsurers diversify

the risk through spreading the risks globally, which aids to avoid the exposure to local risks. This means that reinsurers have a stabilizing effect on the local insurance markets (Brahin et al., 2013). Reinsurance companies are exposed to systemic risks, which is the risk of an entire financial market to collapse causing instability to the financial system. Causes of systemic risks are for instance natural disasters, financial or technological. The low interest rate is an example of a financial systemic risk (Swiss Re, 2015a).

## **2.4 The Solvency II Directive**

This chapter contains a description of the policymakers behind the directive and intended objectives with it. The structure of the directive with a deeper discussion of the including pillars are further explained in this section.

### **2.4.1 Policymakers of the Directive**

The European Commission, EC, is responsible for developing legislations for European Union, EU, including the financial sector and insurance industry. The development of drafts of technical standards and advisement to the EC on the development of EU legislations for the insurance industry is the responsibility of the European Insurance and Occupational Pensions Authority, EIOPA. These standards are further adopted by the EC in forms of regulations and decisions (Finansinspektionen, 2010). Solvency II was developed by the EC along with EIOPA, and was adopted as EU legislation by the EC in 2009. The application of Solvency II was postponed in 2013 followed by an amendment, containing both revision and supplement, named Omnibus II in 2014. Solvency II was taken into effect by January 1, 2016 of both life and non-life European insurance companies (European Commission, 2015a, EIOPA, c.2015). In Sweden, the Financial Supervisory Authority, FSA, is responsible for supervision, regulatory issuance and authorization of financial markets and financial firms (Finansinspektionen, n.d.). The authority is an authority under the Ministry of Finance within the government (Sveriges Riksbank, 2013).

### **2.4.2 Objective of the Directive**

It is fundamental that insurers always can meet its obligations to policyholders. In order to prevent that a company lacks the ability to deliver on this promise, insurance companies must be solvent, meaning that it has capital. It is therefore important to have proper requirements on the solvency of insurance companies. The previous Solvency directive was lacking in the aspect of properly reflecting the risk on the capital base and having supportive risk management practices. In addition, the intervention in the event of insolvency was limited due to insufficient warning and power of supervisors and regulators. Solvency II improves the protection of policyholders by bringing a radical change in terms of capital requirement, risk management models, and increased transparency to the market. The objective of the new Solvency directive is to increase the insurance sector's reliance and stability (Buckham et al., 2010).

### **2.4.3 Structure of the Directive**

Solvency II constitutes of three pillars: the first concerns *quantitative requirements* regarding the capital hold by insurance companies, the second *qualitative requirements* regarding risk management practices, governance and control, and the third *transparency* to the market. These three pillars are further explained in the following sub-sections.

## ***Pillar I***

The first pillar constitutes of insurance companies' *quantitative requirements*, which is the capital hold by insurance companies tailored to the risks a company is exposed to (Goggin and Chisholm, 2008). The risk-based capital framework refers to insurance companies holding sufficient capital to cover all risks that a company faces (European Commission, 2014, Brahin et al., 2013). This creates a better understanding among insurance companies of the risks a business is faced with. The risks covered in the capital requirement include underwriting, market, credit, and operational risks while not the liquidity risk (European Union, 2009). The available capital for firms is calculated as the excess of assets over liabilities. Furthermore, this pillar imposes that assets and liabilities are market valued, which creates consistency in the markets (Brahin et al., 2013).

There are two types of capital requirements insurers must calculate, solvency capital requirement, SCR, and minimum capital requirement, MCR. SCR is the economic capital of insurance and reinsurance undertakings that insurers must hold in order to be able, with 99.5 percent certainty, to meet their insurance obligations to both policyholders and beneficiaries over the next twelve months. In comparison, the MCR is the solvency level that ensures that a company can meet its commitments with a security of 85 percent certainty (European Union, 2009). SCR is the main tool for calculating a company's solvency level. It is the insurance company's VaR connected to the probability of an event to occur once in two hundred years (Ernst & Young, 2008, Brahin et al., 2013). On the other hand, insurers should keep the solvency level at SCR according to the Solvency II regulations. However, if it for some reason falls to the MCR, actions by supervisors are initiated. This intervention could lead to the transfer of the portfolio to another insurance company or to constrain new businesses to only existing (Buckham et al., 2010).

The calculation of a company's capital can be done either by a standard model or an internal model. Companies could also apply a partial internal model, which is a combination of an internal and standard model. Internal models should be applied to both the asset and liability side of the balance sheet. It is a better reflection of a company's risks while not obviously reduces the capital base (Buckham et al., 2010). The Swedish FSA must in Sweden approve internal models (Finansinspektionen, 2015a).

## ***Pillar II***

The second pillar deals with *qualitative requirements*, which is concerned with rules governing companies' internal capital assessment. This pillar puts requirements on qualitative risk management that is connected to the quantitative capital required in Pillar I. Companies must strategically assess three different core implications: to be responsible of leadership for risk management, to clearly link risk strategy to the business strategy, and to manage and control the company's risk-bearing capacity. In addition, the pillar also imposes requirements on the governance structure and key mandatory functions required for all insurance companies. These key mandatory functions are actuaries, compliance, risk management, and internal audit (Hay et al., 2011).

Own Risk and Solvency Assessment, ORSA, is a requirement to fulfill Pillar II and is a vital part of a company's qualitative assessment of their own risk. It is an internal forward-looking process

for the self-assessment of a company's exposed risks, the corresponding capital requirements and adequate capital resources. It requires that companies assess their own solvency and financial position (Hay et al., 2011). The process is useful for the management and board to increase their understanding of the risks and possibilities a company faces during current business plan. The business plan is evaluated both from assets and liabilities and is mainly tested on the *strategic goals a company has, risk appetite, risks the company expects to face within medium-term in the achievement of the strategic goal, and whether the company has a capital planning in accordance to their goals and the regulatory framework* (Financial Compliance Group). The Swedish FSA refers to risk appetite as the level and direction of the company's risks, which can be accepted to reach the company's strategic goals (Finansinspektionen, 2014).

### ***Pillar III***

Reporting and disclosure to the market requirement is what Pillar III constitutes of. This aims to increase the *transparency* of the insurance market, publicly to stakeholders and privately to supervisors (Heisen et al., 2014). The barriers to entry are reduced through increasing the transparency in the market, which enhances the competition in the market (European Commission, 2014). The third pillar contains the obligation to continuously report, both annually and quarterly (Heisen et al., 2014). The annual public report has a standardized format in order to simplify the possibility to compare different companies. This report includes a reflection on the company's risk profile, such as exposure, mitigation, sensitivity, and concentration, of each risk category. In addition, companies must report their SCR and MCR calculations as well as a potential deviation of an internally calculated capital base from that of the standard model. Quarterly, companies are obliged to report to supervisors, the FSA in Sweden for Swedish insurers, with a less extensive report compared to the annual report. There is also a more extensive report required to publish privately for supervisory review. This includes the company's business and risk strategies accompanied by continuity plans. In addition, a more thorough explanation to the results obtained from the internal model is required to be disclosed in this report. Reflection upon issues in regard to legislation and regulations that affect the insurer and any deviation in planning compared to prior report should be included. Finally, it should include apprehension of future solvency needs, revisions in risk exposure and projections in underwriting performance (Buckham et al., 2010).

### 3. METHOD

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*In this chapter, the conducted research methods are presented.*

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The chapter is structured with initially presenting the *Research Approach and Philosophy* followed by the *Research Design*, which is how the problem formulation becomes researchable. Furthermore, the underlying methods of the research design are described thoroughly including the compilation of a literature review and collection and analysis of primary data through interviews and questionnaire. Finally, the *Reliability, Validity and Generalizability* of the research methods, and *Ethics* of this research are discussed.

#### 3.1 Research Approach and Philosophy

The purpose “*to investigate how insurance companies have adjusted to Solvency II*” is argued to be an unexploited field of study due to the implementation recently occurred. This induces that the research was approached towards the inductive research process. Inductive research is defined as a study where observing the reality leads to the development of theory (Collis and Hussey, 2014). It involves collecting and analyzing data, in this case through interviews and a questionnaire, to form theory, which is further related to the existing literature in order to validate or complement the theory (Robson, 2002). This is beneficial for a research area that is unexploited (Saunders et al., 2009). Although the research area is regarded as an unexploited field of study, there are existing research that is predictive in the outcomes and effects of Solvency II. The authors of this study were well versed in the existing predictive research prior to the collection of empirical data. However, this did not shape the collection of theory from observation and the authors were prepared for that the empirical data could lead to alterations in the theory. The purpose is argued to be of exploratory nature, which means that dimensions of the problem are identified and discovered that has not yet been explored (Blomkvist and Hallin, 2015). An exploratory purpose is suitable when it is intended to find out what is happening or to seek new light in a phenomenon (Saunders et al., 2009), which in this research is Solvency II. Since an unexploited field of study is researched, an exploratory purpose is suitable due to the outcomes of the research are unknown (Sahu, 2013). During an exploratory research, the authors should take advantage of the flexibility and simplicity to adapt to changes (Saunders et al., 2009). The authors of this research have shown this in the iterative process of their research questions and purpose during the literature review and collection of primary data, which is further explained in the *Research Design* in the following sub-chapter. An inductive approach, creating theory from the observation of the reality, is suitable for an exploratory purpose since the exact effects searched for are unclear (Blomkvist and Hallin, 2015).

Moreover, the research is interpretivistic, which means that investigating the phenomenon of Solvency II is affected by the research itself. This is explained by the researcher being part of the research. Therefore, the researcher’s view of the reality is socially constructed meaning that social actors, the authors in this research, have different interpretations of a situation. The research findings can only be applied within a certain context and is connected to a certain type of method. Interpretivist research is approached with qualitative methods meaning that it is

shaped by the researchers' perception due to the impossibility to separate the reality from the thoughts of researcher. The data should not be regarded as knowledge just because one interviewee expresses something; rather the focus should lie in the details of a situation. This is captured in in-depth interviews making them suitable for interpretivist research (Collis and Hussey, 2014, Saunders et al., 2009).

### 3.2 Research Design

The strategy and choices of the research process, and the time horizon for conducting the research are considered in the process when designing the research (Saunders et al., 2009). This research was conducted with a *mixed methods approach* over a *cross-sectional* time horizon. In this research, the research strategy is qualitative methodology and consisted of collecting and analyzing data aiming to validate complement or contradict the existing theory. It is suitable to this research's exploratory purpose, described in the previous sub-chapter. Data was initially collected from interviews but was further extended to a questionnaire to obtain primarily qualitative data, which is described in sub-section 3.2.3. The collected data was further analyzed in order to form theory concerned in sub-section 3.2.4. The research design is qualitative; therefore data collection through interviews is suitable to get a deeper understanding of "*How insurance companies have adjusted to Solvency II*", which is of interest. The *mixed methods* choice of this research is the use, but not combination, of several methods to collect data. This means that the data collected from the different methods are analyzed separately (Saunders et al., 2009). In this research, the mixed methods approach is referred to the collection of data through both interviews and a questionnaire. The reason to pursue mixed methods was to attain *complementarity* in order to generate deeper knowledge within one specific field of study, namely investments. Complementarity is the use of several methods to address different aspects of an investigation (Saunders et al., 2009). During the interviews, a lack of knowledge regarding companies' investment behavior was noticed. The reason was that many insurers use external fund and asset portfolio managers for their investments. In addition, this subject was also not included in the interviewees' main field of work. Therefore, the questionnaire complemented the data obtained from interviews. The *cross-sectional time* horizon refers to the phenomenon, adjustments of insurers' businesses due to Solvency II, being investigated at a specific time (Saunders et al., 2009). In this study, the investigation of Solvency II was carried out at an early stage after Solvency II fully entered into force. This research collects data from different organizations within the insurance industry at a specific time.

Furthermore, the research design can be thought of in terms of *explanandum* and *explanans* according to Blomkvist and Hallin (2015). *Explanandum* is the phenomenon being investigated in a research, in this case the adjustments of insurance companies due to Solvency II. *Explanans* is the use of material for investigating a certain phenomenon. In other words, the explanandum, of understanding the effects of Solvency II, is investigated by the explanans. The gathering of empirics through interviews and questionnaire, the explanans, serves to understand the explanandum (Blomkvist and Hallin, 2015).

The research has an iterative approach, meaning that vital components of the research were continuously revised as a result of the acquisition of new knowledge during the research process (Blomkvist and Hallin, 2015), which is demonstrated in Figure 2. An initial preliminary research question was developed early in the process. The commissioning company, SI Consulting,

initially presented the research topic, Solvency II. A problem formulation was formulated based on this complex research topic. Furthermore, a *Preliminary Study* through reviewing existing literature within the regulatory framework Solvency II, two initial interviews and discussion with supervisor at SI Consulting was necessary and contributed to the researchers initial understanding of the problem, which is described in more detail in the following sub-section 3.2.1. The iterative process of the purpose and research questions together with initially the *Literature Review* and further with the *Primary Data Collection*, especially through interviews, is demonstrated to the left in Figure 2. The iterative research approach was not only applied on the purpose and research questions, but also for other parts, such as the *Literature Review*, in order to only contain valuable information for the specific purpose of investigation. Moreover, the *Primary Data Collection* initially constituted of *Interviews* and was further extended to *Questionnaire*, which was also used for iteration. The collection of data through questionnaire was initiated after some interviews had been conducted and was thereafter executed simultaneously with the interviews. When the literature review and collection of primary data were completed, the final problem formulation, purpose and research questions were set. Thereafter, the *Analysis and Discussion*, and *Conclusion* were initiated and conducted simultaneously until the end of the research process.

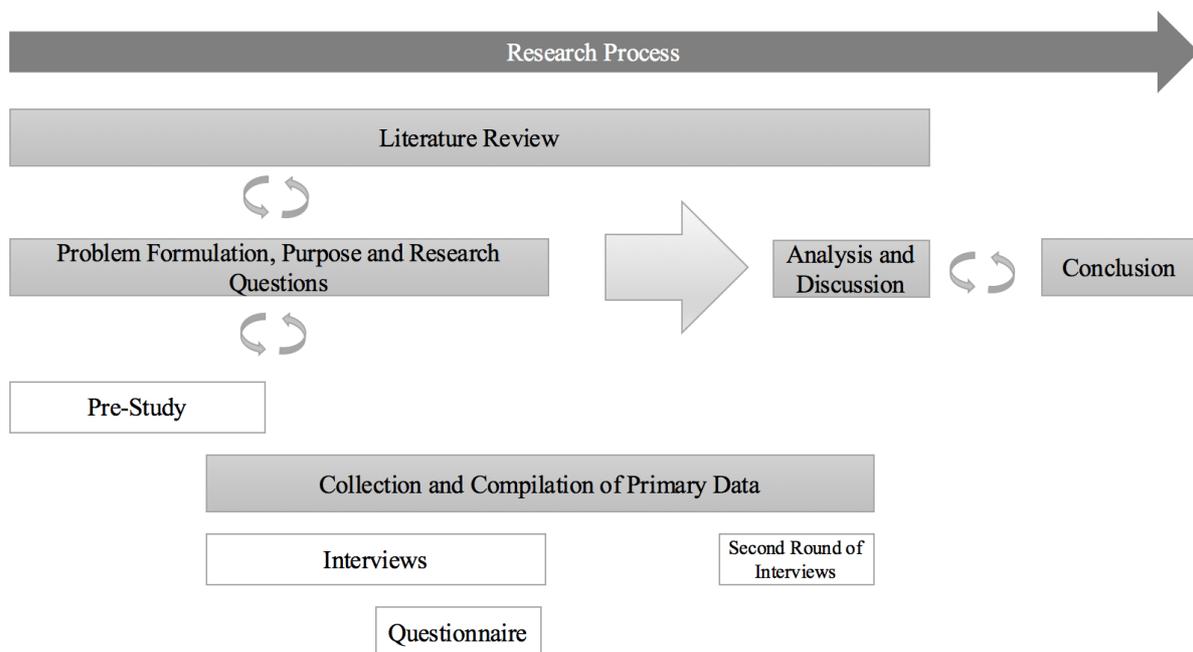


Figure 2: Illustrative representation of the designed research process

The following sub-section contains a description of the *Preliminary Study* conducted in this research followed by the process of compiling secondary sources in the *Literature Review*. The consecutive sub-section describes the *Primary Data Collection* interviews and a questionnaire. Lastly in this sub-section, the analyses of the primary data collected are explained in the *Data Analysis* sub-section.

### 3.2.1 Preliminary Study

At the beginning of the research, a preliminary study, also called a pre-study, was carried out. Saunders et al., (2009) describes the objective of a pre-study is to increase the researcher's understanding in order to refine the research question. The pre-study consisted of a broad and

unstructured literature search within Solvency II and two initial semi-structured interviews. In addition, discussions with the supervisor at SI Consulting, possessing solid knowledge within compliance of Solvency II for insurance companies, contributed to enhanced understanding of the actual problem. This was valuable for the foundation of the actual scope of the study.

The literature search was performed to explore the subject and to grasp common areas of investigation within Solvency II. In addition, common methods of investigation of Solvency II were identified. Initially, the literature search had a wide scope and contributed to gaining an overview of the functions and objectives behind Solvency II. This was done by overlooking the Solvency II directive by the European Commission and EIOPA. This directive is extensive and contains all regulations required for insurance companies to apply. The directive served to get an overview of the required functions and regulations; however, a study in detail was not feasible due to the extent of the framework. Occasionally, the directive was used to validate other sources by searching for keywords within it. In addition, published video seminars by the Swedish Financial Supervision Authority, FSA, were valuable since this authority is responsible for regulating financial markets in Sweden. Subsequently, reports published by many of the largest management consulting firms were studied. These reports generally explore what Solvency II is, how to implement Solvency II and the predicted impacts on the insurance companies. In this research, these reports were of importance to increase the general understanding and knowledge of Solvency II and the insurance industry. In addition, those served to grasp common fields of investigation in the context of Solvency II and as a basis for designing the interviews.

From the literature search, a preliminary semi-structured interview guide was compiled. The preliminary interview guide had the same questions but a different structure as the interview guide presented in Appendix B that was used for the remaining interviews. Before the interviews were held, the commissioning company, SI Consulting, were given the opportunity to review the questions and to add additional questions if desired. This was done in order to secure that all parties were satisfied and to ensure the questions fulfilled the requirements of the study. This interview guide was then tested in two initial interviews with Interviewee 2.1 and 2.2. Since the pre-study interviews had the same questions as the remaining of the interviews but were structured differently, it was used as data collection as well, further explained in sub-section 3.2.3. Although the interviews were conducted as a pre-study, some relevant results were obtained and are presented together with the results from the remaining of the interviews. The interviews highlighted the issues and topics that were of most interest. However, these interviews did not contribute to the results to the same extent as other interviews, which can be noted in the *Results from Interviews and Questionnaire* chapter.

During the pre-study, key themes of this research in the context of Solvency II were observed and generated in the continued structure of the literature review and interviews. These themes are *Business and Organizational, Capital Requirement, Risk Management, and Low-Frequency and High-Impact Risks*. These themes are further explained in the sub-section 3.2.3, *Primary Data Collection under Interviews*. The presentation of the *Literature Review, Results From Interviews and Questionnaire, and Analysis and Discussion* are organized in these pre-defined themes. Structuring these equally creates consistency and shows a clear context of the report. The authors are aware of the different levels of the themes and the reader should be aware that there are overlaps between them. For instance, the questionnaire focuses on investments, which can be regarded as part of the capital requirement since it is an underlying component of it, but it also

has an effect on the business. Furthermore, *Low-Frequency and High-Impact Risks* are concerned in all the themes as it contributes to business and organizational changes, requires capital requirement considerations and effective risk management. However, in this thesis the themes are considered to weigh equally and are assigned the same level for simplicity reasons. An illustration of these themes is shown in Figure 3 below to get a clear overview of the different levels and what is included in each of them. The theme low-frequency and high-impact risks are connected to all three, business and organizational changes, capital requirement and risk management, since it overlaps these but are assigned an own theme. Furthermore, each theme is underpinning to answer a sub research question. These together then answer the main research question: “*How have insurance companies adjusted to Solvency II at an early stage?*”

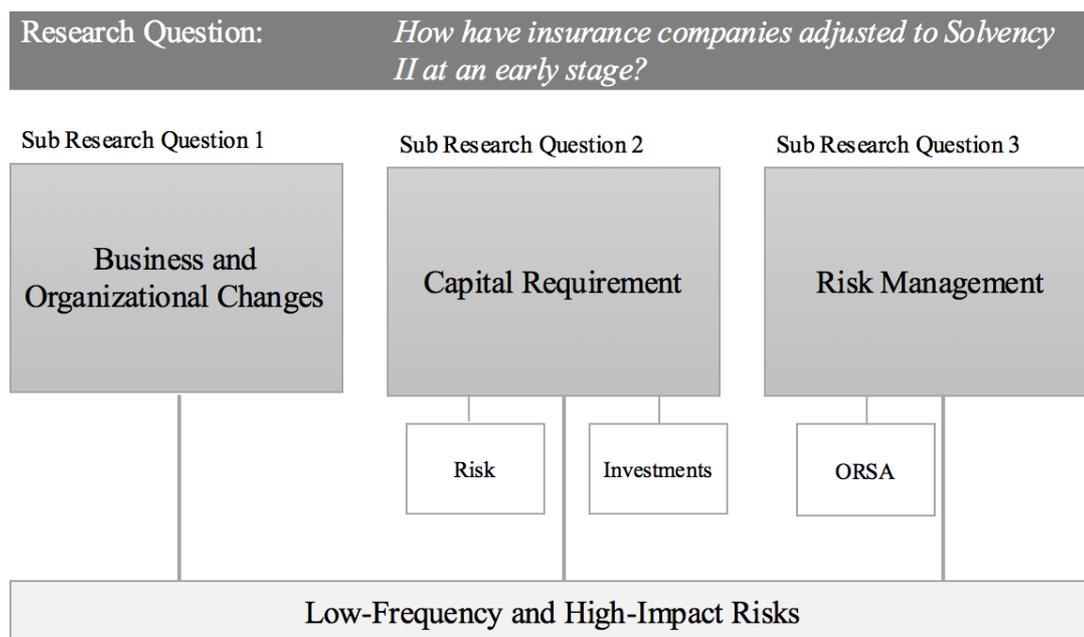


Figure 3: Illustrative representation of themes for the structure of the report

As the purpose and scope of the research were refined in the research process, more structured *Literature Review* was conducted, which is described in the following sub-section.

### 3.2.2 Literature Review

An extensive review of the existing literature in the field of Solvency II has been performed in this research. The reason to perform a literature review is to critically explore the current literature in the field of study, that is Solvency II. The literature review provides guidance for this research (Collis and Hussey, 2014). A more thorough and structured literature search contributed to the researchers’ enhanced knowledge of previous research within Solvency II. The continuous process of the literature review is importance due to the recentness of Solvency II entered into force and new literature frequently emerges. In addition, it is substantial for SI Consulting to receive the most recent information in order to be able to give current and valid advises to their clients.

The literature review has a *thematic analysis* approach. This means that the analysis of the literature is categorized by several themes in order to answer the research questions (Blomkvist and Hallin, 2015). The literature review is structured in the themes resulting from the study:

*Business and Organizational Changes, Capital Requirement, Risk Management, and Low-Frequency and High-Impact Risks.* At the beginning of the *Literature Review* chapter, a *Background to Regulatory Frameworks for the Financial Sector* is compiled. At the end, the chapter contains a *Summary* of the literature review compiling the main findings from the literature review, which leads to the research question of this thesis.

Reports published by many of the largest management consulting firms and investment banks, such as KPMG, PwC, EY, Boston Consulting Group, Goldman Sachs, and Bain & Company, were studied (e.g. Schwarz et al., 2011, Heisen et al., 2014, Hay et al., 2011). These reports were of interest since these had explored the subject matter at another point in time or at other geographical locations. This research complemented the predicted adjustments in the existing management consulting reports since it was carried out after the implementation of Solvency II. Academic reports were studied to review earlier research in the field of Solvency II. These academic reports were mainly searched for on KTH Primo, a search engine by the Royal Institute of Technology, KTH, which compiles primarily available sources for students enrolled at KTH. Previous research publications and thesis reports were identified on the institutional repository, DiVa, mainly for inspiration of research topics and research design, and contribution to literary sources in the field. Google Scholar was also used occasionally for searching for journal articles; however, the limited search functions constrained the use. Journal articles were valuable for evaluating common research methods and risk management models within the field. The literary sources were collected in an application called EndNote. The sources were structured by category containing a short description of each. In addition, the search function within the application enabled finding a source quickly to validate in arrears. The application was meanwhile also used for collection and handling of references.

Key words frequently used, separately and in combination, for the literature study include “*Solvency II*”, “*insurers*”, “*insurance industry*”, “*insurance company*”, “*Swedish insurance companies*”, “*effects*”, “*adjustments*”, “*Pillar I*”, “*Pillar II*”, “*Pillar III*”, “*capital requirement*”, “*risk*”, “*risk management*”, “*risk-adjusted capital*”, “*ORSA*”, “*climate change*”, “*low-frequency*”, “*high-impact*”, “*catastrophes*”, and “*natural disasters*”.

### **3.2.3 Primary Data Collection**

Data was collected through *Interviews* and the distribution of a *Questionnaire* in this research. Interviews and questionnaire are common methods of investigating insurance companies with regard to the effects of Solvency II on the industry in the literature. Interviews were conducted with the purpose to address the pre-defined themes that the *Literature Review* is organized accordingly to. Furthermore, a questionnaire was distributed in order to address a specific topic of interest that interviewees were lacking, namely investments with regard to *Capital Requirement*. These methods of collecting primary data are described elaborately in the following sub-section.

#### ***Interviews***

The method of conducting interviews with insurance companies aimed to address the main research question and the three sub research questions. Interviews are a method to obtain data on what the interviewees do, think or feel by the means of asking questions (Collis and Hussey, 2014). Thus, this method is appropriate in order to understand how insurance companies have

adjusted their business and what actions have been taken to meet the new requirements. Also, the interviews are forward-looking to understand how companies expect to adjust to the regulations in the future. Furthermore, interviews are a suitable method for this research since it is important to understand different stakeholders' perception of the new external requirements of the Solvency II regulatory.

A semi-structured interview guide was developed in advance of the interviews, during the pre-study, containing topics of interest for this research. This means that some questions were prepared for in advance and other questions arose during the interviews (Blomkvist and Hallin, 2015). The course of the interview, in terms of what questions and the order of questions, varied depending on the answers received from the interviewee. This approach was beneficial in order to let the interviewee speak more freely about their specific interest and expertise, and to obtain the interviewee's concepts and ideas (Collis and Hussey, 2014). The authors are aware of that some questions may not be asked during the course of semi-structured interviews. However, since the questions are assorted in certain categories in the interview guide, it could be ensured at the end of interviews that all categories were covered in all interviews. This restricts missing valuable information if not covering all areas of interest. For an exploratory research where the exact effects are unknown, open-ended questions are suitable in order to get the interviewee to talk around the question more openly, to address certain parts that have not been thought of in advance, and to obtain opinions on the framework (Collis and Hussey, 2014).

The interview guide is attached in Appendix C. It is also divided into the already mentioned categories of the report's structure but includes two additional categories, *Overview* and *Prospects*.

#### *Overview*

The purpose of the questions in the overview category was to get an initial understanding on advantages and disadvantages insurers notice with the regulatory framework. Furthermore, these questions were aimed for evaluating the consistency of insurer's viewpoint with the existing literature, as well as investigating insurers views on the appearance of Solvency II. Another goal was to investigate whether interviewees perceived the objective to be achieved.

#### *Business and Organizational Changes*

These questions address the imposed business and organizational changes of Solvency II, and also how insurance companies work to increase the risk awareness throughout the company. The questions concern risk management challenges within the organization and strategic changes.

#### *Capital Requirement*

These questions are of interest to get a perception of the capital requirement, part of Pillar I, and the imposed changes in the capital hold by firms. These questions also regard risks and investments. The questions within risks are investigated to see what the main challenges are with the risks and capital requirement, and if these impacts end customers. It was of further interest to investigate if Solvency II contributes to changes in investment portfolios.

#### *Risk Management*

Since the new regulations impact the risk management of the risks insurers are exposed to, it is of interest to investigate the adjustments to this. The aim is to investigate if companies notice

additional advantages of Solvency II due to the requirement of companies to evaluate their own risk and solvency assessment.

#### *Low-Frequency and High-Impact Risks*

These questions aim to explore if there is an existing gap in the literature and within the regulatory framework, Solvency II. The purpose is to investigate if interviewees consider the solvency capital requirement to cover risk of catastrophic events with low-frequency and high-impact. These are mainly aimed for non-life insurers, who are more affected by these types of events, such as extreme weather and natural disasters.

#### *Prospects*

This part aims to have a forward-looking assessment of the major changes, difficulties, and opportunities within the context of the Solvency II work. The questions address what insurance companies will focus their business on in the future and expected adjustments.

Moreover, when the interview guide was developed, it was used to investigate the Swedish insurance industry. The sampling frame of interviews for this study constitutes of life and non-life insurance companies in Sweden. From this, a population was determined of the largest life and non-life insurance companies since this study is delimited to study those. The market share in terms of proportion of total premium incomes defined large companies. Statistics for the insurance industry, by the Insurance Sweden (Svensk Försäkring, 2015), was used to compile the largest insurance companies. Appendix A contains a list of the largest life and non-life insurance companies in Sweden together with the market share of each company. This implies the population consists of 17 companies valuable for this investigation. Since this population is not too extensive, the entire population meaning all pre-defined large life and non-life insurance companies were selected for the study.

In total, sixteen interviews were conducted in this study, whereof six representing life companies, three representing non-life companies, two representing groups of life and non-life companies, three were anonymous interviewees, and the last two represented one reinsurance company and one at the FSA in Sweden. Although the aim of this study was to investigate large companies with a minimum of 1.5 percent market share, one interview was conducted with a smaller insurance company after recommendations. This was of interest due to the interviewee could contribute with exceptional insight in the subject matter and had knowledge and deep understanding of investment that other interviewees were lacking. The number of interviews was not predetermined. When the interviews were completed, similarities from the different interviews were observed and barely any new information was obtained; however, this did not cover the whole population as desired in advance of conducting the interviews. Appendix B represents a list of interviewees by organization and role, and their received designation. Designation 1.X represents non-life insurance companies, 2.X represent life insurance companies, 3.X represents groups of life and non-life insurance companies, and 4.X are anonymous interviewees. The “X” indicates a number making the combination unique for each interviewee. It would be of interest to present the type of insurance company, life or non-life, that the anonymous interviewees represent. However, since the population of insurance companies is not too exhaustive, this may lead to exposure of the company. When all the interviews with insurance companies were conducted and partly analyzed, a second round of interviews was then completed with a reinsurance company and the Swedish FSA. The interview

with the reinsurance company, denoted 5.1, was conducted to confirm interviewees' responses on the management of low-frequency and high-impacts risks through the use of reinsurance. Additionally, these were expected to be in the forefront of managing low-frequency and high-impact risks and was therefore of interest. The interview with the Swedish FSA, denoted 5.2, was done in order to discuss and evaluate the results from the conducted interviews with those responsible for regulating the Swedish financial market. It was of interest to evaluate if FSA and the insurance companies have similar opinions and if the regulatory framework has achieved the desired impact.

CROs, Chief Risk Officers, were the target position for the first round of interviews due to their executive responsibility to manage an organization's risks and their strategic role within risk management. In addition, CROs are commonly investigated in literature, which confirm their suitability in this research. Also, this creates better comparison with earlier studies since the same target group is investigated. However, interviews are time consuming, which made it difficult for some CROs to dispense time in their tight schedules to participate in this study. It is not mandatory to have a CRO in an insurance company, and some organizations have structured their organizations and risk departments without a CRO. This means that some organizations did not have a CRO. In these cases, other roles within risk management that had a great involvement in the organization's Solvency II work and desirably a great understanding of the strategic work within the organization were suitable interviewees, such as Risk Managers and actuaries. Multiple interviews were conducted with different roles in some organizations. The reason was either that it was suggested by the interviewee to meet with a certain person additionally, who could provide valuable information regarding this study, or to obtain different angles on the subject. Also, when the CRO was not able to participate, several interviews were conducted with reason to avoid missing information that one interviewee was not able to give. In addition, interviewing people involved in the risk management of low-frequency and high-impact events within non-life insurance companies was of interest for this study since it is concerned with evaluating the adequacy of the capital requirement of Solvency II of these risks. These risks require specific management. Therefore, interviews with natural disaster specialists and reinsurance managers were conducted in order to be able to gain knowledge regarding this subject. Interviews were considered a suitable method for investigating this due to the interest to explore and gain a deeper understanding of this subject and difficulty to develop pre-defined questions that could be used for designing a questionnaire. In order to explore the subject it rather required open-ended questions and a semi-structured approach, which can be obtained with conducting interviews. From an academic perspective, the in-depth interviews were considered to fill a gap in the literature regarding this subject on a deeper level compared to a questionnaire. In addition, there were only five companies that belonged to the non-life insurance industry as defined by this study making the number of interviewees not too extensive. There were already people from these companies that had participated in the study making it easy to obtain additional interviewees.

The interviewees were found through annual reports, company websites and the social media platform LinkedIn. These were further contacted via e-mail, through the InMail function available on LinkedIn or customer service available on company websites. In addition, the commissioning company SI Consulting provided contact information to some interviewees. The majority of the interviews were held face-to-face at the interviewee's workplace. This face-to-

face method of interviews is beneficial for the collection of comprehensive data when the interview questions are complex or sensitive for the interviewee (Collis and Hussey, 2014). For some interviewees, parts of the interview questions were sensitive to the company in competitive purpose. Thus, an opportunity to be anonymous was given to respective, both individually and by company. Few of the interviewees considered the questions and their contribution of information sensitive, and therefore did not request for anonymity. Due to geographical locations, two interviews were held via telephone. The duration of the interviews varied between 30 and 100 minutes with the majority lasting for approximately 60 minutes. The interviews were held in Swedish due to the nationality of the interviewees was Swedish. Translating the collected data into English contribute to a possible source of error, which is further concerned in sub-chapter 3.3 regarding *Reliability and Validity*.

During the course of the interview, documentation of it was obtained both by taking notes and through audio recording. Both researchers of this study were present at all interviews, one responsible for asking relevant questions in regard to the semi-structured interview guide, and the other responsible for taking notes. The person taking notes had the interviewee's responses available that could be followed up with complementing questions during the course of the interview. Blomkvist and Hallin (2015) confirm this is an appropriate course of action for interviews. Furthermore, the audio recordings of all interviews were listened to and transcribed afterwards. This enabled verification of the notes taken during the interviews to ensure that no uptake of valuable information was missed and possibility to clarify some responses. In addition, a summary of the data collected in the interviews were sent for the interviewees to review in order to ensure that it did not contain any sensitive information and to confirm the interviewers' understandings of the information obtained from the interviewee. Some interviewees wished to clarify some points, which was satisfied in the final report. Furthermore, a confirmation was received from all interviewees besides one anonymous.

### ***Questionnaire***

A questionnaire was designed in order to get a deeper knowledge and understanding of insurance companies' investment behaviors since this is one of the fields this study concerns. The objective of the questionnaire was to assess if fund and asset portfolio managers had noticed any changes within insurance companies investments due to Solvency II and if this has affected their business. In general, questionnaires are not suitable for conducting an exploratory research. This is due to that exploratory research requires many open-ended questions since the authors wish to explore the subject (Saunders et al., 2009). The questions in the questionnaire are specific and only allow investigating the questions that have been pre-determined. Since the questionnaire was used for complementary reason and was designed later in the research process, the researchers had acquired knowledge in the subject. Hence, it was easy to develop a questionnaire with pre-defined questions where the majority of questions had multiple-choice options. In addition, the questions were regarded as straightforward for the respondent to understand. Furthermore, the questionnaire contains open-ended questions, which contributes to the exploratory research purpose. Conducting interviews with more open-ended questions would allow exploring the subject further. The questionnaire contained some open-ended questions but it was only expected to obtain a short answer and it was up to the respondent to respond to the question. Despite the unsuitability provided by Saunders et al., (2009), a questionnaire was distributed in order to evaluate the investment behavior with regard to Solvency II. This was due

to it was considered more appropriate than additional interviews since it was possible to reach a larger target group and the design of straightforward questions. It was considered to be useful since the questionnaire contributed to information where a gap in the interviews was detected.

The questionnaire was written in Swedish since the requested respondents operated in Sweden and were expected to have Swedish as native language. It was designed in the online service Google Forms. Further, the questionnaire contains 21 questions concerned with the thematic categories *Capital Requirement*. Appendix D contains a translated version, from Swedish to English, of the distributed questionnaire. The online questionnaire link was sent via e-mail or through the in-mail function on company websites to mainly fund and asset management companies, but also investment banks, operating on the Swedish market. Some insurers list fund and asset portfolio managers on their websites that were of relevance to distribute the questionnaire to. Furthermore, portfolio managers operating in Sweden were searched for on the search engine provided by Google. It would have been of interest to distribute the questionnaire to the largest fund and asset portfolio managers for insurance companies in Sweden but such statistics was not found. The questionnaire was distributed to 53 companies that are compiled in Appendix E. Although all companies pursue fund and asset portfolio management, not all these companies had insurers as customers. Some of these companies replied explaining their unsuitability to answer the questionnaire. All respondents were anonymous by name and were also given the opportunity to be anonymous by company. It was of interest to connect the responses to a certain role regardless of what company, which is the reason of requesting the role of the respondent. However, some respondents even responded to be anonymous by role. There were 25 respondents to the questionnaire that had roles including portfolio managers, risk managers, Chief Financial Officers, CFOs, Chief Executive Officers, CEOs, and sales persons. The results from the questionnaire serves to get an indication from fund and asset portfolio managers regarding changes in investment behavior from their insurance company customers due to Solvency II.

### **3.2.4 Data Analysis**

In this section, the analyses of each data collection method discussed in previous chapter are described. Mixed method research, meaning the use of several methods, implies that the data is analyzed separately as mentioned previously (Saunders et al., 2009). The authors are aware of the advantages and disadvantages with the two ways of presenting the empirics; the results and analysis are either presented conjunctively or separately. After meticulous considerations, this thesis presents these separately with the same structure in order to distinguish between results and analysis, and to provide a clear and easy understanding of the results.

#### ***Interview***

The analysis of the interviews in this research consisted of *reducing the amount of data*, *presenting relevant results*, and *drawing conclusions* from these results (Miles and Huberman, 1994). This method Collis and Hussey (2014) refer to as *general analytical procedure*.

The *reduction of data* is the process of selecting data that can be used for the verification of final conclusions. It refers to "*the process of selecting, focusing, simplifying, abstracting, and transforming the data*" from transliterations (Miles and Huberman, 1994, pp.10). It is the researchers' decisions of what data to select (Miles and Huberman, 1994). Initially, each

transcribed interview, raw data, was analyzed individually and interesting aspects from each were selected by marking it in the interview transliteration. The aim was to reduce the raw data by selecting and focusing the data in the pre-defined themes. The interview material was reviewed to find patterns among interviewees that were used for focusing the further data collection. This is a certain type of method to reduce the data that is called *restructuring of the data*, which is the use of pre-defined categories that the data can be fitted into (Collis and Hussey, 2014). Blomkvist and Hallin (2015) refer to this approach as *thematic analysis*, which is the same approach used in the compilation of the *Literature Review*. The thematic analysis starts by sorting the material into each category and then analyzing each category independently to decide what each category should contain and how it should be presented. The data is reduced by the means of reflection of what is entailed in each category (Blomkvist and Hallin, 2015). The reduced data collected from each interview were compiled in each theme, and further compared and analyzed with other interview material to select new aspects and to complement or contradict the data from different interviews. The reduced data were then *presented as results* in the *Results from Interviews and Questionnaire* chapter. The presentation of relevant results is defined as “*an organized, compressed assembly of information that permits conclusion drawing and action*” (Miles and Huberman, 1994, pp. 11). It was continuously taken into consideration whether the presented results were relevant for the purpose of this research. It was also interesting to analyze what different groups, for instance in terms of the size of the company and types of insurance operations, did not agree upon and what the underlying reason of this could be in the *Analysis and Discussion* chapter. The data from interviews were analyzed with the literature since this is already reduced data and could therefore be compared directly with the presented empirics. Based on the results from the interviews, *conclusions could be drawn* based on what the majority of interviews agree upon and what certain groups agree upon. The conclusions were further verified with the reduced data and backed with the presented results (Miles and Huberman, 1994).

### ***Questionnaire***

The data from the questionnaire was analyzed in order to reach conclusions of overall investment changes from insurance companies. The questionnaire contained both closed questions with predetermined categories and open-ended questions where the respondents use their own words to answer the questions. Therefore, these two types of questions were analyzed differently. The data from the closed questions was initially analyzed through codification of the data, which the online service Google Forms provided, in order to evaluate how the majority of respondents had answered on each questions. The online service Google Forms uses a simple form of quantitative analysis by quantifying the share of respondents to each category, which Blomkvist and Hallin (2015) refer to as *nominal variable*. It is explained as studying the amount of responses to each response option and calculating the average by most frequent responses (Blomkvist and Hallin, 2015). Nominal data transforms the qualitative categories into quantitative data (Arvidsson, 2015). In this study, the empirical data from the questionnaire is presented in the *Results from Interviews and Questionnaire* chapter in terms of the category with the majority of responses and the share of responses to each category. Furthermore, the individual responses to open-ended questions were analyzed separately to find interesting aspects that could complement the interviews and explain certain behaviors. Therefore, the open-ended questions were analyzed similar to the analysis of data from interviews. Firstly, the responses were scanned in order to

obtain patterns and recurring themes among the respondents and the interviewees in order to *reduce the amount of data*. The data was used for complementarity of the interviews but also for contradictory reasons. Furthermore, the data was *presented as results* along with the interview results, however, solely within the sub-chapter *Capital Requirement* of the *Results from Interviews and Questionnaire* chapter. Finally, the results were used for *drawing conclusions*.

### **3.3 Reliability, Validity and Generalizability**

This chapter describes and discusses the *Reliability, Validity* and *Generalizability* of the research methods.

#### **3.3.1 Reliability**

Reliability refers to the precision of the results if the study was conducted over again (Collis and Hussey, 2014). The reliability of the literature review is perceived to be quite high. Authors have been recognized and used thoroughly in the report. The bibliography contains extensive information about the literary source. This should simplify the identification of literary sources by other researchers. In addition, the eligibility of various authors has been considered when reviewing the literature critically and mainly prominent authors' work has been used. However, the interpretation of the literary sources affects the empirical data. Other researchers may have a different interpretation compared to the researchers of this study. In this case, the reliability of the literature review would be lowered since the same empirics would not be obtained if the research was replicated.

The semi-structured interview guide is placed in Appendix C in English in order to be able to expand the research further and for the possibility to repeat this research. Furthermore, the data collection through interviews is connected to personal opinions. This means that different interviewees may not present the same answers. In order to obtain the same answers, the same interviewees must participate and the interviewer must ask the same order of questions, which limits the ability to replicate the interviews to get the same answers. Since the interview guide was semi-structured, it does not contain all questions exclusively. This means that not all questions asked during interviews are presented in the interview guide due to these depending on the individual interviewee's responses. This reduces the reliability of the study if it is repeated. The structure of the interview could also affect the answers of the interviewees as it may encourage or discourage some answers. Due to some interviewees are not presented in the report as a result of anonymity, this prevents the repeatability of these interviews.

The individual describes the perception and point of view of the respondent in an interview. There is no guarantee of the honesty in responses or comprehension of questions. The interviewee may also not be the most suitable respondent to the questions due to not possessing the required knowledge. These are instances that would reduce the reliability of the interviews. Since the interviewees were given the opportunity to participate anonymously, the honesty and ability to give reliable responses can be considered to increase, enhancing the reliability of this study. It is important to regard the material from the interviews as input to the research rather than truths. The quality of the material is dependent on the interpretation of researchers. During the analysis, comparable answers from different interviewees are being looked for. This enhances the reliability of the answers obtained in each interview (Blomkvist and Hallin, 2015).

The reliability of the questionnaire is increased since it is attached in Appendix D. This contributes to the possibility to ask the same questions again to the target group. The distributed questionnaire was in Swedish while the attached questionnaire in this research is in English. The differences between those versions are considered low and therefore should not alter the results if the questionnaire would be distributed once again. However, the reliability is lowered as no structured approach of finding the respondents have been conducted. An exclusive list of all the firms the questionnaire was distributed to is attached in Appendix E. Although it is possible to distribute the questionnaire to the companies in the attached list, there is no guarantee that the same respondents are contacted since the list does not contain any contact information. The respondents are presented anonymously making it difficult to replicate the distribution in order to achieve exactly the same responses.

Since the study is of the characteristic of interpretivist paradigm, the reliability is of less importance due to the base of a qualitative method whereas the validity has a greater importance (Collis and Hussey, 2014). This is discussed more thoroughly in the next sub-section.

### **3.3.2 Validity**

Validity is to what extent a researcher measures what it is intended to measure. Also, it refers to the extent of the results reflecting the intended phenomenon being investigated, which has been stated in the purpose (Collis and Hussey, 2014). Since the purpose is to investigate the insurance industry, the sample size of companies must be sufficient to reflect the insurance industry. The companies investigated represent the majority of the market, therefore, these are considered to be sufficient to represent the intention to investigate the industry. The interview questions were formed to answer the purpose of this study, which the literature review also confirms. In the literature review, almost exclusively has the original authors of the source been used and meticulous source criticism has been implemented throughout the research to increase the validity of the source.

Since the same research methods are used in the literature as in this study, this increases the validity of this research. This is due to that it has proven suitable methods of investigation regarding this subject. The choice of CROs is both because of their knowledge and insight in the subject. Also, it increases the comparability with the literature since CROs in different insurance companies are assumed to have similar knowledge, approach and responsibilities. One author of a literary source was also one of the interviewees. This strengthens both the validity of this source and this interview. Additionally, the choice of interviewees is further strengthened as this confirms the interviewees' knowledge within the subject.

It may not be appropriate to draw conclusions about the entire company based on one or a couple of interviews from employees. The more general questions are more concerned with an interviewee's emotions and viewpoints rather than how the company works. These are instances where the individual has a great influence on the answer and may diverge from the company. Therefore, it would have been beneficial in this research to conduct several interviews with different levels and position within a company. CROs and risk managers that are employed to work with risk could have a positive attitude to the enhanced risk requirements of Solvency II since it is within their area of expertise. In comparison, CEOs, for instance, may have a totally different view of the directive because these are generally more concerned with driving

profitability. Extending the research to conduct several interviews within a company would enhance the validity of this study. Since interviews are concerned with an individual's emotions and viewpoints, obtaining several interviews within a company would allow a greater understanding of the company by giving the opportunity to distinguish between individuals' viewpoints and the company. Moreover, the knowledge and expertise of interviewees may also affect the responses. However, since most of the questions require a basic level of knowledge, it was considered sufficient to work with Solvency II in the daily work to be able to answer the questions in the interviews.

As mentioned previously, a summary of the interview used for the result and conclusion in this study was sent to the interviewee for confirmation to avoid misunderstandings between the interviewee and interviewer. Since all interviewees confirmed the empirical data, this increases the validity of it and ensures the correct information is presented. Additionally, when the requested interview person, CRO or Risk Manager, were unavailable for being interviewed, several interviews were held with different persons with similar positions within the company. This was done to ensure that the interview questions were answered due to the different interviewees could complete, oppose or confirm each other. This increased the validity of the study further.

The investigation of investment behavior through the conduction of a questionnaire was performed due to this was not obtained by the interviews solely. Therefore, the questionnaire was designed in order to increase the validity of the study. The results should be seen as an indication and not representative for all fund and asset portfolio companies since not a sufficient sample size was investigated.

### **3.3.3 Generalizability**

Generalizability is the ability of extending the findings of a research to other cases or settings (Collis and Hussey, 2014). During the design of the research process, the aim of the interviews was to generalize the results to how the whole insurance industry had adjusted to Solvency II. To cover the whole population, 17 interviews with CROs or Risk Managers and 6 additional interviews with people involved in the evaluation of low-frequency and high-impact risks within non-life insurance companies would have been required. However, it was discovered that the view on the questions that were asked lead to achieving similar responses and only a small amount of new information was obtained in the last couple of interviews, which is the reason to consider 16 interviews is sufficient. Therefore, the research findings of this report are based on 14 interviews with insurance companies, and additional 2 second round interviews. It is considered to give a good indication since the industry had common thoughts on the subject. However, there could have been some new information obtained through the conduction of all the proposed interviews. According to Collis and Hussey (2014), the sample size is too small for generalizing to the whole industry.

The sample size within non-life insurance represent 86.2 percent in terms of premium incomes and the companies within life insurance represent 78.7 percent of the respective industry segment. With regard to the coverage of investigated insurance companies in the industry, it is perceived that the companies are representative to generalize the insurance industry. However, data was collected from large organizations having a substantial market share of the industry,

and implications for companies may therefore not be applicable to smaller companies. Since the purpose was to investigate the industry rather than the individual companies, it is seen as a good representation of the industry. The generalizability to other industries should be viewed as limited due to the fundamentals of the insurance industry has a vital consequence on the results. It could be viewed as an indication to the banking industry due to it belonging to the same financial sector as the insurance industry. Possibly, the study could be generalized to other industries if those got stricter regulations due to regulatory frameworks.

Since the information of the amount of fund and asset management companies operating on the Swedish market with insurance companies as customers is very limited, it is difficult to define the population size and the required sample size required for generalization. According the compiled list of fund and asset management companies, there are 49 companies of interest to investigate. This implies that a sufficient sample size should consist of nearly all of those listed. Since there are only 25 respondents to the questionnaire, this is not generalizable and should rather be seen as an indication of fund and asset management companies. In addition, this is not an exhaustive list of all fund and asset management companies, which in turn also makes the generalizability of the questionnaire hard to assess.

### **3.4 Ethics**

Collis and Hussey (2014) refer to ethics as “*the moral values or principles that form the basis of a code conduct*” (Collis and Hussey, 2014, pp. 30). Research ethical guidelines have been provided from both the European Union and the Economic and Social Research Council, which have contributed to ethical awareness.

Scientific works must manage the rules of ethics on a national level as well. In Sweden, the Swedish Research Council has stated four requirements all scientific work need to meet, including *the information requirement, the consent requirement, the confidentiality requirement, and the good use requirement* (Blomkvist and Hallin, 2015). These requirements have all been considered in this research. Before the interview, the interviewees were informed about the purpose of this study through receiving a written description by e-mail. This was further repeated in the introduction of the interview in order to secure the interviewees were aware of the purpose of the interview. The respondents to the questionnaire were informed about the purpose of the study in the e-mail distributed and before responding to the questionnaire in the Google Forms application. This serves to the obtainment of the *information requirement*. The iterative process of continuously updating the purpose has not affected the interviewees’ informed intended purpose of this research. By accepting the interview or responding to the questionnaire, the interviewee agreed to be studied fulfilling the *consent requirement* (Blomkvist and Hallin, 2015). In addition, a copy of all the information provided in the report was sent to the interviewee in order for the interviewee to consent to the information. The material obtained during the interviews and from the questionnaire has been handled *confidentially* and only used for the informed purpose of this study. This leads to achieving the ethical *good use requirement*. The interviewee, respondents and its corresponding company were given the opportunity to be anonymous, and with respect to this, they are not identifiable in the thesis (Blomkvist and Hallin, 2015). In addition, quotations and references are thoroughly used throughout the thesis in order to avoid plagiarism. This contributes to achieving the good use requirement (Blomkvist and Hallin, 2015).

## 4. LITERATURE REVIEW

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*In this section, existing literature concerned with the main research question, “How have insurance companies adjusted to Solvency II at an early stage”, is discussed. It is further the foundation for analyzing the research’s empirics.*

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The literature review is, as mentioned previously, structured to assess the *Business and Organizational Changes, Capital Requirement, Risk Management, and Low-Frequency and High-Impact Risks*. The context of each sub-chapter is of interest since it relates to the sub research questions. Initially, a *Background to Regulatory Frameworks for the Financial Sector* is presented in order to facilitate the understanding of the underlying reason to regulate the financial sector. A *Summary* of the main findings within the literature is compiled at the end of the literature review, which is the basis of this study.

### 4.1 Background to Regulatory Frameworks for the Financial Sector

This sub-chapter contains discussions of regulating the financial sector and provides a better understanding of the necessity with it. This is relevant in order to understand the foundation and the clarity of the following sub-chapters.

Several authors have investigated the effect of capital requirements on the prevention of financial crisis and increased financial stability (e.g. Berger and Bouwman, 2013, Hakenes and Schnabel, 2011, Zhou, 2013). Most studies suggest that capital requirements have a positive effect on enhanced financial stability. Berger et al., (2013) conclude that capital requirement in the banking sector serves to reduce the probability of default during a crisis. Default occurs when a financial institution fails to meet its obligations and is a form of disruption to the financial system (Sveriges Riksbank, 2013). This Fiordelisi and Mare (2013) supports who show that the probability is reduced through the absorbance of losses. Basel III, the regulatory framework for banks, is expected to increase financial stability on the occasion of the increased capital requirement (Fiordelisi and Mare, 2013). Controversially, some authors agree that regulatory frameworks are not efficient in enhancing the financial stability (e.g. Berger and Bouwman, 2013, Hakenes and Schnabel, 2011, Zhou, 2013). For instance, Berger et al., (2013) and Hakenes and Schnabel (2011) argue that capital requirements can rather increase the risks under some circumstances, and that capital requirement is not suitable to reduce the level of risk-taking. This is due to the increased capital costs residing from capital regulations that cause banks to allow lower loan volumes and deposits. Therefore, higher capital requirements increase the risk of an individual loan since it reduces the competition of loans (Hakenes and Schnabel, 2011). Similarly, Zhou (2013) suggests that regulations may increase the level of systemic risk, which is the risk of an entire financial market to collapse causing instability in the financial system. This is explained by the increased similarity of different institutions’ investment portfolios due to companies rebalance those to comply with the capital requirements. Although the systemic risks are expected to increase, the individual risks faced by each financial institution are expected to be reduced (Zhou, 2013).

As mentioned earlier, many of the insurance companies already believe the previous capital is enough to cover their risks. This can be compared with how banks reasoned before the financial crisis in 2008. Perez (2014) expresses that Basel II, predecessor to Basel III, was not enough for reducing banks' risks. Cannata and Quagliariello (2010) conclude that Basel II was insufficient and contributed to the financial crisis, which is also confirmed by Lall (2009). However, Perez (2014) argues for that Basel II covered the main sources of the bank's risk, but the regulatory framework was inadequate. One disadvantage with Basel II, according to Perez (2014), was that the banks could use own internal models to determine the required capital and for assessing their risks to achieve the regulations. Cannata and Quagliariello (2010) confirm that the banks internal models had serious flaws regarding risk measurement. This triggered managers to underestimate banks' credit risks. For most banks, this resulted in overly optimistic models, which allowed them to keep a lower capital for regulation requirements and to increase their return on equity (Perez, 2014, Cannata and Quagliariello, 2016, Lall, 2009). Since the effectiveness of Basel II was highly dependent on a powerful regulator, another flaw with Basel II was that the bank themselves could decide on how to implement the regulations. This gave room for banks to bypass the rules. Perez (2014) further points out that this is the reason for the necessity of the role of regulators is to ensure that the regulations are implemented in the correct manner. Lastly, Basel II did not provide sufficient capital to cover market risks, which applied particularly to investment banks (Perez, 2014).

Solvency II has been on the subject for implementation since 2009 and has been revised numerous times. Many previous researchers have assessed the expected impact of the solvency capital requirement and the increased risk management that was lacking in Solvency I. Previous literature by large management consultancies have provided overviews of the implications of Solvency II and what preparation that is needed for insurance companies to fulfill the new requirements (e.g. Schwarz et al., 2011, Heisen et al., 2014, Hay et al., 2011). The regulatory framework proposes a fundamental change to the insurance industry. Besides putting new requirements on capital, it puts new requirements on how insurance companies identify and monitor risk and include guidelines to increase the transparency between the companies (Buckham et al., 2010). Schwarz et al., (2011) further argue for that Solvency II do not only have an impact on the capital risk, risk governance and communication processes, the new rules also affect insurance companies by taking deep cultural and organizational changes. The European Central Bank (2007) asserts that there is a risk to the financial stability during the transition phase from Solvency I to Solvency II, but that there will be a positive effect on the economy in the long run. The risk is associated with the adjustment costs for the new regulatory frameworks and the necessary learning required by insurance companies (European Central Bank, 2007). Similarly, Hedberg (2014) argues for an elevated level of risk connected with a change and introduction of change. It requires that companies manage the risks that may arise in connection with the introduction of new initiatives or changes in existing operations (Hedberg, 2014). In the long run, a new steady state will be reached where structural implications can be captured after the full implementation, leading to enhanced financial stability (European Central Bank, 2007). Conversely, a survey conducted by the Economist Intelligence Unit (2012) concludes that it will not affect the market directly at the time of transition. This is based on the majority, 58 percent, agree that the implementation occurs through phases over a long period of time before the regulations enter into force (Economist Intelligence Unit, 2012).

## 4.2 Business and Organizational Changes

In this sub-chapter, the literature relevant to insurance companies' business and organizational changes is presented, which is provided for the first sub research question "How has Solvency II impacted insurance companies' business and organizations?".

The view of the business impact of Solvency II in the long run is divergent among CROs, CFOs and CEOs according to 44 interviews within European and North American insurance companies conducted by Boston Consulting Group's Solvency II work force (Bernert et al., 2010). The survey shows that CROs are the most positive to the regulations where as much as 84 percent consider Solvency II to create value in the industry in the long run. The least positive are CEOs and business executives where only 40 percent believe it to contribute to value creation in the business (Bernert et al., 2010).

The quantitative study by EY (2014), investigating 170 insurance companies in 20 European countries, expresses that 50 to 75 percent of the respondents expect a significant increase in workload (EY, 2014). The increase in workload is mainly based on the expected increase in time dedicated to strategic input, reporting to regulators, and forward-looking risk assessment. Increased workload further leads to increased costs for insurance companies. The majority, 73 percent, in the quantitative study by Economist Intelligence Unit (2012) remarks that the costs will be passed to the policyholders by rose prices. This study is based on a survey with 254 insurance companies, from Sweden among 10 other European countries, where the majority of respondents have a C-level or board position. The same study also shows that 50 percent of the respondents consider the increased price for policyholders is suitable for the reduced risk that enhances consumer protection (Economist Intelligence Unit, 2012). A study conducted by Bernert et al., (2010) further confirm that life insurers are expected to transfer risks to the policyholders and external asset managers, while non-life insurers are expected to mitigate risks their contracts cover or to raise prices.

Insurance companies can re-evaluate their entire business lines and services over medium and long term in order to form their risk and capital structure to the profile that best fits the company's strategy. For an insurance company to shift from compliance to industry leadership, there are three essential capabilities that need to be implemented deep in the organization according to Schwarz et al., (2011). These three factors include: *risk-based value creation*, *industrial-strength risk assessment processes*, and *a risk culture*. Starting with the first factor, *risk-based value creation*, which is the most important aspect within the company. The management of each business line must therefore correspond to the company's profitability targets and risk appetites. It is the management board's responsibilities to raise the value-maximizing risk-based management to a suitable level. The agenda for each management meeting should focus on the decisions that have the largest impact on the company's value. The second factor to succeed with the more complex Solvency II is the *industrial-strength risk-assessment processes*. During the preparation of Solvency II, insurance companies faced major weaknesses in the ability for risk managers and actuaries to measure their solvency ratio and its changes. Hence, companies need to invest in advanced technology systems of risk-measurement in order to handle both the risk-reporting demands and also their audit. The last factor is the *culture* that should be change-oriented and disciplined. The top management of the organization

should implement an effective change management process in order to educate employees from the frontline in skills of careful risk-taking. It is essential for employees to understand the risks and how the risks affect the business. Thus, managers should be clear about and communicate the organization's goals with the employees. For employees to evaluate if the organization's goals are reached for each individual, simple metrics are needed that enable employees to accurately monitor if the goals will be reached that are consistent within the business' risk appetite (Schwarz et al., 2011). Similarly, Fukuyama (1995) argues for the importance of employees in an organization to be able to work together towards common values (Fukuyama, 1995).

The contracts sold by insurers should cover the underwriting risks (Insurer Solvency Assessment Working Party, 2004). Although Schwarz et al., (2011) suggest that organizations should educate the frontline risk-takers, according to Everis (2009) quantitative study with European and Latin American insurers, the sales area is the department in organizations where fewest employees use the generated information from risk control tools. Smaller organizations, in terms of business volume, are better in this aspect where 40 percent of the respondents consider their companies to incorporate information from risk controls in the sales area (Everis, 2009).

According to a study by Bernert et al., (2010), Solvency II has a greater impact on the strategy compared to the operations. O'Donovan (2014) argues for the importance of strong strategic management capabilities and that this regulatory framework should be incorporated into the corporate business strategy. This enables companies to stay competitive and to be able to evolve with the external environment. O'Donovan (2014) suggests that Solvency II should be viewed as a strategy enabler. The strategy should support the implementation of Solvency II since this steers the day-to-day implementation plans and determines outcomes and results (O'Donovan, 2014). Schwarz et al., (2011) conclude companies that are strategically adjusted to Solvency II will notice new opportunities and take a lead in competition. The most fundamental strategic decision insurers make is the trade-off between risk and return. Higher investment and portfolio risk usually implies higher return but also higher capital requirement. This trade-off is of importance to consider strategically for insurers to find opportunities to take off from competitors (Schwarz et al., 2011). Hay et al., (2011) argue for three core strategic issues with Solvency II including *clear linkage between the risk strategy and the overall business strategy*, *continuous risk management and control*, and *general leadership responsibility for risk management*. Despite the awareness of bringing strategic implications, few insurers have explored the strategic benefits of Solvency II according to Bernert et al., (2010).

The risk department is structured differently in different organization. Some organizations have a Chief Risk Officer, CRO, who has a strategic role in a company and is responsible for the overall risk management (Buckham et al., 2010, Arshamian, 2014). Communication of the company's risk procedures and governance structures effectively throughout the organization is an essential task for the CRO. The accountability for successful Solvency II implementation is in the responsibility of the CRO (Beckers and Neal, 2012). However, according to a survey with eleven major global group CROs with operations in Europe conducted by EY (2015a), the CROs' strategic work is prevented by regulatory work. Bernert et al., (2010) conclude that companies have responded to become compliant rather than to explore the strategic implications of Solvency II. Another major concern of the CROs today is the risk challenge of additional new regulations (EY, 2015b). In the future, CRO's agenda will shift to constitute of more strategic

work and issues (EY, 2015a, EY, 2015b). Approximately 85 percent of European insurance companies in the quantitative study by EY (2014) expect risk managers to have increased focus on strategic input in the future. The global group CROs in the survey conducted by EY (2015a) consider compliance with regulatory matters to distract the preferable strategic focus. There is a perception that details within the regulations, for instance adjustments to the low interest rate, is interrupting CROs from having a core business and strategic focus, which should be of every CRO's key ambition (EY, 2015a).

### 4.3 Capital Requirement

In order to address the second sub research question, *“How have insurance companies adapted to the capital requirement imposed by Solvency II?”*, this sub-chapter contains a literature review concerning the Solvency II capital requirement for insurers. This sub-chapter consists of two sub-sections, risks and investments, which are underlying components of the capital requirement.

The capital requirement, part of Pillar I, states that companies should apply a risk-adjusted approach to hold enough capital to cover their risks. It is essential to remind the reader that the capital is concerned with both assets and liabilities. A suitable capital requirement must ensure that the capital is sufficient to cover all risks by absorbing losses in the case of severe events (Dermine, 2013). To determine how much capital is needed to meet Solvency II risk requirements, a calibration of the insurance company's risk appetite should be done (Schwarz et al., 2011). Eling and Schmeiser (2010) promote the awareness of that capital requirements cannot prevent a company from becoming insolvent, but it can lower the probability for it to occur. Dermine (2013) conveys the importance of the capital requirement for covering the risks should be sufficient but not too excessive. The regulations are self-destructive if it encourages companies to circumvent too excessive capital requirements imposed by the regulations (Dermine, 2013).

As mentioned in the Introduction chapter, insurance companies are critical to Solvency II and believe it goes beyond the required capital to cover risks according to the survey conducted by Economist Intelligence Unit (2012) previously described. The study concludes that more than 80 percent consider having sufficient capital to cover their risks before Solvency II and 43 percent believe regulators should reconsider the capital requirements (Economist Intelligence Unit, 2012). Another study conducted by Siegel and Morbi (2015) surveying 267 Chief Information Officers, CIOs, and CFOs, of EMEA<sup>1</sup>, American and Pan Asian, insurance companies concludes most insurers believe the capital requirement is adequate or over-capitalized. Schwarz et al., (2011) argue for that being well-capitalized means, on the one hand, that companies can experience a higher degree of volatility in the market. On the other hand, well-capitalized insurers may lead to reduced returns due to the company cannot invest this capital. As a result of

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<sup>1</sup> EMEA refers to Europe, Middle East and Africa. In the study by Siegel and Morbi (2015), this includes: United Kingdom, Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden

the capital requirements by Solvency II, insurers become more aware of the risk-adjusted profitability associated with different products and businesses. The lower profitability and higher capital requirements are a struggle for some insurers to survive while others are in a stronger position. According to Schwarz et al., (2011), companies can improve its capital position by cost savings within the business. This is due to cost savings raise capital, which in turn reduces a company's overall capital requirement (Schwarz et al., 2011).

The majority, 60 percent, of the respondents to the survey conducted by EY (2014) have not implemented an internal model and rather use a standard model, which are mentioned in the Pillar I description. The standard models are limited to assess an enterprise risk management (Eling et al., 2007), and are therefore a major drawback to effectively measure an individual insurer's risk profile. Having an internal model instead to calculate the required capital provides an opportunity to align the capital requirements by regulators together with the company's risk management process (Eling and Schmeiser, 2010). Similarly, Buckham et al., (2010) argue that an internal model is a better reflection of a company's risk profile while it does not obviously reduce the capital base. This is confirmed by EY (2014) that states the adoption of partial internal models to calculate SCR gives close results to the calculation of SCR using the standard model. Large organizations are more likely to adopt an internal, or partially internal, model due to the required resources to cover these expenses (EY, 2014).

#### **4.3.1 Risks**

Insurance companies should hold enough capital to cover their risks, meaning that the capital is tied to the risks of both assets and liabilities. There is a distinction between life and non-life insurance companies regarding the primary risk type that the tying of capital, required in Solvency II, is composed of. It has been shown that the capital of life insurance companies' is mainly composed of market risk (Bernert et al., 2010, Bank of England, 2015). The Bank of England (2015), based on a survey responded by 30 insurers in the United Kingdom, explains this by life insurers' reliance of returns on assets to meet their long-term obligations and that their liabilities tend to be stable. Similarly Bernert et al., (2010) state the mismatch in duration between assets and liabilities is the underlying reason of the large composition of market risk within life insurance. This study is based on analysis of the Committee of European Insurance and Occupational Pensions Supervisors, CEIOPS. Further, the capital of life insurers constitutes primarily of market risks, in fact 70 percent according to the study by Bernert et al., (2010) and 50 percent in the report by Bank of England (2015). Controversially, the same studies show that the largest share of capital of non-life insurance companies are concerned with underwriting risks. Underwriting risks constitute 58 percent of non-life insurers risk exposure according to Bank of England (2015) and nearly 70 percent according to Bernert et al., (2010). This means that the risks within liabilities of non-life insurers are greater than the risks associated with their assets.

Insurance companies can set *risk tolerances* and *risk appetites* for their risk profiles (Wallin et al., 2013, Schwarz et al., 2011). *Risk tolerance* is the quantitative limit of a loss event that an insurer can manage without becoming insolvent (Brahin et al., 2013). As mentioned earlier, *risk appetite* is the level of risk that the company is prepared to accept to achieve its strategic objectives. EY (2015b) reports that credit and equity risks are the risks CROs and other risk executives in North America most commonly have set quantitative tolerance limits for when

measuring risks. Almost half of the respondents have not identified tolerances for operational risks. The reasons to this is suggested to be the challenges concerned with measuring the diversity of risk types associated with operational risks and the newness of this type of risk to insurers (EY, 2015b).

Insurance companies usually use the risk management tool, diversification of risks, in order to diversify their risk profile meaning that the total risk is lower than the sum of each individual risk. Therefore, companies do not need to hold as much capital as it would if not using diversification (Bank of England, 2015). It is claimed that the biggest challenge occurs when there is a number of external risks occurring simultaneously. If events occurred simultaneously, then the coverage in capital would terminate (Liedtke and Courbage, 2002). However, the probability of several risks occurring at the same time is very low according to Liedtke and Courbage (2002), although there is a possibility. Since there is a risk for various events to occur simultaneously, this must be reflected upon and managed within insurance companies. Each individual risk may be managed efficiently separately but companies must manage the risk of the events to occur simultaneously as well in order to be able to cope with it. This means that the capital is inadequate if it cannot cope with simultaneously occurring risks.

Solvency II reveals the risks that are connected to different insurance products. Underwriting risks connected to products require more capital when the claims have a high volatility. In addition, a higher capital may be needed for products that are long-term and have a heavy discount. Also, options and guarantees that are subject to changes in financial and underwriting risks require more capital (Hay et al., 2011). Solvency II has an impact on the premium insurers need to charge in order to secure covering their risks. Schwarz et al., (2011) express the great importance of an insurance company to implement risk-appropriate pricing that links the premiums the company receives to its capital position. For many organizations, this leads to an increase in their risk-based pricing model. This is done in order to ensure that the organization sets and implements average prices across the organization to provide sufficient margin to absorb the risks (Schwarz et al., 2011). Solvency II reveals the profitability of different insurance products due to the risk-adjusted capital requirement. It diminishes the profitability of some products causing insurers to tighten the risk boundaries of some products by not containing all risk types or to raise prices in order to be able to cover all risks (Bernert et al., 2010). Bernert et al., (2010) promote the benefits insurers can achieve through diversification over businesses to offer a variety of products for instance by having both life and non-life operations within the insurance group in order to reduce the overall capital requirement of each business.

### **4.3.2 Investments**

Solvency II has a direct effect on insurance companies' investment portfolios since there are different risks associated with different investments. There must be a trade-off between the risks and returns associated with a certain investment in order to both meet capital requirements and the guarantees to the customers (Eling and Schmeiser, 2010, Kreeb, 2015, Heisen et al., 2014). Solvency II could impose a change of insurance companies' investment plans in order to lower the risks and thereby the required capital to hold. However, this may also reduce the return since a lower risk is usually connected to a lower return on investments (Hay et al., 2011). A lower return makes it a challenge to accomplish a company's obligations to customers. Hence, besides the imposed capital requirement on the risks of investments, insurers must consider the pre-

defined return target on investments (Kreeb, 2015). Insurers must therefore optimize their investment portfolios in order to obtain high returns with certain risks requiring a certain capital (Heisen et al., 2014, Kreeb, 2015). Siegel and Morbi (2015) conclude that 50 percent of EMEA respondents consider their industry peer group to have an appropriate level of investment risks while 29 percent believes the investment risks are too high. Furthermore, the new requirements imposed by Solvency II lead to struggle for some insurance companies to survive with the lower profitability and higher capital requirements (Bernert et al., 2010).

By reviewing the investment portfolios of insurance companies, a lower risk can be obtained by decreasing insurers' share in equities and property and instead increase the share of investments in fixed income securities (Hay et al., 2011). Likewise, the survey conducted by the Economist Intelligence Unit (2012) concludes that insurance companies will reduce their investments in equities and other high-risk investments. This is further explained to lead to deterioration of insurers' role in society to invest in businesses since it has a direct negative impact on the private industry's dependence on financing from insurance companies (Economist Intelligence Unit, 2012). In contrast, a more recent study by Siegel and Morbi (2015) concludes the majority, 62 percent, is not likely to reduce their investments in equity. The study also concludes that 40 percent of the investigated EMEA insurance companies expect the risk in their investment portfolios to increase by intending to increase the credit risk. 47 percent are expected to decrease the liquidity risk in their investment portfolios. In addition, the study concludes that the low return on investments stands for the greatest risk according to the majority of insurers (Siegel and Morbi, 2015).

As mentioned previously, insurance company can take advantage of diversification through investments. Solvency II encourages insurers to spread their risks over different investments (Bernert et al., 2010). Diversification of investments lowers the total capital requirement for an insurance company (Goggin and Chisholm, 2008). Eling and Schmeiser (2010) suggest companies should not only consider diversifying their investments by different instruments, but also by different demographics and markets. Bernert et al., (2010) state that diversification over regions can only contribute to the diversification effects to some extent.

Solvency II proposes changes in the asset allocation due to insurers want to match their assets with their liabilities to a greater extent (Heisen et al., 2014). Schwarz et al., (2011) provide evidence of an imbalance between assets and liabilities in the duration. The assets held by insurers as investments should compensate for the liabilities. The matching adjustment between assets and liabilities is beneficial for holding assets to maturity (Schwarz et al., 2011). Siegel and Morbi (2015) confirm this stating that 37 percent of insurers in EMEA are more likely to invest in long duration bonds to benefit from the capital treatment of matching portfolios within the regulations. In addition, insurers are expected to base their investment decisions on the extent of their investments match their liabilities (EY, 2015c). Schwarz et al., (2011) express that the largest gap in duration between assets and liabilities, with today's low interest rate, were found in companies who invested a large part in medium-term government bonds. This is due to the low return on these investments do not compensate for covering the long-term payout promises to their customers. As a result, these companies have to extend the duration of their assets to reduce this gap in order for the assets to compensate the liabilities (Schwarz et al., 2011).

## 4.4 Risk Management

Within this sub-chapter, the literature review related to the third sub research question “*How has Solvency II affected the management of risks?*” is presented. The sub-chapter contains what previous studies have indicated regarding risk management and the objectives with the ‘own risk and solvency assessment’ process.

“*Solvency II is not just about capital. It is a change of behavior*” the former chairman of CEIOPS, Thomas Steffen, stated at the launch of Solvency II (Steffen, 2007, pp. 1). This indicating that the regulatory framework proposes a fundamental change to the insurance industry. Many studies, for instance (Hamwi et al., 2004, Eling et al., 2007), have demonstrated that the solvency regulation is not particularly effective in preventing insolvency. It is argued that the most common reasons that insurers become insolvent is poor internal controls and management rather than excessive risk-taking (Hamwi et al., 2004, Eling et al., 2007). Buckham et al., (2010) agree that one of the main reasons of any failure of an insurance company is incompetent management. The authors further explain the underlying reasons for incompetent management are incorrect reporting or manipulation of the profitability. Best management practices are therefore achieved when insurance companies understand their risks appropriately (Buckham et al., 2010). Furustedt (2014) argues that it is not enough to have capital requirements since these can only be fulfilled with efficient risk management. Similarly, Eling and Schmeiser (2010) state that if the people making the decisions do not understand the results of the risk models, then the models are useless for the company. Similarly, Schwarz et al., (2011) argue for the necessity for employees to understand the risks and how the risks affect the business. Further, Eling and Schmeiser (2010) suggest that there is room for improvement between the interaction of managerial decisions, risk management processes, and risk models.

Insurance companies in the same country are exposed to similar risks since these operate on the same market and have to obey the same regulatory frameworks and laws. What differs between companies is how risks are managed within the company (Andersson, 2012). In a global investigation by EY (2013a) with 576 companies, companies with more mature risk management practices outperform their peers by measures in revenue growth, EBITDA<sup>2</sup> and EBITDA/EV<sup>3</sup>. Furthermore, there is a correlation between the level of coordination and integration of risks into business strategy and financial performance. Achievements in financial results are caused by *mitigating risks, reducing costs, and creating value* (EY, 2013a). Wallin et al., (2013) consider the main difficulty with the qualitative requirements of Solvency II as the interpretation, adoption and incorporation of the directive into the organization.

Ott (2013) argues for that there has been recognition among many insurance companies for the need of risk management frameworks to change. However, the change was initiated by regulations forcing the change of risk management to occur in organizations. This has resulted in that many insurers have focused on achieving compliance rather than the change of risk

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<sup>2</sup> EBITDA measures a company’s current operating profitability. EBITDA stands for Earnings Before Interest, Taxes, Depreciation, and Amortization.

<sup>3</sup> Enterprise value, EV, measures a company’s total value.

management being driven by the business needs and delivery of benefits (Ott, 2013). Wallin et al., (2013) reach a similar conclusion that the prime focus of Solvency II is on the first pillar to achieve the capital requirements. Similarly, O'Donovan (2014) expresses that companies with weak strategic management focus the implementation of Solvency II on achieving the compliance requirements in the short-term. The lack of long-term approach on the risk management will affect the company's ability to stay competitive on the market (O'Donovan, 2014).

Only 20 percent of the respondents meet the requirements of having a system to assess risk management effectiveness according to the survey described earlier by EY (2014). As much as 32 percent of the respondents, to the same survey, have no clear approach in assessing effectiveness towards outcome. It is not a requirement to have an effective risk management, but it would be of every company's interest to understand this business area in order to improve their risk management (EY, 2014).

There are significant benefits that can be achieved beyond fulfilling compliance (Wallin et al., 2013). Nihoul and Briot (2012) express that a successful implementation of qualitative risk management is achieved by having an integrated and systematic view of the regulatory framework in the organization. Ott (2013) suggests that companies should extend the Solvency II work regarding risk management beyond what is required. Through incorporating risk management across the organization, insurance companies can achieve a competitive advantage (Ott, 2013). Similarly, Buckham et al., (2010) state that companies embracing the directive to improve their business and long-term future achieve a competitive advantage compared to those who do not.

#### **4.4.1 Own Risk Solvency Assessment, ORSA**

Chmielewski (2011) states that regulators focus on the achievements of the ORSA rather than how it should be implemented. An insurance company is free to design the analysis based on its business objectives, risk profile and the current business plan (Chmielewski, 2011). The Financial Compliance Group (c.2014) argues for the potential of a well-developed ORSA process to generate benefits for the ongoing strategy process that is tailored to the specific organization. Also, increased continuity plans and preventive risk management for handling the most essential risks are achieved. In addition, it leads to a better insight and control of the company's business and risk-taking and result in common risk awareness throughout the organization (Financial Compliance Group, c.2014).

According to Towers Watson (2011), ORSA should be viewed as a value-adding process for insurance companies due to the risk management model's strategic nature. A study, based on 20 interviews with CROs of both life and non-life insurance companies in North America by EY (2015b), confirms CROs' awareness of the potential of ORSA to add value to the company besides achieving the regulatory requirements. However, the value that can be added to the business is regarded as limited according to the respondents. The added value is connected to identification of gaps within risk management, alignment of stress testing, and promotion of communication to the business (EY, 2015b). Similarly, the Financial Compliance Group (c.2014) argues that the ORSA process provides information about if the capital is optimally used. This is expected to generate new business opportunities (Financial Compliance Group,

c.2014). The creation of value is achieved when the ORSA is embedded into the strategic decision-making and planning. 74 percent regard the ORSA to add value to the company according to CROs in North America (EY, 2015b). However, as much as 80 percent of the respondents, to another questionnaire by EY (2015a) conducted with global group CROs, regard that the ORSA is not incorporated into the business. This suggests that the value cannot be achieved and this is considered as a missed opportunity (EY, 2015a). Towers Watson (2011) suggests that the ORSA should be an iterative process in order to fully take advantage of the added business value by better reflecting the risk profile of an organization. In addition, it is suggested that there is a simultaneous top-down and bottom-up approach to risk management. This would lead to early engagement of the organization with the management on the top-down reports making improvements to risk management systems occur more efficiently (Towers Watson, 2011).

The main weaknesses of ORSA today, as per global group CROs stated in the study by EY (2015a), is the lack of alignment in regard to the regulatory requirements and business needs. This can be explained by the detailed descriptions in the regulatory framework that makes it a challenge for making it effective and prevents achieving a tailored ORSA that is closely linked to the insurers' risk profiles (EY, 2015a). Furthermore, another weakness currently is that the timelines of the ORSA that regulators have set are not aligned with the insurance companies' business planning timelines. This results in that the ORSA is not being used as a tool for business planning, which would be beneficial for insurers. In the future, CROs view the ORSA to be aligned with strategic business planning and to strengthen the link between risk appetite, product development, strategy and capital management. In addition, CROs believe the currently poor capability to project capital will be improved in the future (EY, 2015a). Common pitfalls Chmielewski (2011) mentions with the ORSA are lack of connection between the ORSA and the business plan, and lack of connection between risk, capital and profitability. In addition, another pitfall noted is that the process is too extensive and it is therefore difficult to have a clear overview in the ORSA process (Chmielewski, 2011).

#### **4.5 Low-Frequency and High-Impact Risks**

In the *Method* chapter, Figure 3 is presented and illustrates an overview of the themes of the structure of this report. It can be noticed that low-frequency and high-impact events is related to all three sub research questions and it is therefore of interest to provide a literature review regarding this in this sub-chapter.

Low-frequency and high-impact events, also called catastrophic events, are of special concern for insurance companies due to the difficulty to forecast these and the high costs these could cause. Since Solvency II requires insurance companies to manage all risk types, they also have to manage the risk of these to occur. Companies that fail to forecast catastrophic events could experience a substantial loss, which could lead to bankruptcy (Buckham et al., 2010). The losses caused by catastrophic events are much more problematic since these occur more irregularly compared to risks that follows a foreseen pattern (Viscusi and Born, 2006). The change in climate is fundamental to society. The Swedish Meteorological and Hydrological Institute, SMHI (2009), conveys the importance of how extreme events change with climate, since these events can cause serious damage and therefore need preventive measures. Climate extremes is defined by SMHI (2009) as occurring rarely or on the basis that these affect the society and

environment in a noticeable way. There is a lack of knowledge regarding how extreme weather is affected due to a warmer climate. According to SMHI (2009), the higher the temperature on the Earth's surface, the more available energy there is for evaporation and movement of various kinds in the atmosphere. Climate in an ongoing change, constantly impacts the probability of extreme events. This means that climate change can contribute to the occurrence of improbable events (SMHI, 2009). Furthermore, it is evident that the likelihood of weather related natural disasters to occur has increased over time and is expected to increase in the future (Rutberg, 2015, Klein, 2013).

SMHI (2015) indicates that the risks associated with climate change can be managed through climate adaptation and by lowering the climate impact. Climate adaptation has a local focus since climate change is not the same in all locations. Hence, SMHI (2015) points out the importance of reducing the vulnerability and the exposure of current climate variations. Therefore, there is a need of national cooperation of local authorities work as well as the importance to include the private sector. In addition, many of the risks are related to today's ongoing climate change according to SMHI (2015), which was stated already in 2009 by SMHI. There are possibilities to lower the overall risk if climate change is kept at a lower level. The more the greenhouse gas emissions are decreased today, the better can the risks be managed in the future (SMHI, 2015). The robustness of societal system to manage climate change can be strengthened. Commonly used, the concept of resilience for description of a system's long-term ability to cope with change and continue to develop. Resilience refers to the strategy used by companies to strengthen and reduce an organization's vulnerability from consequences arising from unknown or uncertain risks. It is the ability to recover from hazards (Aven and Renn, 2010). To be able to develop adaptation strategies, important factors to consider are how large the climate change will be and the pace of it, stresses SMHI (2015). A slower process provides a better scope for adaptation (SMHI, 2015).

There is recognition among insurance companies of the risks associated with climate change. However, there is a lack in the management especially among smaller insurance companies. There are only 12 percent, of 330 of the largest insurance companies within the United States investigated by Messervy et al., (2014), that have demonstrated statements regarding their risk management of climate change risks publicly. In addition, non-life insurance companies demonstrate a greater understanding of the risks associated with climate change compared to life insurance companies (Messervy et al., 2014). Climate change also plays a key role for reinsurers due to the increased frequency and severity of natural disasters such as storms, floods, drought, and extreme rainfall (Swiss Re, 2015a). As a means to tackle the issues regarding climate change, the reinsurer Swiss Re (2015b) has a comprehensive strategy and considers the company to be in forefront of handling the risks regarding climate change. This strategy includes the development of products and services to prevent or adapt to climate change, the raise of risk awareness of climate change among customers, employees and the society, and the increased understanding and knowledge of the risks by quantification and integration into the risk management (Swiss Re, 2015a).

Single insurance companies can be majorly impacted by natural disasters and especially non-life insurance companies are struck hardly by natural disasters. The increased frequency of weather related natural disasters must be reflected upon in insurance companies risk management. The Swedish Financial Supervisory Authority is tasked to review the risk management and actions

taken by non-life insurance companies to cover the risks of natural disasters (Rutberg, 2015). Insurers can respond to natural disasters through *transferring or limiting the risk, adjusting the premiums* or *controlling the damage* (Dlugolecki, 2000). The risk can be transferred to reinsurers (Bank of England, 2015), or the risk can be limited by a restriction of payouts or making exceptions of risks covered in the contracts. It is effective to reflect the risk of natural catastrophes in the premium if reliable forecasts are available. However, adjusting the premiums has an impact on the competition. Damages can be controlled after a natural disaster has occurred through reduction of the costs of claims and improvement in customer satisfaction. This can be obtained by approving quality guarantees to more suppliers or repairers, or by providing extended helplines (Dlugolecki, 2000).

The difficulties to forecast the impact and to offset the risk associated with natural disasters are due to the dependency of *meteorological*, the science of weather, and *seismological* factors, referring to earthquakes and elastic wave extensions in the soil (Buckham et al., 2010, SMHI, n.d., Parasnis and Kulhánek). Reinsurance is therefore preferred for the management of natural disasters risks since it is impossible for most insurance companies to cover these themselves (Buckham et al., 2010). Similarly, Dermine (2013) mentions capital requirements in the banking sector cannot anticipate catastrophes, which has clearly been shown historically. According to Klein (2013), reinsurance is the primary risk management tool for the diversification of catastrophe risks. However, insurance companies that have a high reliance in reinsurance companies are more exposed to failure and to become insolvent. This is due to the increased risk exposure of insurers when large parts of the risks are transferred to reinsurers. As long as reinsurance is cheap and the reinsurer is able to meet its obligations, reinsurance is a beneficial tool for risk management. However, it constitutes a risk for insurance companies if the reinsurer becomes insolvent or refuses to pay. This can lead to substantial losses for insurers caused by the reinsurer not being able to meet its contractual obligations (Buckham et al., 2010).

#### **4.6 Summary of the Literature Review**

The main aspects of each sub-chapter are summarized in this chapter, and underpin the presented research questions and are connected to the conclusions of this study in the *Conclusion* chapter.

Literature has advocated the necessity of regulating the financial sector. However, the authors do not agree on how the probability of default is reduced and financial stability is enhanced most efficiently. Some suggest that the major cause of failure is incompetent management and others not sufficient capital to cover risks and there are criticisms on both aspects. Despite this, regulators have adopted Solvency II to improve the risk-adjusted capital requirement, risk management and reporting to regulators.

Literature suggests there have been *Business and Organizational* changes due to the implementation of Solvency II. Business changes include the trade-off between risk, capital and return, how to maximize a company's value of risk-based management, and industrial-strength risk-assessment processes. The foremost organizational changes are strategic adjustments to Solvency II and the creation of risk culture. The business and organizational changes are investigated in this research to validate and assess these within the Swedish insurance industry, as a means of addressing the first sub research question.

*Capital Requirements* are expected to reduce the probability of default for financial institutions. It proposes new fundamentals on effectively reflecting upon all risks an insurance company is exposed to in order to protect the policyholder. Although the capital requirement reduces the probability of default, it cannot prevent a company from becoming insolvent. It has been shown that previous capital regulations for the financial sector were inadequate for covering all the risks. Therefore, the adequacy of this to prevent default is of interest to investigate. There are several ways to improve a company's capital position, for example by diversifying investments or reducing the exposed risks. However, studies have demonstrated that solvency regulation is not particularly effective in preventing insolvency. Since there is an ambiguous view in the result on financial stability and prevention of default in the event of a crisis, it is of interest to investigate the role of regulatory frameworks. In this research, insurance companies' adaptations to the capital requirement, as part of the second sub research question is investigated.

Furthermore, studies have shown that the main reason of insolvency is not capital requirements rather deficient *Risk Management* processes. Besides Solvency II's quantitative risk management, qualitative risk management should support the capital requirements imposed by the regulations. This suggests that companies should expand beyond the regulations in the evaluation and management of risks. Therefore, an investigation regarding insurance companies' risk management intends to address the third sub research question.

It is a challenge to anticipate *Low-Frequency and High-Impact Risks*. Historically, the financial sector has failed in the anticipation of catastrophic risks due to the low frequency. If insurers fail to foresee these events, the capital based on the risk of it occurring fails to fulfill its objective. Many insurers use reinsurance to cover for the risks of catastrophes. Climate change is an occurring phenomenon, which causes extreme weather to increase. Furthermore, the frequency of weather related catastrophes has increased in the past decades. This could be described by increased extreme weather caused by climate change. This suggests that there is a correlation between climate change and the frequency of weather related natural disasters to occur. This research investigates insurance companies business and organizational changes, adaptations to the capital requirement and risk management of low-frequency and high-impact events.

This study attempts to contribute to existing literature summarized in this sub-chapter with an investigation of how insurers have adjusted to Solvency II. The following chapter presents the *Results from Interviews and Questionnaire* conducted with insurance companies, and distributed to fund and asset managers.

## 5. RESULTS FROM INTERVIEWS AND QUESTIONNAIRE

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*In this section, the empirical data from the 16 conducted semi-structured interviews and the 25 respondents to the questionnaire is presented together.*

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The structure of this chapter is essentially in accordance with the *Literature Review* and interview guide. The sub-chapters that follow are: *Business and Organizational Changes*, *Capital Requirement*, *Risk Management*, and *Low-Frequency and High-Impact Risks*. The results from the questionnaire are presented together with the results from the interviews in the sub-chapter *Capital Requirement* since it is only concerned with this. For reminding the reader of the themes this study constitute of and the corresponding research questions, the following should be noted:

**5.1** Business and Organizational Changes aims to address the first sub research question “*How has Solvency II impacted insurance companies’ business and organizations?*”

**5.2** Capital Requirement aims to address the second sub research question “*How have insurance companies adapted to the capital requirement imposed by Solvency II?*”

**5.3** Risk Management aims to address the third sub research question “*How has Solvency II affected the management of risks?*”

**5.4** Low-Frequency and High-Impact Risks aims to address all the three sub research questions.

Tables of interviewees by organization and role are presented in Appendix B. Interviewees designated with 1.X represents non-life insurance companies, 2.X represents life insurance companies, 3.X represents groups of life and non-life companies, 4.X are anonymous interviewees, and 5.X the second round of interviews. The “X” indicates a number making the combination unique for each interviewee.

### **5.1 Business and Organizational Changes**

All interviewees agree that there has been no difference in their Solvency II work after the turn of the year 2015/2016 when Solvency II entered into force. Interviewees have expressed that this is mainly due to companies have prepared for the implementation for years and it is too soon to notice any differences. The complexity and size of organizations are factors explaining the duration of the preparation in different organizations, which is expressed by Interviewee 2.5. Small organizations are generally less complex than larger organizations, which Interviewee 2.5 assumes is an advantage in the context of Solvency II. Large companies are slower in the transition according to Interviewee 2.3, 2.4 and 3.1. It is stated by Interviewee 2.3 that mid-sized companies can achieve an advantage by fewer people being involved in the process making it easier to discuss and bring about change in the organization. However, Interviewee 1.2 sees no benefits with being a small company in the context of Solvency II. Interviewee 1.1 and 2.3

explain that the costs for small companies are likely extensive although the proportionality principle exists, meaning smaller firms do not have to report equally as larger organization. Interviewee 2.3 explains the reason to this is that small companies often have less complex businesses, which means less reporting burden. Therefore, the costs are less for small companies due to the complexity rather than the size of the company, the interviewee further explains. Interviewee 5.2 at the Swedish Financial Supervisory Authority, FSA, expects the check for small companies to be larger although exceptions of Solvency II for small companies exist. The challenge for small companies is to afford to hire all the employees needed for the compliance work Solvency II regulations require. Therefore, this may lead to external consultancies according to Interviewee 2.5.

The interviewees also agree that the benefit of Solvency II is that companies get better control of their risks. Interviewee 3.1 claims this should lead to fewer wrong decisions than before. At the same time, it is recurring that the interviewees consider the framework to be too detailed and consider the extensive reporting a challenge for the organization. Interviewee 2.1 states that the Solvency II preparations have been more of a regulatory focus in order to achieve the regulations rather than an economical focus, which reduces the efficiency. Interviewee 2.5 further means there currently is a trend towards over-regularization, which not always lead to better governance.

Insurance companies have developed systems and processes to manage the extensive reporting and for calculating the capital requirements. Interviewee 2.3 expresses that the company can, in some aspects, benefit from the extensive reporting. The new data warehouse built for reporting has led to increased data quality, automation and information flows that are useful. However, the company cannot retrieve the entire development cost because the development would not have been needed if it was not for the extensive reporting burden. Meanwhile, Interviewee 2.2 states that there must be an increase in the premiums in the future. This is due to the increased reporting, *ceteris paribus*, increases the costs. Since IT projects are both time consuming and expensive, Interviewee 2.6 states that the starting point of the IT project required to comply with Solvency II was to explore the business benefits that could be obtained. The business benefits are explained in the interview by the use of more detailed information to analyze the profitability of different insurance contracts and products. Interviewee 2.6 states that the company can benefit from the generated information by the new IT systems in order to evaluate what insurances that is connected to high risk and thereby also requires more capital. This is due to the benefits of clarifying what insurance is related to high risk, both from their own company perspective and from the external capital requirement. In addition, Interviewee 2.6 states that the company can offer its corporate customers extensive reports on follow-ups on insurance, which is an advantageous selling argument that could generate added value for the corporate customers. It is possible that the company needs more information from their insurers customers in the future. In comparison, Interviewee 5.1 clarifies that the company will try to avoid this and expresses that the current systems are well developed and believes these are sufficient. Furthermore, Interviewee 2.3 states that it is more difficult for new companies to enter the market due to Solvency II requires the establishment of extensive systems and models. Therefore, Solvency II creates entry barriers due to extensive legislation and high entry costs. This hampers the competition and has a negative impact from a customer and societal perspective, which is conveyed by Interviewees 2.4, 2.5 and 3.1. Interviewee 5.2 speculates that it is more difficult but

not impossible for new players to enter the market. Interviewees also express that the insurance market is relatively local and customers prefer local insurance companies. The Interviewee 5.2 at the Swedish FSA expresses a similar opinion, customers usually demand insurance in well-known brands and that the market is saturated. This can also contribute to less competition.

Few interviewees observe a link between the Solvency II regulations and a change in strategy. Interviewee 2.5 states that the company has started to use new risk measures and taken strategic decisions based on Solvency II. Life insurance companies with occupational pensions can apply transitional provisions. One strategic decision has been to not apply transitional rules on their occupational pension division due to the increased administrative burden this would cause. On the contrary, Interviewee 5.1, representing the reinsurer company, expresses that no organizational changes have been done yet. Solvency II is still a relatively new concept and it is too soon for organizational changes. Furthermore, the company has a clear risk strategy stating how much risk it can handle itself and how much reinsurance coverage it needs to buy. However, there has not been any changes to the risk strategy yet, Interviewee 5.1 explains.

Interviewee 4.1 states that the regulations have been a driving force in the creation of a risk culture in the organization. Several of the interviewees confirm that employees have become more risk aware overall on account of Solvency II. This is obvious in the company, according to Interviewee 3.1, where it has started to measure risk culture in the employee satisfaction survey the past couple of years. In addition, it is evident that risk is communicated more in the organization and that decisions are based on this, Interviewee 3.1 explains. It was declared in the interview that this may lead to slower processes, but it generally has a positive effect since some risks can be avoided and thereby enhance the overall efficiency. Therefore, the company that Interviewee 3.1 is employed at will focus on the risk culture in the future. Interviewee 2.2 also expresses this. Interviewee 2.6 states that there is a knowledge spread in the whole organization regarding the Solvency II regulation. Employees that are not part of the core Solvency II work will be educated in how the new regulation might possibly impact their work. Interviewee 2.6 further explains it is important that underwriters understand that different insurance products, and different terms and conditions, can have major impact on the regulatory capital requirement in Solvency II. It is therefore necessary to consider the capital requirement when pricing the insurance contracts, and for the salespeople to be able to explain the pricing to their customers in eventual cases where capital requirement has an impact on the insurance premium, Interviewee 2.6 expresses.

Several interviewees consider the main organizational change insurance companies have experienced is the imposed key functions part of Pillar II, which are mandatory for all organizations. There has been a separation between the actuary department and the actuarial function since Solvency II requires an independent actuarial function, expresses Interviewee 2.4 and 2.5. Actuarial resources have been considered a bottleneck for the Solvency II work according to Interviewee 2.6. As a result of Solvency II, Interviewee 1.1 explains that the number of employees involved in risk monitoring, risk reporting and compliance have increased. The compliance department has expanded as a result of the extent of the framework, requiring employees who understand, can educate and follow up the organization to ensure the company complies with the requirements. Similar to Interviewee 1.1, Interviewee 3.1 notes that the risk function has expanded. There is a need for new roles working with risk. In addition, Interviewee

5.1 estimates that standard functional operations increase with 20 to 30 percent as a result of Solvency II. This is due to new job assignments and report writing.

It is expressed by interviewees that there is a trend where insurers expand and also decrease in number of companies. This creates oligopoly in the market affecting the end customers. Interviewee 2.5 expresses that the complexity of Solvency II makes it difficult for small companies to understand and cope with it, which potentially could result in mergers of companies that in turn creates oligopoly in the market. Interviewee 4.3 states the entry barriers and promotion of companies to merge could be the drawbacks with Solvency II. The interviewee explains the reason to this is that it inhibits the competition, which does not benefit the policyholders. Interviewee 1.2 explains there have been large organizational changes in line with Solvency II. The company previously constituted of hundreds of smaller companies. However, there has been a change to constitute of one larger company during the past decade. This is due to it is too costly with many small companies. The change was not initiated by the Solvency II regulations but it would not have been possible to comply with the directive on the previous organizational structure according to Interviewee 1.2. Similarly, the Director of Insurance Risk Supervision at FSA, Interviewee 5.2, expresses that Solvency II is developed for an average European company and is not directly applicable on a small Swedish insurance company. On the other hand, Interviewee 5.1 expresses the reinsurance company has not changed its organizational structure although it is considered complex including several companies worldwide.

Interviewees mean that the largest part with implementing Solvency II has already been done; the focus now is to get a routine of the working process. Interviewee 2.3 establishes that *“once you have the model, this will not be the biggest challenge rather to get the process rolling in an efficient way.”* So far, companies have focused on achieving compliance. In the future, Solvency II is expected to be more part of the business and companies will strive to take advantage of the added benefits. In order to comply with Solvency II, companies have been forced to employ people with the required competences. In the future, it is expected that the efficiency of the processes is enhanced, which could lead to reduction in the number of employees of some parts of the organization, according to Interviewee 3.1. Furthermore, the company will focus on developing the internal processes.

Interviewee 1.1, who has seen challenges with the complex regulation, believes the industry, to a large extent, lives accordingly. Some interviewees see the potential in developing the Solvency II work. Interviewee 2.4 expresses the continuous management, for example, of models and regulatory documents required by Solvency II since these always have to be in line with business changes. The focus now is to assess how the company can benefit from the regulations besides being compliant with it according to Interviewee 2.4. Another point of view has Interviewee 2.5 who expresses that Solvency II has become business as usual. The company will instead continue to develop the business and further focus on occupational pension and risk insurance. Both Interviewee 2.1 and 2.5 further state that dramatic changes of life insurers business may occur if new regulations come into force affecting the business models and value chains. This is due to new ways of financing and distribution could be needed.

## 5.2 Capital Requirement

*“It is obvious that a regulatory framework is needed for protecting the customers“*, Interviewee 2.5 states. Solvency I had obvious flaws and Solvency II is superior to Solvency I in the manner that it is based on the balance sheet at market value today and the value are then stressed at different scenarios. The capital requirement is no longer based on a standard template as in Solvency I, rather it is based on different scenarios. Interviewee 2.5 considers this to be the greatest benefit of Solvency II.

Generally, the capital requirement is expected to be sufficient for covering the risks insurance companies are facing. Interviewee 5.2, an employee at the Swedish FSA, believes there was a certain consumer protection in the insurance industry prior to Solvency II. However, there is an increased protection now with a capital that is directly dependent on a company’s assets and liabilities. Similarly, having a risk-adjusted capital requirement under the Solvency II regime is perceived by interviewees to be beneficial since their businesses are risk-sensitive. The previous volume based capital requirement in the Solvency I directive was lacking in this aspect. However, interviewees express that it goes beyond what is required in some aspects where the actual risk is considered to be lower than what is prescribed in the directive. For instance, Interviewee 2.6 states that Solvency II overestimates some risks. Similarly, Interviewee 2.4 is somewhat skeptical to the calculation of some risks due to it being too detailed in some respects and too unspecified in other respects. It is further stated by Interviewee 2.4 that quantitative requirements are based on assumptions and probabilities of risks to occur. Interviewee 4.3 sees the benefits of linking the capital to the risks in order to see how much risk that can be undertaken and what premium to charge for covering the risks in order to price the risk more fairly. However, it is stated by Interviewee 4.3 that the premiums have not changed as a result of new capital requirements.

Swedish life insurers were well-capitalized before the Solvency II regulations, is the perception of Interviewee 2.4. Similarly, Interviewee 2.1, 2.6 and 4.1 express that their companies are in a well-capitalized position. According to Interviewee 3.1, large organizations are generally more capitalized compared to smaller organizations. This is confirmed by the small company that Interviewee 1.2 represents who points out that there was a challenge to achieve and calculate the capital requirements mainly due to the organizational structure. This is further explained to have struck the company hard and the company works to release capital by different risk management methods. In comparison, the anonymous Interviewee 4.3 and the large corporations represented by Interviewees 2.1 and 3.1 indicate the imposed capital requirements to be less challenging to achieve. It is suggested by Interviewee 1.1 that there are other requirements besides Solvency II that require a higher capital requirement by their company. Interviewee 1.1 clarifies that the company was well-capitalized also before the implementation of the regulatory framework and did not see any challenges in obtaining the new capital requirements. Similarly, the large life and non-life insurance groups Interviewee 3.2 represents is well-capitalized and sees no need to release capital. Interviewee 5.1 considers the new Solvency II requirements for reserves to be lower than the previous Solvency I requirements. However, this has not been established yet but it is the interviewees’ perception. Although the capital requirement for reserves is lower than before, it is more risk-adjusted and is expected to cover the risks the reinsurance company are exposed to, Interviewee 5.1 further declares.

The investigated insurers use the standard model for calculating the capital requirement. According to Interviewee 2.5, the compliance focus of the Solvency II project is the reason the company has not yet developed an internal model. Interviewee 2.4 express flaws in the standard model are being evaluated to make judgments of their own risk profile in correlation to the standard model. Similarly, Interviewee 2.5 states that, as a requirement of the ORSA process, the standard model is being challenged to investigate whether it is suitable for the company's risk exposure. For instance, Interviewee 2.5 explains that the business is exposed to volatility in the stock market, which is not covered in the standard model. Calibration towards a world share index is an example of a potential deviation in the standard model that may not be applicable to the businesses of Interviewee 2.4's company. Therefore, it may be more suitable to use the Swedish share index. Interviewee 2.6 believes developing a regulatory internal model would not necessarily result in a lower capital requirement, mostly due to the regulators' restrictions regarding assumptions in an internal model. Similarly, Interviewee 5.2 has difficulties seeing that companies developing an internal model observe a lower capital requirement. Interviewee 2.6 expresses that even if an internal model could give a lower capital requirement, the company must evaluate if it sees a need to release capital by implementing one. Factors to consider are the high development costs and the capitalized positions. Likewise, Interviewee 5.2 considers in practice it will be about the need for companies to release capital in order for it to be regarded as profitable to develop an internal model. Interviewee 2.2 states that the company has developed an internal model that is used for the internal governance. This model, the interviewee considers is appropriate for controlling the risks and communicating with the asset management. For similar reason, the company Interviewee 5.1 represents has developed an internal model internally. The interviewee explains that the company uses the model for internal use but will not apply for approval of the model by the inspection. The interviewee further expresses that it requires extensive work for maintaining and controlling the internal model against the inspection. The perception of Interviewee 5.1 is that it is not worth it. Therefore, the model is only used as a valuable tool for business monitoring. Interviewee 5.2, from the Swedish FSA, believes using an internal model for internal use can in the future lead to company's taking initiative to apply for approval. This is due to the enhanced belief of the model and proof that it works internally. Interviewee 5.2 clarifies that an internal model is more suitable for insurance companies that have odd risk profiles. In certain cases, the FSA can even force companies to develop an internal model if the standard model deviate too much from a company's risk profile. Furthermore, the interviewee regards internal models powerful for companies to reflect their underwriting risks while not necessarily for market risks. This is due to underwriting risks are connected to an individual's business and depends on the structure of business.

Capital optimization is one of the focus areas in the future according to the Interviewee 4.1, CRO of the company. Both Interviewee 2.4 and 4.1 express that their companies will in the near future focuses to look over the investments of what drive most capital. Interviewee 3.1 states that the future will determine whether the view of their investments will change. Similarly, Interviewee 2.4 remarks that their investment portfolio may change eventually, but that this is dependent on the financial situation and how well-capitalized the company is.

### **5.2.1 Risks**

Market risk and underwriting risk are recurring risks insurance companies are most vulnerable to. Several of the interviewees further express their vulnerability to market risks such as interest rate risk and stock market losses. Interviewee 3.1 distinguishes between the life and non-life operation in the company on the question of what risks it is most vulnerable to. The life group is more vulnerable to market risk and other financial risks while the non-life group is mainly exposed to underwriting risk. Interviewee 5.2 who states that life insurance companies are more vulnerable to market risks and non-life insurance companies to underwriting risks also confirms this. Interviewee 3.2 in the same company as Interviewee 3.1 also means that the non-life group is mostly exposed to underwriting risks, mainly towards individual and not so much towards companies. Interviewee 3.2 further explains that the company is vulnerable to highly frequent risks and weather related risks. The most vulnerable risks for the companies according to Interviewee 2.4 and 4.1 are market risks. The non-life insurance company that Interviewee 1.1 speaks for is vulnerable for both market risk and underwriting risk. Interviewee 1.2 is consistent with other interviewees being more vulnerable to concentration risks, which is a certain type of market risk. This is explained to be due to the ownership of their company is within smaller companies. Interviewee 2.4 and 3.1 agree operational risks are the risks most difficult to dispense capital for. The difficulty to quantify this risk type is the major concern of Interviewee 3.1.

When asking the asset and fund managers regarding whether Solvency II has changed insurers' actual market risks, the largest share, 48 percent, consider Solvency II to not affect insurers' exposure to market risks. 28 percent of the respondents perceive Solvency II to reduce insurance company's actual market risks. Companies where insurers accounted for the largest part of their business did not consider a reduction in market risk. Meanwhile it was shown that all the respondents who did consider Solvency II to reduce the market risk had a low share of their customers constituting of insurers.

Solvency II will eventually lead to changes in prices is the perception of Interviewee 3.2. The interviewee further declares it does not necessarily have to lead to an increase in price but that the prices better reflect the risks. Furthermore, Interviewee 3.2 states that the company must consider how the pricing or the launch of a particular product influences the total risk profile.

### **5.2.2 Investments**

Interviewee 1.2, a former employee at the Swedish FSA, conveys that Solvency II is good for preventing crisis that could lead to bankruptcy, which would enhance the financial stability as the objective of Solvency II suggests. Furthermore, the interviewee believes Solvency II could have a significant impact on the society and economy and could also in fact be the cause of a financial crisis. Lowering the investments as a result of Solvency II, due to companies hold more capital, means that money is not invested in the economy as it used to, Interviewee 1.2 explains. Interviewee 5.2 also recognizes there is a risk of that money is not invested in the society. One CEO that responded to the questionnaire who considers the regulations to hamper economic growth and lead to increased unemployment further confirms this. Another respondent, a business developer, further states that Solvency II favors government securities, which currently yields very low. This means that insurance companies need to invest in investments with low return, which will affect the pensions later, the respondent further explains. Interviewee 1.2 is

convinced that reduced investments will have an impact on the society and economy in the long run. However, the interviewee is not certain that Solvency II could cause a financial crisis, but there is a risk that this occurs. As a result of less investment by insurance companies in the economy, the interviewee indicates that a lower capital requirement on investments in infrastructure has been implemented to reverse this. Interviewee 5.2 also confirms EU wants to reduce the capital requirement on investments to increase the investments in infrastructure. The interviewee believes the reason that EU considers a lower capital requirement on investments could be both due to the lower risks it entails and to promote these investments. However, the Swedish FSA, according to Interviewee 5.2, disagrees with EU on this question. The interviewee further explains FSA considers investments in infrastructure are classified as risky investments and have capital requirement based on risk.

The questionnaire shows that approximately half of the 25 respondents have noticed changes in demand from their insurers customers as a result of Solvency II. The capital requirement of investments has been one material factor for investment decisions faced recently by the company that mainly invest in funds, according to Interviewee 2.6. One respondent to the questionnaire, working as both a client advisor and executive director institutional business at a company where insurers constitute the largest part of their business, responds that there is increased focus on solvency capital requirement, SCR, on new investments. In addition, fund and asset management companies, where insurance companies stand for a large part of their business, have observed more focus on SCR for new investments. Interviewee 1.1 states that the company has looked over their investments to see what investments drive most capital. It is also stated by Interviewee 4.3 that the company has reviewed their investments of what drive most capital, which has led to a decrease in riskier investments. However, not all cases of risky investments lead to initiatives to change the investments but to have control over them is important for the company. The earlier capital requirement was significantly lower and did not have any major impact on the company's investments explains Interviewee 2.6. A more thorough consideration is now needed for investments according to the interviewee. Another respondent, a capital manager, expresses that insurers demand fewer external fund and asset management.

Interviewee 2.6 explains the company is dependent on its capital to be able to grow and expand. It is therefore necessary to decide if the company wants to take a higher risk within investment assets, with higher rate of return meanwhile it requires more capital, or if the company wants to make investments for potential expansion and growth of the company, states Interviewee 2.6. Also, Interviewee 5.2 distinguishes between growing by increased return on investments and growing in terms of business opportunities. The interviewee points out that insurance companies are dependent on the return. Capital requirements can be an obstacle for growing because it limits the capacity of taking more risk. However, the possibility to increase the number of customers is limited due to the market is saturated, Interviewee 5.2 considers. Concurrently, Interviewee 1.3, who also represents one of the smaller companies like Interviewee 2.6, expresses the increased difficulty to grow as a company with the higher capital requirement. Interviewee 1.3 further states, *“it is difficult to grow fast, or it is impossible, if you do not get any capital contribution in some way.”*

Since it is costly for companies to hold capital, companies can release capital through various risk management methods. Reviewing and optimizing the investments is one way of releasing capital. Interviewee 2.1 states that it is relative easy for the company to increase free capital

when own funds are approaching SCR, by reallocating the investment portfolio to a lower proportion of risk bearing assets and/or by decreasing the duration gap between assets and liabilities. However, there has not been any change in the investment portfolio as a result of Solvency II, which Interviewee 2.2 in the same company also confirms. Interviewee 2.5 expresses that changes in investment have been done due to the low interest rate environment rather than to Solvency II. According to Interviewees 2.4 and 3.1, their companies have neither changed their investment portfolios due to Solvency II. On the contrary, both Interviewee 1.2 and 4.1 state that their companies' investment portfolios have changed as a result of Solvency II in order to achieve a reduction in capital. Interviewee 4.1 adds that the regulatory framework clarifies the types of investments that require much capital. Interviewee 2.6 explicitly states that their investment portfolio would probably have looked different without the implementation of Solvency II regulations. Another way to release capital is through diversification, which one respondent within institutional sales recognizes has increased in focus with Solvency II.

The majority, 68 percent, of the fund and asset managers express that Solvency II has affected their business. The results from the questionnaire show that insurance companies demand more transparency and increased reporting. In addition, some respondents have made IT investments to handle these increased requirements. According to Interviewee 2.6 who is responsible for the asset management at the company, it is now less interesting to invest in hedge funds that generally has low risk. This is due to Solvency II requires full transparency of what assets the hedge fund includes to be able to calculate the exact capital requirement. This is further confirmed by several of the respondents to the questionnaire, who also have noticed a decrease in investments in equity funds. One respondent and Interviewee 2.6 declare that if the company does not have access to the exact information to calculate the required capital, the same risk level as for unlisted equities is forced to assume. Interviewee 2.5 further agrees that if not full information about the content of investment funds is available, then one must assume that the funds have the highest risks and therefore requires more capital, which is expensive. Interviewee 2.6 further explains that the difficulty with the information about full transparency of hedge funds lies in that hedge funds have patented investment strategies. This results in that hedge funds do not reveal how these are invested. Interviewee 2.5 also points out the importance of the look-through approach. The majority of the respondents to the questionnaire confirm enabling the look-through approach to their insurance company customers. One respondent within investor relations clarifies the reason to not provide the look-through approach is due to the risk that other market actors use this. Instead, the respondent states that a complete SCR report is provided to the customers in order to lower the capital requirement for their funds.

Interviewee 2.6 also states that there has been a change in investments in credit bonds. The capital requirement for credit bonds is affected by the duration of the bond and the rating. It is not a linear increase in capital requirement in correlation to the bond rating. The capital requirement increases significantly for credit bonds with a rating below BBB expresses Interviewee 2.6. Hence, the company has relatively small investments in credit funds rated below BBB, which otherwise might have been larger if the capital requirement was not so excessive for credit bonds. In addition, it is important to evaluate what assets have the most attractive yield related to capital for insurance companies. Therefore, Interviewee 2.6 states that credit bonds with rating between AA and BBB with duration of two to five years are relatively attractive with respect to the expected return in relation to capital requirement. Also, government and mortgage

bonds have a low capital requirement but also low expected return. Hence, real estates and not listed funds investing in real estate are fundamentally good investments according to Interviewee 2.6, in a comparison of capital requirement in relation to expected return and risk diversification effects. This is further confirmed by respondents to the questionnaire where changes in investment due to Solvency II have been noticed. One respondent to the questionnaire indicate on reallocation to more illiquid instruments with non-market based prices like infrastructure investments, private equity, and real estate. In comparison, two respondents to the questionnaire respond that investments in private equity are disfavored in Solvency II. According to the questionnaire, 24 percent agrees there is an increased interest to invest in infrastructure while 16 percent do not observe an increase. As much as 60 percent of respondents are unaware of whether there is an increased interest in investing infrastructure.

On the other hand, the low interest rate environment seems to encourage investments in real estates, predicts Interviewee 2.6. This is due to the low interest rate has generated low rate of return on stocks, which leads to increased interest for real estates explains Interviewee 2.6. Interviewee 2.2 also conveys the change in investments is due to the low interest environment instead of Solvency II. The interviewee further explains that investments in interest-bearing investments are unattractive and that there has been an increase in investments of inflation-indexed bonds, private equity and corporate bonds. Similarly, a respondent to the questionnaire responds that return opportunities are on private equity bonds but these are disfavored in Solvency II. According to Interviewee 2.2, the capital requirement is almost the double on stocks compared to real estate; meanwhile the expected return is nearly the same.

### **5.3 Risk Management**

Interviewee 3.1 emphasizes that the obvious advantage of Solvency II is the good risk management. Interviewee 3.1 further states *“basically there is nothing odd with Solvency II but it becomes more formalized now than it was before.”* Interviewee 2.4 also points out the benefit with Solvency II by the stimulation of good risk management in order to achieve a lower capital requirement. The interviewee further explains that companies managing risks well could achieve a lower capital, which is reasonable. The new demands on risk management provide significant benefits for insurers according to Interviewee 1.1 and 2.3. In most companies, there has previously been a need for a change of risk management, but it has demanded a clarification in the form of regulations to actually make an effort. The regulations have been a driving force in that matter Interviewee 2.3 explains. Moreover, Interviewee 2.6 expresses that the management of underwriting risks have been clarified in the new directive. This has lead to actuaries work closer to the business through the analysis and pricing of individual insurances.

Interviewee 2.3 emphasizes the opportunities with benefiting from the risk management by engaging the organization within it. Interviewee 2.3 further explains that *“the better risk management, the less undesirable events.”* Furthermore, Interviewee 1.1 states, *“good risk management benefits the customers.”* By having control of the risk, it secures that companies have enough capital to compensate its customer, which is one of the main objectives of the Solvency II regulations. Similarly, Interviewee 2.3 expresses that the minimum level of risk management has increased as a result of Solvency II, which in turn reduces the risks for customers. Interviewee 2.3 further explains that the company focuses on involving the

employees in risk management. Clarifying the risk management for the implementation of Solvency II has led to increased efforts to engage employees within risk.

Interviewee 2.4 expresses that not all risks must be handled with a capital buffer. Instead of dispensing capital for operational risks, Interviewee 2.4 works more to reduce the operational risks. This is achieved by developing processes with limited operational risks associated with it, Interviewee 2.4 explains. Solvency II specifically requires insurers to document the risk management of all risks, Interviewee 2.4 further explains.

Solvency II impacts companies with ring-fenced funds, which Interviewee 2.6 perceives is not clearly defined in the Solvency II regulation. Ring-fenced funds imply that a company cannot take advantage of diversification between different groups of insurance policies, so that gains and losses cannot compensate for each other within a company. The contracts are written so that the results of one group of insurances are not allowed to favor or affect another group of insurances. Since the company cannot benefit from diversification, the company's total risk increases and so also the capital requirement. The company has not yet finalized the analysis of ring-fenced funds and hopes the regulator to clarify the interpretation of ring-fenced funds going forward. Furthermore, Interviewee 2.6 explains Solvency II has helped to highlight this but it is yet unclear how ring-fenced funds should be properly defined and managed.

Interviewee 5.2 considers Solvency II aims to increase the risk awareness. Interviewee 2.3 sees the potential of engaging the whole organization in risk management. This is considered to be a long process but actions towards reaching this the coming year have been implemented. A risk culture takes long time to develop to get it deep down in the organization, Interviewee 2.3 explains. Additionally, the interviewee declares that it is not enough to have a regulatory framework for this. It is required to actively work towards this in order to achieve it. Currently there is a lack of risk awareness in employees' daily work. The risk awareness is expected to increase by implementing controls that remind employees in their daily work of the company's risk exposure, Interviewee 2.3 explains.

### **5.3.1 Own Risk Solvency Assessment, ORSA**

Those interviewed consider the ORSA process to generate in added value besides fulfilling the Solvency II regulations and express several benefits with the process. Interviewee 5.2 at the Swedish FSA emphasizes the benefits with the process rather than what is reported to authorities. Similarly, Interviewee 1.1 expresses that one of the benefits with Solvency II is the ORSA process. Interviewee 2.4 expresses that, as with any regulations, firstly it is ensured that the regulatory framework is achieved before exploring the potential benefits. Similarly, Interviewee 2.3 claims the company initially sets the most basics, that is required to comply with the regulations, and then the focus can be on how to achieve the benefits with it. Interviewee 2.4 states that there are benefits with the ORSA to take advantage of in the long term and that the process can be complemented internally beyond what is pre-scribed in the regulations. A challenge with the ORSA is, according to Interviewee 2.3, to make it work so the company can benefit the most out of it. The company has to perform the ORSA a few times before it can be established. This suggests the company has not yet achieved all obtainable business benefits with the ORSA. Furthermore, Interviewee 2.3 states the near focus is on taking advantage of the ORSA by linking it to the business planning and strategy. By incorporating what the company

wants to accomplish in the ORSA, the company can obtain an assessment of how the strategy affects their risks and performance.

Recurring benefits among the interviewees are that the organization and the board get better control and understanding of the risks the company is exposed to and involves a forward-looking analysis. According to Interviewee 5.2, the regulations have promoted the board and senior executives to understand and be aware of risks, which earlier varied between organizations. The interviewee further explains that the board must comprehend the ORSA in order to approve it. This results in an increased risk perspective besides just having a market perspective. This means that company is not only focusing on market shares but also on having a healthy business. Interviewee 2.3 points out the benefit of involving more employees than before in how the capital requirements are formed and how the insurance products are affecting the company's risks. This increases the understanding of how the risks and products are linked together, which Interviewee 2.1 also states. Interviewee 2.1 further expresses that errors within the standard model are observed during the ORSA process. Interviewee 2.3 explains that the responsibility of the board is extended beyond the ORSA work. It is the board's responsibility to challenge the ORSA. Furthermore, it also has the ultimate responsibility for functioning governance around the risk management in the company, Interviewee 2.3 adds. Furthermore, Interviewee 2.4 considers the ORSA to generate whether and how the profitability of a product differs with different possible future scenarios. This provides the company with valuable information when deciding upon changes on insurance products. Similarly, Interviewee 2.5 regards the ORSA as a tool for understanding their own business. Also, Interviewee 2.4 considers the ORSA useful for evaluating their company's risks and not solely relying on the prescribed risk levels in the directive.

#### **5.4 Low-Frequency and High-Impact Risks**

Low-frequency and high-impact risks have a major impact on non-life insurance companies. It is one of the most important risks to manage for non-life insurers according to Interviewee 1.2. Additionally, Interviewee 1.2 explains that historical data are the basis for evaluating low-frequency and high-impact events, which also Interviewee 4.3 expresses. Interviewee 4.2 points out that one challenge in their work is to use historical data to say something about the future. Furthermore, Interviewee 4.2 states their work is mainly "*about imagination to say the unpredictable*". A major risk for non-life insurers, according to Interviewee 4.3, is to set the wrong reserves for future damage, so called claim reserves, that are further affected by environmental pollution or environmental impact. It is further declared that unexpected large amount of rain and storms that cannot be seen historically, resulting in a trend break, constitutes a vital risk. Interviewee 4.3 means that the company hopefully can manage those types of risks, which also Interviewee 1.2 is hopeful to do. More convinced about the adequacy of the capital requirement for these risk types is Interviewee 2.5 and 4.1. It is expressed by Interviewee 2.5 that the company assumes that several of these types of events with low-frequency and high-impacts do not occur at the same time. Interviewee 2.5 does not see a situation where all negative events occur simultaneously and do not consider this reasonable since the events are of very different nature. Assumptions have been made regarding the probability of several events to occur simultaneously, Interviewee 2.4 explains. The interviewee further states that if everything would happen at the same time, no company would be able to handle it. However, the probability of this is considered low. Similarly, Interviewee 5.2 expresses that the standard formula has

assumed the correlation between risks and that it is not reasonable to assume a company to handle all risks simultaneously since it would prevent businesses. Furthermore, the interviewee states that it would be problematic if risks start to correlate. It is a trade-off in the assumptions of the correlation of several events occur simultaneously.

Interviewee 5.2 explains the standard model is more aligned for European natural damages than Scandinavian. Since there are weather differences in Europe, the damages can differ a lot. Interviewee 5.2 expresses that floods are common natural disasters in Central Europe while storms are more common in Scandinavia. Storms have shown an increase in frequency according to Interviewee 1.2. In contrast, Interviewee 4.3 states that there could be an increase in the frequency of catastrophes, but this increase is difficult to determine. This the interviewee explains is due to the length of data required to be able to observe such increase, if there is any, in low-frequency and high-impact events. In addition, Interviewee 5.1 in a reinsurance company expresses that it is more difficult now to get the capital to last and to achieve profitability in affected geographical areas, such as Southeast Asia. This could be explained by the increase in weather related catastrophes, since Interviewee 5.1 expresses that *“it feels like extreme events have increased”*. However, the interviewee further explains that several extreme events have occurred during a short period of time, and it is therefore difficult to establish long-terms trends and changes. Hence, it cannot be directly related to climate change at this time. Interviewee 4.3 indicates that there could be an increase in the frequency of floods but there is no observed increase in storms. Interviewee 1.3 explains that the company is more exposed to weather related natural disasters today due to the increased attractiveness to build waterfront houses where there is an increased risk for floods. This is also confirmed by Interviewee 3.2 who stresses that the global warming has lead to increased amount of rainfall based on statistics from SMHI. This in itself leads to raised water levels the interviewee explains; hence it will have an impact on waterfront houses. Interviewee 1.3 further states that the increased average temperature on the Earth cannot be denied for having an impact on the climate. This could lead to an increase in weather related extreme events. However, this is difficult to determine due to the long-term aspects for discovering climate change, the interviewee states.

The natural disasters specialist, Interviewee 4.2, is convinced there is an increase in both impact and frequency of weather related natural disasters. The interviewee declares the impact is due to the increased costs associated with today’s more advanced infrastructure. It is conveyed in the interview that the increased frequency of storms and cloudburst has a correlation with the increased climate change. Interviewee 4.2 regards the company works to reduce climate change indirectly. The company aims to reduce the damages of catastrophic events by advising their customers and mapping their customers’ risks. Interviewee 4.2 explains that the company advises its corporate customers, for instance, by how the production can be altered in order to reduce the impact that a natural disaster can cause. In turn, working to prevent the damages is expected to reduce climate change. A concrete example the interviewee explains is the advice on forestry actions that could be adopted, such as forest harvesting and choice of plants, in order to limit the impacts on forestry caused by storms. Interviewee 4.1 agrees with Interviewee 4.2 stating this company also prevents damages from catastrophic events by informing their customers in order to reduce the impacts of low-frequency and high-impact events. Interviewee 1.1 also states that the company has risk engineers informing the large corporate customers what is reasonable to do to prevent large damages.

Interviewee 4.2 expresses that there is an increased awareness among employees and customers regarding climate change since this has a large impact on the business. Interviewee 4.2 further claims that their company is at the forefront of the insurance industry to prevent and work with climate change. *“It would be a professional misconduct not to work actively with these issues”*, expresses Interviewee 4.2. Furthermore, the interviewee states the company no longer invests in businesses related to fossil fuels. However, the whole company has not yet reached the targets to not invest in anything related to fossil fuels but the company works towards this goal. The underlying reason to not invest in this is due to the increase in frequency of weather related natural disasters and climate change that has been noted. In addition, the questionnaire also shows that the majority, 60 percent, of fund and asset managers considers insurance companies to demand more sustainable funds.

Reinsurance is a common risk management tool for these types of events. Interviewee 1.3 considers the new capital requirement and the use of reinsurance to be adequate to cover the losses from any catastrophic risk. However, consequential impacts may arise that could influence the continued operations. Interviewee 4.2 expresses that it is difficult to identify the risks of catastrophes, which is required in order to be able to reinsure it. Interviewee 3.2 expresses that the company must evaluate how much reinsurance the company should buy. It may be more appropriate for the company to stand for a greater share themselves by reducing the amount of insured, which would lower the costs according to Interviewee 3.2. It is particularly important to consider this if reinsurance becomes more expensive. Interviewee 1.3 who works as a reinsurance manager predicts the reinsurance premiums to be more expensive, which eventually lead to increased prices to their policyholders. Interviewee 1.3, who has seen an increase in weather related catastrophes, means that the company’s costs will increase. The reason is that when more catastrophes occur, the reinsurers’ expenses will increase and thereby the reinsurance coverage for the company itself will be more expensive. This will in turn affect the policyholder by increased costs according to Interviewee 1.3. Further, Interviewee 3.2 explains the reinsurance market’s dependency of catastrophes worldwide since reinsurers are global actors. The Interviewee 5.1, representing the reinsurance company, further confirms this. The interviewee explains that catastrophes worldwide impact the premiums charged by reinsurance companies. The premium is market-driven and goes in cycles, the Interviewee 5.1 states. Henceforth, if it is damage free during some years, the customers expect a decrease in premium. The premium may also decrease due to new actors enter the market with the belief of an interesting market but do not always have the right ability to price the premiums, Interviewee 5.1 expresses. On the contrary, the premiums will increase if a catastrophe occurs. This is due to fewer participants in the market caused by bankruptcy or reduced interest to invest in this market leads to reduced supply. Interviewee 1.2 believes it is more challenging with many less severe events since these cannot be managed with reinsurance. Controversially, Interviewee 3.1 states *“the company is enough capitalized even if several risks occur simultaneously.”* Interviewee 1.2 conveys, *“new risks always emerge where you do not expect them to. If you could predict all crisis, there would not be any ... at least not as substantial.”*

## 6. ANALYSIS AND DISCUSSION

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*This chapter analyses the Results from the Interviews and Questionnaire with the existing literature presented in the Literature Review, and discusses the results of this research.*

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In this chapter, the literature review is analyzed and discussed with the findings from the interviews and questionnaire. The empirics from the data collected are compared to the literature review in order to strengthen or contradict the previous results, or to obtain new results. To maintain the clarity of the investigation, this sub-chapter is further divided in the same categories as the *Literature Review* and *Results from Interviews and Questionnaire* chapters. Equivalent to the *Results from Interviews and Questionnaire* chapter, the questionnaire is only concerned within the sub-section *Capital Requirement*. For reminding the reader of the themes this study constitute of and the corresponding research questions, the following should be noted:

**6.1 Business and Organizational Changes** aims to address the first sub research question *“How has Solvency II impacted insurance companies’ business and organizations?”*

**6.2 Capital Requirement** aims to address the second sub research question *“How have insurance companies adapted to the capital requirement imposed by Solvency II?”*

**6.3 Risk Management** aims to address the third sub research question *“How has Solvency II affected the management of risks?”*

**6.4 Low-Frequency and High-Impact Risks** aims to address all the three sub research questions.

### **6.1 Business and Organizational Changes**

Interviewees consider the regulations to favor their companies by creating barriers to entry since this causes oligopoly in the market. In comparison, in the literature, regulators argue for the reduced barriers to entry due to the enhanced transparency of the market through increased reporting. The different points of view regarding the competition could be due to European regulators and Swedish insurers perceive this differently. Regulators observe the increased transparency it causes while insurers’ notice the increased workload it causes. Insurers further consider that new players are less willing to enter the industry because of the need to establish processes for reporting and management of the regulations. Likewise, the interviewee at the Swedish Financial Supervisory Authority, FSA, also mentions the difficulties of new players to enter. This in turn promotes the oligopolistic market and hampers the competition. Another explanation to the different approaches may be due to this study has been done on Swedish insurance companies. Swedish insurance companies may differ from the rest of the European companies due to Sweden is a relatively small country and the Solvency II is suitable for all insurance companies in Europe. A large Swedish insurance company is not regarded large in European terms. One aspect is therefore that Solvency II does not contribute with what it is supposed to in all aspects. It is further uncertain whether Solvency II creates these barriers to

entry or if these existed previously. It could be the case that regulations were imposed due to the fact that the industry is oligopolistic to increase the transparency for new actors. This would further suggest why regulators are concerned with promoting the financial stability because the actors have a major impact. However, several interviewees express that Solvency II has not contributed to a more transparent competition between insurers. Since occupational pension companies have the possibility to apply transitional rules instead of Solvency II, it is more difficult to compare between different life insurers. It may also be too soon to notice any actual results of Solvency II on the competition.

Both literature and empirical data suggest insurers can benefit from Solvency II beyond achieving compliance. Several authors argue for having a strategic focus of the Solvency II work. Especially, Schwarz et al., (2011) establish that strategically adjusted companies to Solvency II will notice new business opportunities and become more competitive. However, none of the interviewees state that Solvency II has affected their strategy. A possible explanation to this result is that it has been difficult for the interviewees to determine whether a change has been caused directly and exclusively by Solvency II. Probable reasons to this are that regulatory change is just one of many changes the insurance industry faces and the long period of time for which Solvency II has been implemented. A strategy may have changed during the time period of implementation of Solvency II but it could be difficult for the interviewee to observe the exact change although some aspects may be due to Solvency II. Also, the entrance of Solvency II has been a matter of time for insurance companies. Therefore strategic changes may have been done in the organization earlier due to the knowledge of Solvency II to come into force. The compliance focus that insurers have had will in the future shift to more focus on the business benefits suggests several interviewees. There are interviewees that express the organization have explored the benefits but additional work can contribute to obtaining even more benefits. However, both the literature and interviewees express Solvency II contributes to increased workload. The study conducted by EY in 2014 on 170 European insurance companies shows that 50 to 75 percent of the respondents expected a heavy increase in workload. This Interviewee 5.1 further confirms by stating an increase in workload with 20 to 30 percent for actuaries. Another possible explanation to interviewees' expression of no changes in strategy is that companies have changed the strategy as a result of Solvency II without the interviewees' awareness. What many interviewees understand is the importance of capital optimization with regard to investments and risks. This is what Schwarz et al., (2011) argue is the most important strategic decision to make for insurance companies. Hence, it could be the case that insurers unconsciously have had or are aiming for a strategic focus of Solvency II although it has not been stated explicitly in the interviews.

Furthermore, it is foremost important to establish the regulations deep down in an organization. However, the company must identify the benefits with it and embrace them in an organization in order to fully utilize the benefits of the directive. The directive proposes vital points to the insurance industry and it is not enough to become compliant with the regulations. Risk awareness has increased due to Solvency II in many organizations express several interviewees. Furthermore, several interviewees express a desire for creating risk culture in the organizations. According to some interviewees, the future focus will lie in the continued development of risk culture. Initiatives to involve employees have been initiated in one organization through the implementation of controls to remind people of the company's risk exposure and in another by

measuring risk culture in the employee satisfaction survey. This is in line with the implications provided by Schwarz et al., (2011) in order to improve risk culture in an organization. The authors argue for the importance of having simple metrics that enables employees to monitor if they are on the right track of reaching the organization's risk appetite. Insurers that have not yet understood nor implemented such controls are likely to not establish a risk culture since employees usually work to meet an organization's stated goals. Therefore the benefits with the adoption of a risk culture cannot be obtained.

Schwarz et al., (2011) suggest educating the frontline risk-takers in skills of careful risk-taking. Furthermore, it is declared that it is essential for employees to understand the risks and how the risks affect the business (Schwarz et al., 2011). This is further established by interviewees whom express the importance of hiring competent employees. The importance of educating salespeople in risk awareness that an interviewee conveys further highlights this. In 2009, Everis states that the sales department is the department within insurance companies where fewest employees use risk-controlling tools. This indicates the importance of having risk awareness throughout the whole company. Since salesmen are the cause of underwriting risks through selling the contracts to the customers, it is problematic if those are not aware of the risks. Salesmen may underestimate the coverage of a certain risk if they do not understand the actual risk. Since Solvency II requires an independent actuary to control the underwriting risks, this means that the actuary can possibly detect and prevent deficiencies in risk management of these. Hence, this would not affect the industry but it could be problematic for a company to dispense capital for the risks associated with a contract if a salesman has underestimated the risks and thereby make profitable affairs. This would lead to not achieving the risk-adjusted profitability associated with different products and businesses, which Schwarz et al., (2011) suggest Solvency II does. In turn, this could lead to struggles for some insurers to survive (Schwarz et al., 2011). This increases the risks of bankruptcy of these insurers, which in itself harms the financial stability. Since Solvency II is expected to enhance the financial stability, this contradicts the objectives of it. Likewise, Eling and Schmeiser (2010) also argue for the importance of people making the decisions understand the models; otherwise the models are useless for the company. There may also be a risk that people using the risk models ignore the results of them, rather than not understanding the model. This could be the case for salespeople if these get provision on every contract sold, which would create initiative to underestimate the risk in order sell a contract. Therefore, it may be appropriate with regulations for provision-based professions within the insurance industry to prevent initiatives to sell at every possible price by not reflecting the actual risk in the price.

Interviewees express that future focus will lie in optimizing the capital requirement, adjusting prices and products among other business changes. This suggests that insurers are aware of the benefits that can be obtained through strategic changes and will have a more strategic focus in the future of their Solvency II work. The increased costs for insurance companies, as a result of Solvency II, expect to lead to rose prices to their policyholders expressed by one interviewee. This is also shown in earlier studies, conducted by, for instance, both Economist Intelligence Unit (2012) and Bernert et al., (2010). However, the majority of the interviewees in this study do not see a correlation with Solvency II and rose prices. This may be explained by the interviewees' consideration of the well-capitalized position in their companies before the implementation of Solvency II. Contrariwise, one reinsurance manager at a non-life insurance company expects rose prices as a result of increased reinsurance contracts due to increased

weather related catastrophes. The interviewee is alone in expressing this and it did not emerge during the literature review. A possible explanation to this may lie in that the majority of the interviewees did not see an increased threat of weather related catastrophes.

## **6.2 Capital Requirement**

Several interviewees emphasize the benefits of having a risk-adjusted capital to cover their risks and expect to further reflect the risks in the prices of insurance contracts. Some literary sources argue for insurers' perception of already having sufficient capital to cover their exposed risks and that Solvency II leads to over-capitalization (e.g. Economist Intelligence Unit, 2012, Siegel and Morbi, 2015). Several interviewees confirm that the regulations are too excessive for the coverage of some risks and that there were no uncertainties to meet the obligations in the past. This can be compared with how the banking sector reasoned about their capital held before the financial crisis. The financial crisis occurred due to companies were not sufficiently capitalized and did not reflect the risks in the products' prices. If it is a perception that the insurance industry is over-capitalized and initiatives to release capital is pursued, then this could possibly lead to insurance companies not being sufficiently capitalized within a contingency. This could potentially cause a financial crisis if comparing the outcome of not reflecting the risks properly within the banking sector. Therefore, the regulations require a certain amount of capital, but the accuracy in itself is another matter. Dermine (2013) confirms that too excessive capital requirements are self-destructive due to the encouragement of circumventing the requirements. Although there is a perception of the regulations are too excessive for covering certain risks, many interviewees express that their companies are well-capitalized under the Solvency II regulations and do not work to release capital. This shows the mindset that interviewees are critical to excessive regulations while consider it is reasonable since the interviewees hold even more than what is required. Furthermore, interviewees perceive the occurrence of several risks simultaneously is unreasonable. Liedtke and Courbage (2002) argue for this as well in their report in 2002. Additionally, an interviewee suggests that it is not possible to forecast a crisis, it occurs when it is least expected. However, increasing the awareness and preparedness of the possible risks expect to reduce the probability of default.

Already in 2010, Bernert et al., claim that the new requirements with Solvency II would lead to struggles for small insurance companies to survive due to the lower profitability and higher capital requirements. Several interviewees further verify this. Interviewees from the smaller companies also express the struggle with growth and expansions due to this. The empirics of this study indicate that smaller companies struggle more with the capital requirement compared to larger companies. In addition, life insurers seem to struggle more due to their obligations are more long-term compared to non-life insurance companies making the capital to cover their investments not as eligible causing a lower return on investments. This gives the indication that the capital requirement is more suitable for one of the two businesses. The non-life insurance industry is much more concentrated to large companies and shows less concern with the achievements of the directive. However, the one small non-life insurer this study investigated shows struggle with the capital requirement.

The empirics show that insurance companies in Sweden use the standard model. However, as a complementary, some of the companies use an internal model within the company and not for reporting purposes. Companies using both models express that the reason to not apply for

approval is the extensive controlling of an internal model required by the FSA. This may be related to interviewees express that Solvency II requires extreme reporting. The lack of initiative to implement an internal model could also be explained by insurers' well-capitalized position and the perception that the advantages with such a model is limited with regard to the resources it requires. Also, companies have worked to become compliant with the regulations so far and still need to assess the suitability of the standard model to their business. Companies must question themselves, in the evaluation of implementing an internal model, whether the standard model is a good fit for the company and what benefits that can be obtained with an internal model. Since the standard model uses an enterprise risk management approach, the capital does not fit perfectly with an individual's risk profile. Besides achieving a better fit of an individual's risk profile with the capital, companies become even more aware of the risks. However, there are extensive costs associated with implementing and getting approval of an internal model. Therefore, companies must outweigh the benefits with the resources. The interviewee at the FSA indicates that standard models reflect the market side risks better while it may not be appropriate to use for all insurance companies underwriting risks. Since non-life insurance companies are more exposed to underwriting risks, these may be keener to develop an internal model depending on how suitable the standard model is on their risk exposure. On the contrary, life insurers that are mainly exposed to market risks, an internal model may not result in a better reflection of their risk profile compared to the standard model.

### **6.2.1 Risks**

There are clear differences between life and non-life insurance companies regarding the most vulnerable risks. This is earlier stated in the *Literature Review* chapter and is further confirmed by the interviewees in this study. The empirics show that market risk is the risk life insurers are most vulnerable to. Bernert et al., (2010), for instance, express that life insurers' capital essentially consists of market risk. Both Bernert et al., (2010) and the Bank of England (2015) argue for that the underwriting risk stands for the largest share of capital for non-life insurers. Several of the interviewees explain that non-life insurers are most vulnerable to underwriting risks. Thus, it is a connection between the risks insurance companies are mostly exposed to and the risks that bind most capital. This illustrates the importance of good risk management to control the correlation between risk and capital. As some interviewees also express, the better risk management, the fewer unwanted incidents occur that cost money.

Market risk is an important factor since it is related to the invested asset value. Life insurers have long-term obligations, and it is therefore assumed that a lower market risk is preferable to meet their obligations to policyholders. The largest share of respondents perceive insurers' exposure to market risk has not been reduced due to Solvency II. A possible explanation to the finding that insurers have not changed their market risk exposure is due to the well-capitalized position. This is partly contradictory since several interviewees express a decrease in interest-bearing investments and stocks due to the low interest rate environment. Hence, there is no obvious indication of a correlation between Solvency II and a reduction in market risks.

An interesting point that an interviewee conveys is that Solvency II has helped the company to highlight vital points in the management of a certain risk. This shows that the previous directive was not adequate for the management of all risks insurers face. It might not have been a problem even if several risks occurred simultaneously because Swedish insurers are generally well-

capitalized. However, the raised awareness of that the risks may not have been managed accurately within the company suggests that the company did not appreciate all risks adequately. Since one of the reasons for regulating the insurance industry has been to achieve consumer protection, regulators have considered that the consumers were not enough protected earlier. However, some insurers did not consider that there were uncertainties to fulfill their obligations in the past. This may be a sign of neglect among those, which could ultimately lead to default. One interviewee also mentions that the company cannot only rely on the risk calibration by EIOPA and that the company will evaluate whether Solvency II handles the actual risk properly. This indicates that there is a certain doubtfulness regarding the current directive within the standard model. Furthermore, the increased risk awareness, which some interviewees consider has been driven by Solvency II, has possibly established this view. This indicates insurance companies have applied the risk-adjusted view of their Solvency II work beyond what is required. Since Solvency II is developed for an average European country, it may not be perfectly matched to the Swedish market. Therefore, it is important for insurers to evaluate the actual risk.

### **6.2.2 Investments**

The view of changed investments as a result of Solvency II differs between interviewees within insurance companies and respondents from fund and asset management companies. The majority of interviewees state that their investments have not changed. On the other hand, the majority of fund and asset managers respond that their insurance customers' have changed their investments as a result of Solvency II. A possible explanation to this divergent view could lie in the insight of interviewees in the company's investments or that many insurers use external capital managers transferring the responsibility to a third party. The research question is concerned with "*How insurance companies have adjusted to Solvency II at an early stage?*". Therefore, investigating this from an external party was not the initial aim. The questionnaire was partly distributed to fund and asset management companies through company websites. Therefore, it is not certain that the questionnaire reached suitable respondents. Since this study is delimited to investigate the largest Swedish insurance companies, it was of interest to get fund and asset management companies that have these as their customers. It could be the case that the respondents' company have smaller insurance companies and are therefore not applicable for this study since their investment behaviors may diverge from the larger companies.

The lack of knowledge of those interviewed is noticed in the *Investments* sub-chapter within the *Results from Interviews and Questionnaire* chapter since it is mainly collected from one interviewee. Furthermore, the questionnaire was conducted due to a lack in knowledge within investments noticed among interviewees. This means that these results should be seen as an indication rather than general for the industry. One interviewee, representing a small company, is involved in the capital planning and states the company has changed their investments. This suggests there are two factors that can have an impact, the size of the company and the knowledge of the interviewees. As stated earlier, smaller companies struggle more with the capital requirements, and therefore may also pursue initiatives to release capital through changes in investments. Another possible reason some interviewees express that these have not changed their investments, and also prices to policyholders, could be due to the companies have been well-capitalized in advance and have not been too affected by the imposed capital requirement on investments. Another explanation is the length of the Solvency II work that lead to

interviewees cannot directly connect changes in investments to Solvency II due to changes occur regularly.

Hay et al., (2011) express that a lower risk can be obtained by a decrease in investments in equities and real estate and instead increase the share of fixed income securities. This is partially contradictory to the empirics from the interviews and questionnaire. In this study, interviewees and respondents to the questionnaire confirm the decrease in equities but rather argue for an increase in real estate. The reason to the differences could be geographical and due to the low interest rate environment today, which differs significantly from 2011. Market factors, such as the currently negative repo rate in Sweden, contributes even more to an increase in investment in real estate and a decrease in equities, since it has become harder to earn money on the stock market. Since the literature and the empirical results of this study are contradictory, no conclusion regarding changes in investments in real estate could be drawn. This was mainly due to the empirical results of this study was not enough to strengthen an increase in investments in real estates that is required to complement the existing literature.

The questionnaire indicates increased interest to invest in infrastructure for return opportunities but that Solvency II disfavors these. The majority of respondents do not know if it has become more interesting with infrastructure investments, however the largest share of the remaining respondents consider an increase in infrastructure investment. On the other hand, interviewees imply a lower capital requirement on infrastructure investments due to the EU wants to increase the investments in infrastructure. The Swedish FSA disagrees with EU that the capital requirement should be lower on infrastructure investments due to these are considered to have high risk. The lower capital requirement on investments in infrastructure is therefore contrary to the risk adjusted capital that Solvency II imposes. A possible explanation for a lower capital requirement could be to promote investments in infrastructure. This is due to the higher capital requirement by Solvency II leads to decreased investment in the social economy. The different viewpoints of infrastructure investments between the Swedish FSA and the EU could be geographical variations and do not reflect the whole Europe. This shows the difficulty of creating a framework that is suitable for an entire continent with different conditions. Since it may not reflect the Swedish insurers' risk exposure, this demonstrates the importance of being risk aware and not entirely relying on the regulations.

Interviewees and respondents to the questionnaire express a decrease in investments in hedge funds, which previously has been considered as good investments due to the general low risk. In Solvency II, hedge funds are disfavored since these lacks in transparency. This means that insurance companies do not have the full information regarding the content of the hedge fund, and therefore need to calculate a higher capital requirement. This is consistent with the risk-adjusted capital imposed by Solvency II. The capital is supposed to cover the risks and it is not appropriate to assume a lower risk if the risk exposure is not revealed. This leads to insurers demand more information from fund and asset managers, which in turn may lead to business changes in fund and asset management companies. Therefore, interviewees express the importance of the look-through approach, which also the majority of the fund and asset managers enable. For insurance companies to continue invest in hedge funds, it is required that fund and asset managers provide the look-through approach in their funds.

As a result of Solvency II and the noted changes within investments, the trade-off between risk, return, and capital is of more significant.

### **6.3 Risk Management**

Literature suggests that there is a new need of employees that understand risks (Eling and Schmeiser, 2010). Interviewees confirm that there has been a new need of employees within risk management and education has been pursued to increase the knowledge among employees within organizations. The compliance department has been the largest organizational change that demonstrates the need of employees within risk management.

It is proposed by the literature that risk management should be incorporated throughout the organization (Ott, 2013). There have been organizational changes in order to be able to manage the risks properly. The people interviewed with the objective to investigate the risk management of low-frequency and high-impact risk have not been involved in the Solvency II work. This could show a lack in these organizations' risk management of low-frequency and high-impact risks in line with the Solvency II directive. The directive should make the organizations more risk aware and although interviewees express that the organizations have increased the risk management with regard to these risks, it cannot be connected directly to the Solvency II directive.

O'Donovan (2014) suggests that companies should have a long-term approach on risk management in order to stay competitive on the market. This is not noticed within this study. However, this study indicates that the Swedish oligopolistic insurance market may be the reason to that this has or will not be prioritized as suggested by the literature.

On the one hand, authors argue for the main reason for insolvency is poor risk management rather than the regulation of sufficient capital requirement (Hamwi et al., 2004, Eling et al., 2007). On the other hand, it can be discussed what approaches regulators can use to regulate an industry. Imposing capital requirements can be argued a more suitable approach to impact the industry than trying to control the governance of companies. Regulators do not have a lot of options for influencing the industry, but controlling the capital is at least one approach to prevent insolvency.

#### **6.3.1 Own Risk and Solvency Assessment, ORSA**

Interviewees and the literature agree with the awareness of the benefits of the ORSA process since it involves the board in the risk management process. What many insurers struggle with, both according to interviewees and the literature, is the incorporation of the ORSA process into the business planning and decision-making. This has similarities to the fact that companies have not been strategically adjusted to the Solvency II and have rather worked to achieve compliance. At present, all insurance companies have implemented the ORSA process as a means to achieve the regulations. However, few have explored the benefits beyond being compliant with it. Insurance companies have taken a first step to change this through the awareness of this change but now need to strive to obtain it. This means that companies have not adjusted their business to the regulations with regard to the ORSA, rather the ORSA have been adopted to achieve the compliance. A challenge according to one interviewee is to make it work so that the company can benefit the most out of the ORSA process. This could be explained by one of the pitfalls that

Chmielewski (2011) states with the ORSA process referring to the difficulty to get a clear overview of the process due to its extensiveness. This is in line with that several interviewees express that the ORSA process has to be performed a couple of times in order to fully understand and utilize its benefits.

#### **6.4 Low-Frequency and High-Impact Risks**

Regarding low-frequency and high-impact risks, companies have the perception of being well-capitalized and having reinsurance, which can compensate for losses from catastrophic events. The differences that could be noticed between the interviewees working actively with these types of questions, often within non-life insurers, and those who do not have these questions within their work tasks, were the different attitudes among these events. Those who do not work with this on a daily basis do not consider these events a burden and have a more relaxed attitude to both the impact these events could have on the company and that the company could manage if these types of risks occur. Meanwhile the interviewees working with these questions are much more concerned about the risk these events could cause. Natural disasters specialists were the ones that had the strongest expression in the question. An explanation to the different viewpoints may lie in knowledge or the interviewees' personal interest of natural disasters. Both the literature, for instance Messervy et al., (2014), and interviews indicate more awareness of the risk of climate change within the non-life insurance industry. An explanation to this could be that climate change has a greater impact on the non-life insurance industry. Therefore, there is a certain degree of neglect of climate change in the life insurance industry since it is not affected in the same manner of destruction. Another imaginable reason of the reduced concern is the belief of reinsurance coverage of the losses. Several of the risk managers and CROs explicitly express, without doubt, that the losses are covered with reinsurance. Reinsurance coverage is good aid for insurers to meet its obligations and to prevent default, which is both expressed by interviewees and the literature. However, it may cause insurers to lower the risk management of those within the company and rely on the reinsurer. As stated in the literature, companies that are too reliant on reinsurers are more susceptible to failure (Buckham et al., 2010). Companies that have more reinsurance can be more likely to expose themselves to risks due the reliance on reinsurance. This can lead to worse risk management. Insurers should regard this when buying reinsurance coverage. Some interviewees clarify companies' consideration of how much reinsurance to buy and how much to stand for alone. This shows awareness of not covering all losses with reinsurance. In addition, it indicates a strict attitude of the risk management of these events.

Some of the interviewed organizations that observe the necessity for managing low-frequency and high-impact risks have also seen the need to improve the risk management. As a means of improving the management of low-frequency and high-impact risks, interviewed organizations have employed natural disasters specialists. This shows the need for competent employees in organizations. It is uncertain whether this has been driven by Solvency II or the fact that there is an increased interest and awareness of low-frequency and high-impact risks. Then again, this is only in non-life insurance companies.

Several interviewees express that historical data is used for the evaluation of catastrophic events. Although an increase in the frequency of catastrophic events is difficult to determine, both literature and some interviewees consent there is a noticed increase. Therefore, it is not suitable to use historical data for forecasting catastrophic events. In addition, some events cannot be

foreseen with historical data by reason of that these have not occurred in the past. This is what makes these events problematic and the reliance of historical data not eligible for the evaluation of low-frequency and high-impact risks. However, the correlation between climate change and the frequency of natural disasters, which was indicated in the literature review, is too soon to be established according to several interviewees. Moreover, to work damage prevention aims to reduce the impact of catastrophic events. However, it should be considered with the awareness of that catastrophic events occur where least expected. Therefore, it is difficult to work damage prevention but it should be in all companies' interest to make an effort.

Literature states that a lower level of climate change can be obtained through climate adaptation and by lowering the climate impact (SMHI, 2015). This study's empirical results indicate on both. The higher premiums insurers charge for waterfront houses is an example of climate adaptation since it aims to impact those living in waterfront house. This an adjustment since increased sea levels due to climate change increases the risks of flood. Lowering the climate impact has been demonstrated through lowering investments in fossil fuels and increasing investments in sustainable funds. In addition, working damage preventing also lowers the climate impact. Therefore, the empirical results of climate change support the literature findings.

The risk management tool, diversification of risk, reduces the capital required for the total risk profile in comparison to dispensing capital for each individual risk. This means that the capital may not be sufficient for the occurrence of several risks simultaneously. However, many interviewees express that the probability of several events to occur simultaneously is unreasonable. It is assumed plausible to not predict all events occur simultaneously. The appropriateness of the assumed correlation between events has not been investigated but according to the empirical results it is perceived to be adequate. The high impact of catastrophic events is the reason that the literature suggests that it can lead to bankruptcy if companies cannot handle them. This promotes the importance of adequately managing these risks. Furthermore, interviewees also give indication of the difficulties to manage several rather large risks due to not reaching the level where reinsurers cover the losses.

## 7. CONCLUSION

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*This chapter presents the conclusions of this study based on the presented results and analysis in order to answer the research questions.*

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This chapter initially presents the *Main Findings* of this research, which serve to fulfill the purpose of this study. Furthermore, the *Implications* of this research are presented, which are practical conclusions that are valuable for insurance companies, compliance consultancies, and fund and asset managers. Finally, recommendations for *Further Studies* within this field are given.

### 7.1 Main Findings

The purpose of this study, “*to investigate how insurance companies have adjusted to Solvency II at an early stage after the transition*”, has been addressed with the main research question. The conclusions of the main research question, “*How have insurance companies adjusted to Solvency II at an early stage?*”, therefore fulfill the purpose of this investigation. Furthermore, the research has three sub research questions that are aimed to address the main research question in order to fulfill the purpose of this study. The conclusions to each sub research question are initially presented separately and are further the basis for the conclusions to the main research questions.

#### 7.1.1 Findings to the Sub Research Questions

The conclusions answering the first sub research question, “*How has Solvency II impacted insurance companies’ business and organizations?*”, is based on *Business and Organizational Changes* from the *Analysis and Discussion* chapter. In addition, the conclusions from *Low-Frequency and High-Impact Risks* related to business and organization are also presented.

The business and organizational changes are:

- Swedish insurers have not yet changed their strategy.
- Increased risk awareness among employees to be able to understand the business’ vulnerability to risks.
- Desire to create risk culture in organizations in order to involve all employees.
- Increased need of competent employees, and continuous development and education of employees.
- Employment of natural disaster specialists to manage low-frequency and high-impact risks.
- Developed systems and processes for managing extensive reporting to regulators.
- Increased workload.
- Expect changes in prices.

The *Capital Requirement* from the *Analysis and Discussion* chapter is the basis for the conclusion to the second sub research question, “**How have insurance companies adapted to the capital requirement imposed by Solvency II?**”. Also, the conclusions regarding Low-Frequency and High-Impact Risks connected to the capital requirement are given.

The adaptations to the capital requirement are:

- Trade-off between risk, return, and capital in order to maintain profitable business. Higher risk usually implies higher return but also higher capital requirement, and vice versa. This trade-off is important to both meet capital requirements and the obligations to the customers.
- Swedish insurance companies have adopted the standard model for reporting but some have developed internal models for internal use. The use of internal models increases the understanding and creates better control of an individual’s risk profile.
- The well-capitalized position of Swedish insurers means that the adjustments have been limited.
  - The majority of fund and asset managers perceive insurers’ actual market risk has not changed due to Solvency II.
- Changed investment behaviors.
  - Complicated investments that were previously considered as good investments with high returns are disfavored in the Solvency II capital requirement because of lack in transparency.
  - Decrease investments in hedge funds and equities.
- Predicts covering low-frequency and high-impact risks due to well-capitalized position and assumed low probability that several catastrophic risks occur simultaneously.

The following conclusions to the third sub research question, “**How has Solvency II affected the management of risks?**”, are based on *Risk Management* and *Low-Frequency and High-Impact Risks* from the *Analysis and Discussion* chapter:

- Improved risk management processes.
- Awareness of the additional value that the ORSA process can contribute to than solely achieving compliance. The ORSA process is a useful tool for the board to become aware of the risks the company is exposed to.
- Improvements to the ORSA process in order to achieve the benefits include linking it to the strategic business planning.
- Low-frequency and high-impact risks are managed through reinsurance.
- Damage prevention for low-frequency and high-impact risks and operational risks.

### 7.1.2 Findings to the Main Research Question

The conclusions of the three sub research questions leads to the conclusions to the main research question: “*How have insurance companies adjusted to Solvency II at an early stage?*”.

The conclusions for this thesis on insurers’ adjustments are:

- Compliance focus to adopt the regulations but not yet adjusted the business for utilizing the benefits of Solvency II. This includes:
  - No indication of adjustments to corporate business strategy.
  - Implementation of systems and processes for reporting and calculating capital.
  - Increased understanding of the trade-off between capital, risk, and return by holding a risk-adjusted capital.
  - Usage of the standard model for calculating capital requirement.
  - Aligned with the ORSA process and aware of potential benefits.
- Improved risk awareness and culture through educating existing employees and employing new competent employees.
- Creation of risk culture in some organizations.
- Increased engagement of employees in the risk management process.

## 7.2 Implications

The implications this study concerns are *Managerial*, *Research*, and *Sustainability* and are explained in the sub-sections below.

### 7.2.1 Managerial Implications

The managerial implications are based on the findings from this study and aims to provide professionals within the financial market with indications on how Solvency II has affected the insurance industry. This is of interest for management consultancies within the field, banks, insurers, and fund and asset managers. The implications of this research are based on discovered gaps of “*How insurance companies have adjusted to Solvency II*” and the possibilities of beneficial business adjustments.

- Business focus to explore the benefits.
  - Integration of the regulatory framework in the corporate business strategy. Strategic focus in order to gain competitive advantage and business opportunities.
  - Continuous development of risk culture.
  - Increase automatization and efficiency of systems and processes.
  - Continuous optimization of capital, risk and return.
  - Optimization of investment portfolios to the capital requirement.
  - Evaluation of the fit of an individual’s risk profile to the standard model. Development and usage of internal or partially internal model create a better fit for an individual’s risk profile.
  - Involve and educate all employees in risk management.
  - Linking the ORSA to the strategic business planning.
  - Reflection and usage of the risk adjusted capital requirement in the pricing and design of products.

## 7.2.2 Research Implications

This thesis contributed to academia by investigating how external requirements affect the insurance industry and what adjustments these requirements has resulted in for insurance companies. It further contributed to literature within social science since the subject, Solvency II, not hitherto has been investigated thoroughly on a scientific level. This study extends previous predictive research of the adjustments of Solvency II after the full implementation has occurred. The conclusions of this research contribute to research with additional knowledge of how insurance companies adjust to Solvency II.

Furthermore, this study contributed with evaluations weather the requirements of Solvency II is sufficient to reduce the probability of default by making insurance companies more aware of the risks associated with their business. Since it is perceived that Solvency II has increased risk awareness and a better risk-adjusted capital requirement is now used, it may indicate that Solvency II creates a more stable financial market and it can therefore be assumed a reduced risk of default.

In addition, this research contributed to a gap in the literature regarding how insurance companies evaluate low-frequency and high-impact risks and their perception of the risk management of these.

## 7.2.3 Sustainability Implications

Sustainability refers to “*Development that meets the needs of present without compromising the ability of future generations to meet their own needs*“ (United Nations, 1987, chap. 2 para. 1). There are three aspects of sustainability this discussion covers, including *environmental*, *economical*, and *social*.

*Environmental sustainability* refers to the impacts of business operations on the environment (Elkington, 1998). The insurance industry does not have a major impact on the environment. However, the insurance industry has the possibility to impact global operations through its capital investments. There is awareness among some interviewees of the investments impact. An interviewee have explicitly expressed the company has reduced investments in fossil fuels in order to prevent climate change this contributes to. However, the company has not yet reached entirely fossil free investments are fossil fuel free but the objective of the company is towards this. This shows insurers impact on the environmental sustainability but also that an environmentally sustainable industry is not yet reached. Respondents to the questionnaire have noticed an increased interest from insurers to invest in sustainable funds, which promotes the environmental sustainability. In addition, some interviewees have shown actions to reduce climate change.

*Economical sustainability* refers to the long-term sustainability of a firm’s profitability and economic capital, which is its assets subtracted liabilities (Elkington, 1998). The insurance industry has a major impact on the global economy. Solvency II is aimed to enhance the financial stability in the global economic. Hence, it is considered to enhance the economical sustainability. With regard to this, the study is based on socioeconomic sustainability. On a company level, it secures that companies can meet its obligations within a contingency. Therefore, it is also supposed to enhance the economical sustainability on a company level.

However, some interviewees and literary sources have given indication of the Solvency II being too extensive, which lowers the economic capital creating a struggle for being profitable. This thesis aims to increase the knowledge of how insurance companies have adjusted to Solvency II. Hopefully, insurance companies can benefit from the implications of this study to make more economically sustainable adjustments to Solvency II. For instance, it provides implications of investment portfolios that are possible to reduce the amount of capital in firms.

*Social sustainability* consists of human capital and the potential of the whole society's health and wealth (Elkington, 1998). Furthermore, it is important that the employees in an organization are able to work together towards common values (Fukuyama, 1995). The empirics of this study confirm the importance of social sustainability. The importance of involving the employees within risk and creating a risk culture in the organization are conveyed in the interviews. This facilitates cooperation within a company, which is important (Goodland, 2002). Furthermore, Solvency II requires new expertise and competences regarding risk management and compliance. Interviewees express that the companies have or are planning to educate their employees within risk management, which shows the importance of spreading Solvency II within the company. If companies decide not to educate employees within the necessary skills, then this would destroy the human capital. In addition, automatization of the systems has increased, which can decrease, or at least, change the human capital needed in companies. However, small companies could have struggled to hire these people and instead hire consultancies.

### **7.3 Further Studies**

This study showed a lack in investment behavior of insurance companies and investigated this through a questionnaire distributed to fund and asset managers. The questionnaire had a pre-determined and specified sets of questions. Future studies through the conduction of in-depth interviews with fund and asset managers would explore the subject further.

This research had a qualitative approach meaning that no mathematical calculations with regard to the capital requirement were included. By combining mathematical calculations of the capital requirement together with the qualitative interviews of capitals, would enhance the validity of a similar research. This suggests further studies within mathematical calculations.

It is suggested to conduct several interviews in companies with different positions and levels possibly through a case study approach. This should give a better reflection of the participated companies, especially with regard to organizational changes.

Since this study was conducted at an early stage after the regulations entered into force, it was difficult for the interviewees to evaluate the effects of Solvency II at this time. Therefore, it would be of interest to follow up if Solvency II had the desired effects after a longer period of time.

This study was delimited to investigate large insurance companies. Their business may diverge from small insurance companies. In order to extend the research for the whole industry, further study of the adjustments of smaller insurance companies is needed.

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## APPENDIX

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### A: Market Share in Terms of Premium Income

*Table 1: Market share of non-life insurance companies*

<b>Company</b>	<b>Market Share as per 2015-12-31 (Percent of premium income)<sup>4</sup></b>
Länsförsäkringar	30.1
If	18.2
Folksam	16.3
Trygg Hansa	15.4
Moderna Försäkringar	2.9
Dina Försäkringar	2.6
<b>Total</b>	<b>85.5</b>

*Table 2: Market share of life insurance companies, excluding occupational pension companies*

<b>Company</b>	<b>Market Share as per 2015-12-31 (Percent of premium income)<sup>5</sup></b>
Folksam	16.6
Skandia	13.8
Nordea Liv	7.9
SEB Trygg Liv	7.7
Swedbank	6.8
Avanza	6.4
Länsförsäkringar	5.0
Handelsbanken Liv	4.9
Danica	4.4
Nordnet	3.7
Movestic	1.5
<b>Total</b>	<b>78.7</b>

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<sup>4</sup> Statistics from Svensk Försäkring (2016).

<sup>5</sup> Statistics from Svensk Försäkring (2016).

## B: Interviewees

*Table 3: Interviewees of non-life insurance companies*

Organization	Role	Designation
If	CRO	1.1
Dina Försäkringar	Risk Control Manager	1.2
Dina Försäkringar	Reinsurance Manager	1.3

*Table 4: Interviewees of life insurance companies*

Organization	Role	Designation
Skandia Liv	Head of ORSA	2.1
Skandia Liv	Head of Capital Calculation and Market Risk	2.2
Movestic	CRO/Head of Risk Management	2.3
Handelsbanken Liv	Responsible Actuary	2.4
Swedbank Försäkring	Risk Manager for Insurance	2.5
Bliwa	Responsible Asset Management	2.6

*Table 5: Interviewees of insurers operating both within life and non-life*

Organization	Role	Designation
Folksam	Head of Risk and Compliance Department at Folksam Liv	3.1
Folksam	Actuarial Manager	3.2

*Table 6: Anonymous interviewees*

Organization	Role	Designation
Anonymous	CRO	4.1
Anonymous	Natural Disaster Specialist	4.2
Anonymous	CRO	4.3

*Table 7: Interviewees of second round of interviews*

Organization	Role	Designation
Sirius International Insurance Corporation	Chief Actuary	5.1
Swedish Financial Supervisory Authority	Director Insurance Risk Supervision	5.2

## **C: Interview Guide**

- Description of the degree project
- Are we allowed to record the interview?
- Do you want to be anonymous in this investigation?
- Can we send you a summary of the interviews for you to confirm the information?
- Tell us about your role

### **Overview**

1. What are the biggest challenges to fulfill the Solvency II regulations?
2. Have you noticed any differences after the turn of the year 2015/2016?
3. What advantages and disadvantages do you see with Solvency II?
4. The objective with Solvency II is to harmonize the competition, have you seen any indications of this?
  - a. Has the competition changed?
  - b. Has it become easier to compete on the European market?
  - c. Have there been or will there be any changes of the competition on the Swedish market?
  - d. Do you notice any change in the foreign market? More international customers or investors now?
  - e. Will you be able to take advantage of increased transparency in the market?
5. Is Solvency II a good framework to counteract a financial crisis? Are you better prepared now?
6. Do you consider that Solvency II is a good framework for achieving consumer protection? Are the customers enough protected during a crisis?

### **Business and Organizational Changes**

7. What are the biggest business and organizational changes caused by Solvency II ?
  - a. Advantages and disadvantages with these?
  - b. Are you working for increased risk awareness in the organization? If so, how are you doing this?
8. Have you changes your strategy due to Solvency II?

### **Capital Requirements**

9. Do you see a need to release capital?
  - a. Do you use any methods to release capital/lower the capital requirement? What methods? Why?
  - b. Do you use a standard model or an internal model to calculate the capital required? Why?

## *Risks*

10. What risks are you most vulnerable to?
  - a. What risks are most difficult to calculate capital for?
  - b. Are the Solvency II requirements adequate to cover the risks insurers are exposed to?
  - c. How well suited is the Solvency II capital requirements if multiple risks occur simultaneously?
11. Has there been a change towards the end customers as a consequence of Solvency II due to an increase in risk management?
  - a. Have you changed your products? Why? How?
  - b. Have you changed the pricing? Why? How?
  - c. Has it become more expensive for the customers to underwrite insurance? As a result of implementation costs
  - d. Have the guaranties to your customers changed? Why? How?

## *Investments*

12. Have you changed your investment portfolio as a result of the capital requirement to cover the risks? Why? How?
  - a. What risk is your investment portfolio most vulnerable for?
  - b. How are you affected by the low interest rate?
  - c. Do you invest in more sustainable funds and stocks?
13. How is the Solvency II capital requirement handling changes in the interest rate during low interest rate environments?
14. Have you changed the demands on your mutual fund and portfolio managers now?
  - a. Investing in infrastructure
  - b. Social and climate responsibility

## ***Risk Management***

15. Do you consider that ORSA adds more value than just achieving Solvency II regulations?
  - a. Do you consider ORSA being part of your operations and strategy? How is the interaction between these? How is ORSA used in connection with the strategic work?

## ***Low-frequency and High-impact Risks***

16. How do you evaluate low-frequency high-impact risks?
  - a. Do you see an increase in the frequency of natural disasters?
  - b. Do you see an increase in threats from climate change (natural disasters)? Terror?
17. Is the required capital enough even to cover for catastrophic events? If not, how do you prepare for it?
  - a. Is it possible to achieve lower capital requirement with improved management of climate change?
18. Do you work with preventing climate change?

## **Prospects**

19. What will you focus on in the near future? What about in 1-3 years?
20. What will be the biggest changes/challenges in the near future? What about in 1-3 years?
21. What are the main opportunities of Solvency II in the future?

## **Additional Questions**

22. Are there anyone else we should contact to receive additional information?
23. Are you aware of any documents that would be of interest for this study?
24. Is there anything you would like to add that you think we have not discussed in this interview?
  - a. Are there any additional comments or questions in regard to this study?

## D: Questionnaire to Fund and Asset Managers

Please state the company that you represent. If anonymity is desired, please fill in “anonymous”.  
(Written answer)

What is your position in the company? (Written answer)

Do you have insurer customers?

- Yes  No

What type of insurer customers do you have?

- Life  Non-life  Both life and non-life

How large part of your business consists of insurers?

- Low*  1  2  3  4  5 *High*

Have you noticed any effects of Solvency II from you insurer customers?

- Yes, from non-life insurers  
 Yes, from life insurers  
 Yes, from both life and non-life insurers  
 No  
 Do not know

What effects have you noticed? (Written answer)

Have you noticed any changes in demand from the insurance companies on your products?

- Yes  No  Do not know

If you have noticed changes in demand, what are these changes? (Written answer)

Has it become more interesting for insurance companies to invest in infrastructure from the public sector?

- Yes  No  Do not know

Do you believe changed investment behavior due to Solvency II, if you have noticed this, can affect society and the national economy?

- Yes  No  Do not know

Can this lead to increased difficulties in financing some investments?

- Yes  No  Do not know

If yes, what type of investments does this apply to? (Written answer)

Do you regard Solvency II to reduce insurance companies' actual market risk?

- Yes  No  Do not know

Are you aware of the capital coverage that your funds/products require from a Solvency II perspective?

- Yes  No

Are you engaged in a dialogue with your insurer customers from a Solvency II perspective?

Yes

No

Are you allowing the so-called “look-through-approach” for you insurer customers? In other words, do you send the necessary information to your insurer customers in order for them to look through your funds on a positional level with the aim of increasing transparency and/or the avoidance of the otherwise mandatory 49% level of capital coverage under Solvency II.

Yes

No

If you do not offer a “look-through-approach”, why are you not offering it? (Written answer)

Has Solvency II affected your business?

Yes

No

If yes, how has your business been affected? (Written answer)

Are your insurer customers demanding investments in more sustainable funds?

Yes

No

Do not know

## E: Questionnaire Distribution List of Companies conducting Fund and Asset Management

Table 8: List of fund and asset management companies

Advisor	FIM Fondbolag AB
Aktie-Ansvar AB	Folksam Fond AB
Aktiesparinvest AB	Fondbolaget Fondita AB
Aktiva fonder	Franklin Templeton Investment Management Ltd.
Alfred Berg	Gustavia Capital Management AB
Allianz Global Investors	Garantum Fondkommission
AMF Pension Fondförvaltning AB	Handelsbanken Fondbolag AB
Atlantfonder	JPMorgan Asset Management (Europe)
Brummer & Partners	Lannebo Fonder AB
Carnegie Asset Management	Lynx Asset Management
Carnegie Fond AB	Nordea Fonder AB
Case Fonder	Norron
Catella Fondförvaltning AB	ODIN Fonder
CB Asset Management AB	OPM/Optimized
Cerberius	PriorNilsson
Cicero Fonder AB	Robur Fonder AB
Coeli	Simplicity AB
Cliens Kapitalförvaltning	Sjunde AP-Fonden
Danske Capital Sverige AB	SKAGEN Fonder
Danske Fund Management Company S.A.	Sparinvest S.A.
Didner & Gerge Fonder AB	Spiltan Fonder AB
DnB NOR Kapitalforvaltning ASA	SPP Fonder AB
E. Öhman J:or Fonder AB	Storebrand Kapitalforvaltning AS
East Capital Asset Management AB	UBS AG
Enter Fonder AB	Wassum
Erik Penser Fonder AB	Ålandsbanken
Evli Fondbolag AB	