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A Study of the IORP and the Traffic Light System in Sweden

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Abstract

We analyze the implications of the implementation of the IORP and the traffic light system in Sweden. Our aim is to provide an introduction to the effects on the life- and pension insurance institutions that provide occupational pension insurances as well as introduce any fundamental market effects resulting from these regulatory changes. We find that the new regulatory framework has altered the investment behaviour of less solvent life- and pension insurance institutions. Furthermore, we find support for an increased alignment of the investment portfolios among the very same institutions. However, we can not establish any solid proof that the IORP and the traffic light system generally have had a considerable impact on the life- and pension insurance institution's product portfolios nor could we establish a significant trend towards increased market segregation as a consequence of the new regulatory framework. Finally, we find evidence that the low supply of long term nominal government bonds poses a sincere predicament to the life- and pension institutions independently of solvency level.

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Index

1 Introduction

On January 1st 2006, the Directive on Institutions for Occupational Retirement Provisions (IORP) was implemented in Sweden. The directive is part of EU's Financial Services Action Plan and represents a united regulation for prudential supervision and capital requirements for occupational pension institutions in EU (*Internal Market: Commission acts to ensure 16 Member States implement EU laws* (2006)). The aim with the new regulatory framework is to create a level playing field among occupational pension providers in Europe and allow effective management of occupational pension assets. Furthermore, the IORP seeks to establish a prudential standard, with focus on risk management and decision-making processes in the individual companies. The main principle is the prudent person principle that amongst other things state that the liabilities should be valued realistically, using the market interest rate *(Regeringens proposition 2004/05:165*). As a consequence of the directive and the increased flexibility and responsibility for the individual institutions, the need for powerful supervision has been enhanced. Finansinspektionen (FI), The Swedish Financial Supervisory Authority, has several measures in order to supervise the life- and pension insurance companies, e.g. business ratios, investment guidelines and now also the traffic light system. The traffic light system will shed light on how the companies follow the prudent person principle. Moreover, the system will facilitate FI's work in determining whether the institutions have taken on too much risk in order to fulfil their commitments towards the pension savers.

The new regulatory framework is expected to have significant implications on how the occupational pension providers in Sweden conduct their business. The life- and pension insurance companies that provide the occupational pension insurance are dominant investors in financial markets. Hence, regulatory changes affecting those companies are also likely to have major spill-over effects on financial markets.

Before the introduction of the IORP and the traffic light system several concerns were expressed regarding the effects of the implementation and its consequences for pension savers. The issue is particularly delicate since demographic conditions, with an increased proportion of pensioners in society, makes the occupational pension an

increasingly important complement to the public pension plan *(Regeringens proposition 2004/05:165*). It has been argued that the regulatory change will significantly alter the life- and pension insurance companies' investment behaviour and increase the scope for asset and liability management (ALM) [1]. Hoevenaars *et al.* (2005) argues that in a setting with market valuation of liabilities, bonds become an increasingly attractive investment asset. As a consequence, concerns have been expressed that the new regulatory framework will have adverse effects on the life- and pension insurance companies' possibility to take on risk[2], which goes in conflict with the long term investment horizon of pension savings as elaborated by e.g. Campbell and Viceira (2005). Concerns have also been raised that the new systems will have implications on the stability of financial markets. Davenow and Welch (1998) established that in times of high market volatility large financial institutions i.e. life- and pension insurance institutions tend to move together resulting in adverse effects on financial stability. Critics have argued that the new system will aggravate those destabilizing effects[3]. In addition the low supply of long term nominal government bonds, in combination with the new regulatory framework has been expected to have significant implications on the investment behaviour and the financial stability[4].

Several other implications of the regulatory changes have also been discussed. For instance, it has been debated that the divergence in risk levels between the companies on the life- and pension insurance market will increase, leading to augmented market segregation between weak and strong companies. Furthermore, it has been argued that some of the effects of the IORP and the traffic light system will be canalized through changes in the companies' product portfolio and in particular lead to lower guaranteed interest rates on traditional pension insurance.[5]

1.1 Purpose and contribution

The purpose of this thesis is to provide a study of the IORP and the traffic light system in Sweden. We aim to investigate the implications for the life- and pension insurance institutions that provide occupational pension insurances. Furthermore, we

[1] See e.g. *Pensioner & Förmåner* (2005), "Fortfarande stor osäkerhet"
[2] See e.g. Finansinspektionen (2006*), Rapport 2006:14*
[3] See e.g. *Dagens Industri* (2005), "Alecta: Trafikljusen hot mot spararna"
[4] See e.g. *Dagens Industri (*2005), "Lättnader i trafikljusmodellen
[5] See e.g. *Pensioner & Förmåner* (2005), "Fortfarande stor osäkerhet"

want to examine fundamental effects on the financial market resulting from these regulatory changes. Our intent is not to present a complete study on all possible implications and effects but to provide an introduction to the subject and contribute to a platform for future research in an area that is still unexplored by academics and highly up to date.

1.2 Outline

The thesis will be structured in the following way; in section 2 we give a market background and present the theoretical framework behind the occupational pension directive and the traffic light system. In section 3 we outline the method and the selection process as well as discuss previous research. Section 4 encompass our hypothesises, while section 5 discloses our results. Finally in section 6 and 7 we conduct our analysis, present our conclusion and outline possibilities for future research.

2 Background

2.1 Market Background

The bear market in combination with falling interest rates in the beginning of the decade disclosed obvious problems within the life- and pension industry and the failure of the existing regulatory framework. The life- and pension insurance companies had increasingly difficult to meet their commitments which were reflected in eroding solvency[6] and consolidation[7] levels. Many companies lacked an action plan to handle the difficult situation and in particular how the deficit should be evenly distributed between generations (*FI:s rapport 2004:*9). The solvency levels started to rise again in 2003 in association with the bull market that has lasted until today (*FI:s Rapport 2005:10*). However, falling interest rates continued to put pressure on the life- and pension insurance companies until 2005, when the interest rates started to turn up.

Moreover, transformed demographic preconditions have lead policymakers to reform the existing pension systems. The ongoing trend is a shift from defined benefit schemes to defined contribution schemes i.e. the risk is shifted from the employer to the employee[8]. Today, all four large collective agreements in Sweden has transformed or decided to transform their defined benefit schemes partly or fully into defined contribution system (*Regeringens proposition 2004/05:165*).

2.1.1 EU implementation

The IORP directive should have been implemented before the 23 September 2005 in all EU's member states. However, so far not all countries have notified the European Commission of the main provisions of national law which they have adopted in the field governed by the directive. As of today; Italy has not notified the Commission at all but transposed the directive into national law, France and UK have only partially

[6] Solvency is the market value of the assets divided by the guaranteed technical provisions. (Försäkringsförbundet)
[7] Collective consolidation is the life- and pension insurance company's assets divided by the guaranteed technical provisions and the allocated bonus. (Försäkringsförbundet)
[8] Defined benefit means that the employer has promised a certain amount at retirement. Accordingly, the employer bears all the risk. In a defined contribution plan, the employer sets aside a specific amount of money each year for the benefit of the employee. This means that the employee bears the uncertainty. (E.g. Bodie *et al.* (1985))

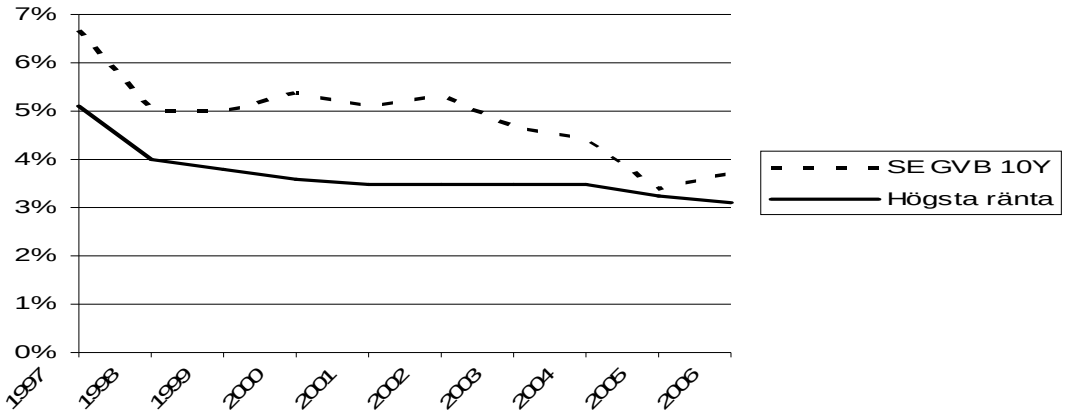
notified the Commission and Bulgaria's and Romania's notification is under examination. In the 22 member states that in full have notified the Commission, the directive has been implemented differently as the directive is adapted to the individual national laws (Frederica Cameli, CEIOPS). The divergence in implementation between the member states is an extensive topic and out of the scope of this thesis.

2.2 Before the IORP

Before the introduction of the IORP there were mainly three mechanisms to ensure that the life- and pension insurance companies would be able to meet their obligations toward their customers. Firstly, when the liabilities were valued the companies should use safeguard assumptions. These assumptions implicates that the liabilities become overvalued; hence they do not reflect the companies' true commitments towards its customers. Secondly, the companies should hold a capital buffer of 4 percent of the overvalued liabilities. Thirdly, quantitative rules governed how the institutions could invest their assets, which put limitations on the companies' risk exposure (*Trafikljusmodellen finansiella risker – Bakgrund och första förslag*). These rules were static and gave no incentives for handling risk since, for instance, the capital buffer was unaffected by the amount of risk the company choose to take on.

Before the introduction of the IORP, FI decided the interest rate that should be used to calculate the present value of liabilities, the so called "högsta räntan". Högsta räntan has been decided on a yearly basis by FI and should be 60 percent of the long term government benchmark rate. This safety margin leads to an overvaluation of the liabilities. Furthermore, since the interest rate only has been changed once a year, it has been vastly more slow-moving than the market rate (*FI:s Rapport 2005:10*).

Chart 1 Comparison between högsta räntan and 10 year Swedish Government Bond



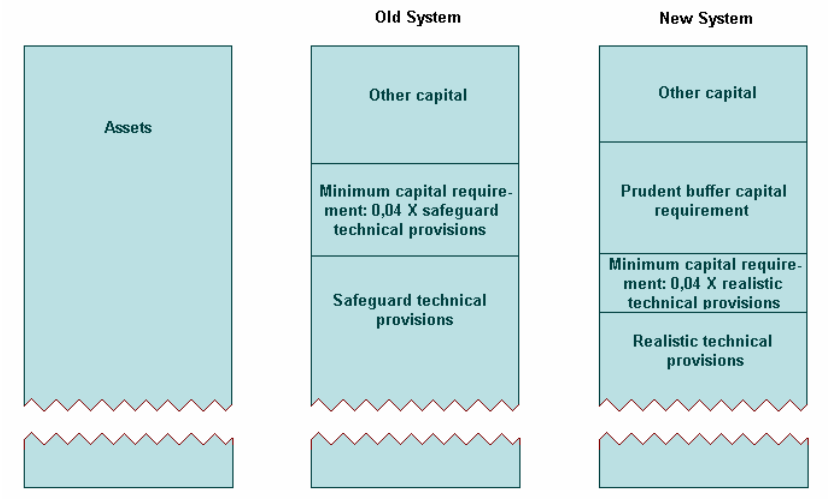
Source: Finansinspektionen (högsta ränta) and Riksbanken (SE GVB 10Y).

2.3 The IORP

The new pension directive is part of EU's work to unite the legislation for its members in the financial sector that eventually should result in a well functioning European market for financial services. The purpose of the directive is twofold; it is partly to assure safety for the future pension savers but also to enable an effective investment management (*Regeringens proposition 2004/05:165*).

With the new directive the focus will shift from quantitative rules to qualitative regulation. According to the occupational pension directive "the prudent person rule" should be the ruling principle for investment decisions. This means that the previous rules of safeguard assumptions will be eliminated along with almost all the quantitative rules. However, the capital buffer of 4 percent will remain but since the liabilities will be valued differently with the directive, the size of the minimum capital requirement buffer will not be the same as before as illustrated in the chart below. The prudent buffer that is added will be dependent on the amount of risk in the companies' assets and liabilities (*Trafikljusmodellen finansiella risker – Bakgrund och första förslag)*.

Chart 2 A comparison between the old and the new system



Source: Finansinspektionen (2005), *Presentation on FI:s seminar on New Rules for Life Insurance Institutions*

According to the prudent person rule companies should use realistic assumptions to value the liabilities. There are several prudent assumptions in different areas that need to be made when calculating technical provisions[9]. These areas are; discount rate, mortality, morbidity, operating cost, tax on returns and changes in existing insurance policies. We will in this thesis only discuss the implications of the prudent assumptions on the discount rate since this will have the greatest effect on the valuation of the liabilities (*FI:s Rapport 2006:14*).

Högsta räntan, which has been used in the previous system, is not appropriate for realistic valuations of liabilities. Instead one should use the risk free market interest rate which corresponds to the duration of the liabilities. The prudent valuation of liabilities means that each transaction in an insurance contract should be valued individually with the risk free interest rate which has the same maturity as the contract (*Tjänstepensionsföretag – en vägledning*). What is meant by the risk free interest rate is discussed later in this section.

Prudent assumptions do also mean that the companies should invest the assets with the pension savers best interest in mind (*FI:s Rapport 2005:10*). In addition, the prudent principle implies that all institutions should send their investment guidelines to FI. These guidelines will include; desired level of risk, investment orientation to

[9] Liabilities assigned the insurance takers.

achieve this level of risk and information about risk management. Furthermore, the directive implies that only the commitments applicable to occupational pension should be valued with prudent assumptions; other obligations should be valued using högsta räntan (*FI:s Rapport 2006:14*).

When the IORP was implemented the risk free interest rate should be derived from an interest rate with the lowest possible credit risk i.e. government bonds. However, the swap rate could also be applicable given that the credit risk is taken into account. In case of discrepancies the prudent person principle stipulated that the lowest interest rate should be used (*Tjänstepensionsföretag – en vägledning*). The vast majority of companies affected by the IORP choose a discount rate in line with prudent assumptions. However, a few companies applied an obviously flawed discount rate. FI lacked the mandate to reprimand those companies and as a consequence the rules had to be amended (Tomas Flodén, Finansinspektionen). A referral was presented by FI (2006-11-16) but was met by ample criticism. The main elements of the referral were that the swap rate no longer would be endorsed as a possible discount rate. Instead the swap rate less deductions for the credit risk should only be considered to prolong the government bond curve at the point of the longest maturity (*Webbsänd diskussion om diskonteringsräntan* (2006)). The final decision (2006-12-15) took into account some of the criticism since the resolute framework implies that an average of government bond interest rates and swap interest rates with equal maturities shall be used. For longer maturities the swap rate shall be employed with deductions for the credit risk (FFFS 2006:19).

2.4 The traffic light system[10]

Even though the traffic light system was not invented as a tool for supervising the occupational pension directive, it has been shown that it can be used for that very purpose. Furthermore, the traffic light system will shed light on how the life- and pension insurance institutions follow the prudent person principle (*Presentation on FI:s seminar on New Rules for Life Insurance Institutions*).

[10] If not stated differently, the reference for section 2.4 is *Trafikljusmodellen – Beslutad version*.

The traffic light system is a tool for supervision that measures the life- and pension insurance companies' abilities to manage essential asset price changes over the short term. The aim of the model is to visualize at an early stage life- and pension funds that has too much risk exposure in order to be able to fulfil their obligations towards their customers (*Trafikljusmodellen – Beslutad version)*. During 2006, the traffic light system has only measured financial risks, but from January 1st 2007 it will also be expanded to include insurance risks[11]. The traffic light model for financial risks takes into consideration interest rate risk, equity price risk, real estate risk, exchange-rate risk and credit risk. However, FI states that the traffic light system does not measure all potential risks, hence the model needs to be accompanied by other supervision, for instance by supervision of business ratios and investment guidelines. Moreover, the model is only a tool for identifying companies that should be taken out for further investigation. The model is not supposed to work as an ALM-model for the companies nor is it portfolio optimization tool.

The traffic light model measures effects on both the asset- and the liability side following the price changes that are considered according to different scenarios (*table 1)*. Hence, it is the net effect that is measured in the model. Red light is shown when the company's capital buffer, i.e. equity, untaxed reserves and subordinated liabilities, is completely erased by the changes in asset prices that are considered in the scenarios.

[11] Insurance risks are the risk that the outcome of the insurance will deviate from expectations (*Phase 2 of the traffic light model – non-life insurance companies and insurance risks to be included in the model as of 2007).*

Table 1 Scenarios of asset-price changes in the traffic light system

	Scenarios
Interest-rate risks	
Interest rate risk, nominal interest rate, SEK	+/- 30 % of 10-year interest
Interest rate risk, real interest rate, SEK	+/- 30 % of longest real interest
Interest rate risk, nominal interest rate, EUR	+/- 25 % of 10-year interest
Interest rate risk, other foreign interest rates	+/- 30 % of 10-year interest for largest other exposure
Credit risk (increase in spread)	Max of (100 %; 25 basis points)
Equity risk	
alt.1 (no exchange-rate risk added),	
Swedish	-40%
Foreign	-37%
alt.2 (exchange-rate risk added),	
Swedish	-40%
Foreign	-35%
Real estate price risk	-35%
Exchange rate risk	+/- 10 %

Source: Finansinspektionen (2005), *Trafikljusmodellen – Beslutad version.*

Zero-correlation is assumed between the different asset classes meaning that the model acknowledges differentiation effects. Furthermore, the different risk factors are also assumed to be uncorrelated, except the different interest rate risks as well as the foreign and Swedish equity risk. The correlation assumptions in the model are those believed to exist during the different extreme scenarios that are considered.

2.4.1 Interest rate risk

There are four different interest rate risks to consider in the model; nominal SEK interest rate, real SEK interest rate, EUR interest rate and other foreign interest rates. The model assumes that the different interest rates are correlated as depicted in *table 2*. In the model, the companies should calculate the effects on assets and liabilities that all four interest rate categories will either rise or fall according to the scenarios. The change that is least favourable for the companies is then reported in the system.

Table 2 Correlation assumptions of the interest rate risks in the traffic light system

Interest rate risks	Interest rate risk, nominal interest rate, SEK	Interest rate risk, real interest rate, SEK
Interest rate risk, real interest rate, SEK	0,8	1
Interest rate risk, nominal interest rate, EUR	0,8	0,5
Interest rate risk, other foreign interest rates	0	0

Source: Finansinspektionen (2005), *Trafikljusmodellen – Beslutad version*.

2.4.2 Equity risk

The exposure to equity risk is divided between foreign and Swedish equity. The total amount of equity risk is the sum of the foreign and the Swedish equity risk. There are two different approaches for calculating equity risk. The methods vary based on how they deal with the currency exposure of foreign shares. In alternative one, the exchange-rate effect of foreign equity is included in the share price change and hence not included in the calculation of exchange-risk. The other alternative does not include the exchange risk in the share price change and hence should be included in the exchange-rate risk. Swedish and foreign equity is supposed to be perfectly positively correlated, i.e. a correlation of 1.

2.4.3 Real estate risk

The percentage decrease in market value of the real estate portfolio is the real estate risk.

2.4.4 Credit risk

The traffic light system measures the credit risk by calculating the change of the company's assets with credit risk, when the average credit spread, i.e. the difference between the risk free interest rate and the interest on fixed-income instruments subject to credit risk, increases according to the scenario.

2.4.5 Exchange-rate risk

The exchange-rate risk is the risk of increased exposure of the company's total position in foreign currency following an exchange rate change according to the scenario. In case of currency hedges, these must be taken into consideration. If the first alternative for calculating equity risk is used the model should not comprise exchange-rate exposure to equities.

2.4.6 Summary

In the final calculation all the risks are considered net according to formula (1), the so called square root formula.

$$\text{total effect on the capital buffer} = \begin{bmatrix} (\text{total net interest - rate risk})^2 + (\text{net equity risk})^2 + \\ (\text{net real - estate price risk})^2 + \\ (\text{net credit risk})^2 + (\text{net exchange rate risk})^2 \end{bmatrix}^{0,5} \quad \textbf{(1)}$$

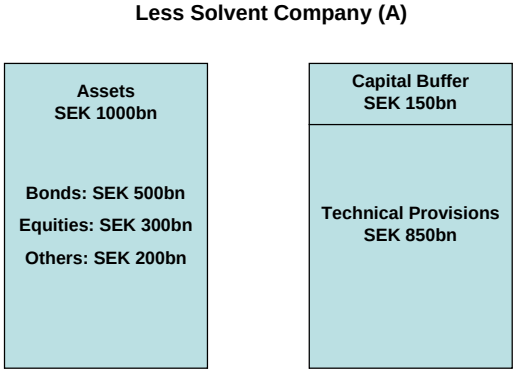
If the total effect, in absolute terms, is greater than the capital buffer, the company is assigned red light. In case of red light, FI will not immediately place sanctions on the company but rather conduct further investigation of the company's ability to fulfil its commitments.

2.4.7 Numerical Illustration

In order to more easily communicate the traffic light system's effect for the life- and pension insurance companies we have constructed a simplified numerical illustration. As accounted for in the previous sections, the traffic light system measures equity risk, interest rate risk, real estate risk, exchange rate risk and credit risk. However, in this example we will only focus on how to measure the equity- and interest rate risks as those are the most prominent amongst the life- and pension insurance companies and since those are the risks mainly discussed in this thesis. Accordingly, real estate risk, credit risk and exchange rate risk are assumed to be 35bn, 10bn and 10bn respectively, for all companies considered.

First, we consider a less solvent company that has a simplified balance sheet according to the chart below.

Chart 3 Balance sheet for Less Solvent Company A

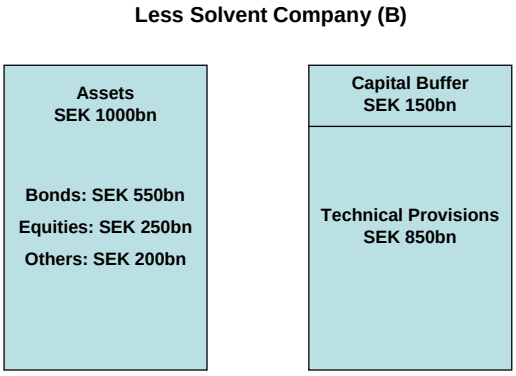


If share prices fall by 40 percent, the market value of equity will decrease from 300bn to 0.6*300=180bn. The liabilities will remain unchanged. Total assets will be 880 and the net equity risk is 120 (=0.4*300)bn. The interest rate risk on the other hand is more complicated to illustrate. Firstly, you need to estimate the effect on both the asset and the liability side. Secondly, the interest rate risk depends on the duration gap the company has, a larger duration gap entails a greater interest rate risk as the interest rate falls. Moreover, the company have four different interest rate risks to measure. In this simplified example we will only specify the total effect, since the different interest rate risks are calculated in the exact same manner. The traffic light system states that we should calculate the effect of a change in basis point corresponding to 30 percent of the 10 year benchmark interest rate. Taking 30 percent of the Swedish average 10 year government bond, gives us $0.3*3.7012$[12]$=1.11036$. Hence we are to calculate the effects of a fall in the interest rate by 111.036 basis points. In addition, we must make some assumptions about the duration for both assets and liabilities; it is realistic to assume a duration for the assets of 5 years and a duration for the liabilities of 15 years. We approximate the asset increase by multiplying the interest rate fall in basis points with the duration and the market value of the assets. Hence, when the interest rate falls by 111.036 basis points, the assets market value increase by $0.0111036*5*500\text{bn} \approx 27.76\text{bn}$. Thus, the new value of the assets will be 527.84bn. The market value of the technical provisions will also increase but with a larger amount due to the much longer duration. Accordingly, the market value increase by $0.0111036*15*850\text{bn} \approx 141.57\text{bn}$. This results in a net interest rate risk of approximately 114 ($\approx 41.57-27.76$)bn. Inserting all the net risks into formula (1) from section 2.4.6 gives us a total effect, for the less solvent company, of approximately 169.77bn. Since this is larger than the capital buffer of 100bn, the company will show red light in the traffic light system.

Consider another company with same amount total assets and technical provisions as the first company. However this company has reallocated from equities to bonds and has hedged its interest rate risk by extending the duration of the assets to 10 years.

[12] www.riksbanken.se

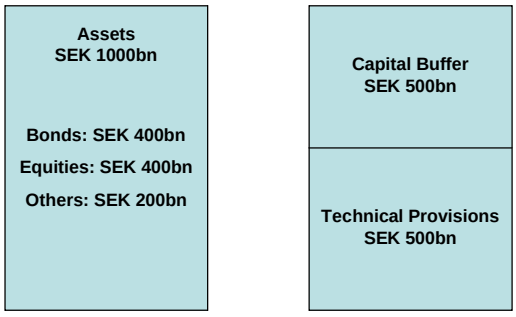
Chart 4 Balance sheet for Less Solvent Company B



The equity risk amounts to 0.4*250bn=100bn and the net interest rate risk will be (0.0111036*15*850bn) - (0.0111036*10*550bn) ≈81bn. Using formula (1) we estimate the total effect for this company to be 134bn meaning that their capital buffer is greater and they have managed to avoid red light. This illustrates how the companies can act in order to avoid red light in the traffic light model.

Finally we analyze a company with assets and liabilities as depicted below.

Chart 5 Balance sheet for Highly Solvent Company



This company is clearly highly solvent, with a large capital buffer. Furthermore, the company has a larger proportion of risky assets, i.e. equity in its portfolio. Calculating the risks in the same manner as for the other companies gives us an equity risk of 160bn. The 111.036 basis points fall in interest rate (assuming a duration of 5 years and 15 years respectively) results in an increase in assets of 0.0111036*5*400bn≈22.2bn and an increase in technical provisions of 0.0111036*15*500bn≈83.3bn. This generates a net interest rate risk of 61 (≈83.3-22.2)bn. Inserting these values together with the real estate-, exchange rate- and credit risk in formula (1) gives us a total effect of 175.3bn, which is lower than the capital

buffer, hence the company will show green light. This illustrates how the traffic light system will affect companies differently, depending on how large their capital buffer is. A more solvent company can take on a larger amount of risk and still be able to fulfil its commitments towards its clients whereas a less solvent company can not maintain as high risk in order to get a green light.

3 Method

3.1 Research method

To obtain our purpose outlined in section 1.2 we have chosen a qualitative approach. The reason for this is twofold; firstly, the IORP and the traffic light system were implemented in Sweden on January 1st 2006, hence there is yet no or very little data available to perform a quantitative study. Secondly and most importantly, we are not convinced that a quantitative approach would disclose the information we need in order to obtain the purpose. Difficulties would arise on evaluating whether the observed effects are directly attributable to the regulatory change that has occurred or not. Furthermore, interviews give the advantage of enabling the respondent to more freely express his own thoughts and interpretations of the questions.

The main drawback of our research method concerns our ability to establish any robust conclusions only from the interviews. However, taking into consideration that our sample constitutes approximately 92 percent of the traditional pension insurance market in Sweden[13], we argue that the results presented should be considered highly relevant and that plausible conclusions can be made. Another shortcoming of interviews is that there could be information that the interviewed companies do not want to disclose, in addition they could deliberately give more flattering answers in order to present a more favourable picture of their own company. In order to eliminate this drawback, we have chosen not to display which comments that are attributable to which company. In addition, we argue that this can be done without any loss of relevancy of neither the results nor the implications.

3.2 Selection

The study comprises eleven life- and pension insurance companies and one financial society that together make up around 92% of the traditional pension insurance market in Sweden (*FI:s rapport 2006:14, Försäkringsförbundets kvartalsstatistik Nr 3/2006 – 2a kvartalet 2006*). The financial society is Kåpan Pensioner and is included because of its significant amount of assets under management in traditional pension insurance and since we wanted to account for the companies that cover the largest

[13] See section 3.2

collective pension agreement schemes. Kåpan Pensioner is closely linked to PA 03 (former PA-91) that is the collective agreement between Arbetsgivarverket (Agency for Government Employers) and the three state union employee organisations[14] (*Nytt pensionsavtal för statligt anställda* (2003)). The other large collective agreements are mainly; the ITP-agreement between SAF (Confederation of Swedish Enterprise) and PTK (Council for Negotiations and CO-operations) linked to Alecta; the SAF/LO-agreement between SAF and LO (Swedish Trade Union Confederation) linked to AMF Pension (*Avtalspension SAF-LO* (2005)) and the KAP-KL agreement between Swedish municipalities and county councils and the municipal unions linked to KPA Pension (*KAP-KL - Ditt nya pensionsavtal* (2005)).

All the companies in the sample apart from three are mutually working insurance companies whereas the other companies pay dividends to shareholders[15]. We have included both types of companies without making any separation between the two. The companies included in our sample are Alecta, AMF Pension, Folksam Liv, Handelsbanken Liv, KPA Pension, Kåpan Pensioner, Länsförsäkringar Liv, Nordea Liv I, SEB Trygg Liv Gamla, SEB Trygg Liv Nya, Skandia Liv and SPP Liv.

Table 3 Assets under management and solvency ratio[16]

	Assets under management, MSEK (Tradtional Pension Insurance)	Solvency ratio
Alecta	391 509	14,8
AMF Pension	248 743	35,5
Folksam Liv	59 722	5,3
Handelsbanken Liv	30 231	2,5*
KPA Pension	36 677	7,8
Kåpan Pension	26 033	10,7
Länsförsäkringar Liv	109 049	7,3
Nordea Liv I	15 765	2*
SEB Trygg Liv Gamla	180 282	22,7
SEB Trygg Liv Nya	8 413	2,1
Skandia Liv	275 797	14,8
SPP Liv	92 540	3,8*
Total	1 474 761	

* Solvency ratios between divident paying companies and mutual companies are not directly comparable.

Source: Finansinspektionen (2006), *Rapport 2006:14,* Försäkringsförbundet (2006), *Försäkringsförbundets kvartalsstatistik Nr 3/2006 – 2a kvartalet 2006*

[14] OFR/S,P,O, SACO-S and SEKO

[15] Mutually working insurance company is a company that is owned by its insurance takers whereas an insurance company that pays dividends to shareholders is owned by its shareholders. In addition, the shareholders do not need to be the insurance takers. (Cummins, J.D., Viswanathan, K.S, 2003)

[16] The solvency ratio is the capital base divided by the required solvency margin of 4 percent. (Finansinspektionen)

3.3 Prior research

There have been almost no prior studies in direct relation to the area studied in this thesis. The only report that provides some insight is the stability report of the financial sector, published by FI in October 2006 (*Rapport 2006:14*). The report reveal that for the first and second quarter 2006, only one friendly society reported red light in the traffic light model out of all institutions obliged to report to FI in association with the traffic light system. In general, the companies have quite large margins to red light. However, FI states that since this method is new to the companies, there could be errors in the numbers disclosed and therefore the information should be interpreted with certain vigilance. Furthermore, FI evaluates the effects on the financial markets from the introduction of the traffic light system. They conclude that in general, the traffic light system does not seem to result in a lowering of risk exposure among the companies. Moreover, they cannot distinguish any alignment in the institutions risk profiles; consequently, they dismiss the risk of destabilizing behaviour on the financial market.

The academic research concerning optimal asset allocation for long term investors i.e. life- and pension insurance institutions is more extensive. Merton's (1969, 1971) and Samuelsson's (1969) pioneering work determined under which conditions optimal portfolio decisions will not be different between long run investors and short run investors. The framework is based on several assumptions and amongst others that the investment opportunity set remains constant over time implying that excess returns are not predictable. Lately, several studies have questioned the assumption that the opportunity set remains constant over time. Brennan *et al.* (1997) analysed US stock and bond market data between 1972 and 1992 and found that the time horizon had significant effect on the composition of the optimal portfolio. The findings are explained by the mean reversion in both bonds and equities that make these assets less risky from the viewpoint of a long term investor and by the fact that the long term investments provide a hedge to the investor against future adverse shifts in the investment opportunity set. Building on this work Campbell and Viceira (2005) expanded the sample period to include the entire post-World War II period and established a "term structure" of risk return trade-off. The authors show that the variance and correlation structure of real returns of stocks and bond changes

dramatically by investment horizon. Hence, the mean-variance efficient frontiers that investors face at different horizons suggest that the asset allocation used by a tactical investor with a short investment horizon will vary from the optimal allocation of a strategic investor with a long investment horizon and that the optimal portfolio will be increasingly biased towards stocks as the horizon increases.

Hoevenaars *et al.* (2005) acknowledge the difference in optimal asset allocation between a strategic- and a tactical investor and aim at elaborate on the strategic asset allocation of US institutional investors i.e. life- and pension institutions. The authors, further, extend the previous models to include an ALM-optimization framework and to account for a wider investment universe that additionally include credits, commodities, real estate and hedge funds. The expanded investment universe better take into account cross-sectional risk diversification that is particularly important to a long term investor. Hoevenaars *et al.* (2005) consider the effect of stocks, bonds etc in real terms as a hedge against liability risk at different investment horizons. The authors find that credits and bonds are more imperative to an "asset-liability" investor than to an "asset-only" investor because of the high correlation with real rates. On the other hand, stocks are proven to be more favourable for "asset-only" investors. Commodities, hedge funds and listed real estate are proven to be rather insensitive against including the liabilities in the analysis. The thesis concludes that the costs of ignoring the liabilities in the asset allocation is substantial and increase with the investment horizon.

Hoevenaars *et al.* (2005) did not take into account interest rate derivatives in their ALM-optimization framework. However, Engel *et al.* (2005) shows that interest rate derivatives can be highly beneficial in an ALM-context. The main advantageous element is that the existing asset allocation can remain in place i.e. there is no need to shift from risky assets with higher Sharpe-ratios into long term government bonds. Instead it is possible to apply a derivative overlay structure to the existing portfolio. Effectively this implies that strategic investor with risky liabilities can invest more from an "asset only" perspective in line with the findings of e.g. Campbell and Viceira (2005). Moreover, it is argued that the outstanding amounts of long term government bonds as well as the liquidity on the secondary market for those securities are far too low in most western economies to consider long term government bonds a

good hedge. The authors evaluate the nominal interest rate hedge possibilities on defined benefit pension funds using swaps and swaptions. Swaps are characterized by a linear payoff and used properly, proven to be highly efficient in reducing the interest rate risk. However, the authors conclude that when interest rates are significantly below their long term mean levels the short run risk premium on swaps will be negative due to the high propensity that the interest rates will revert to the mean. Instead, swaptions are preferred in such a scenario due to the optionality associated with its non linear features. Hence, Engel *et al.* (2005) determines that the optimal hedging strategy is interest rate dependent.

The implications of the institutional investors' investment behaviour and their role in financial markets is another topic that has been extensively researched. Davis (2003) concludes that in normal times institutional investors provide liquidity that enables efficient risk dispersion and provides stability to financial markets. However, Devenow and Welch (1998) argue that at times of high market volatility institutional investors can have the opposite effect on financial stability. The authors introduce the concept of rational herding defined as behaviour patterns that are correlated across individuals leading to suboptimal investment behaviour by entire populations. In other words, rational herding implies that large investors seek to exit or enter the same positions at the same time resulting in an augmented market stress and further increased market volatility that goes beyond what could have been expected with separate smaller investors. Bodie (1991) reason that the herding can be particularly present with institutional investors that have minimum funding limits i.e. for instance life- and pension insurance institutions that provide traditional pension insurance. Such institutions are exposed to shortfall risk if the value of the assets falls below the value of the liabilities, which could lead to herding effects if markets move unfavourably. The herding effect could either take its form in sales of equities for bonds or through interest rate hedges. Bodie (1991) further argues that institutions handling a minimum funding limit are more constrained in their stabilizing role compared to other financial institution even in a normal setting.

4 Hypothesises

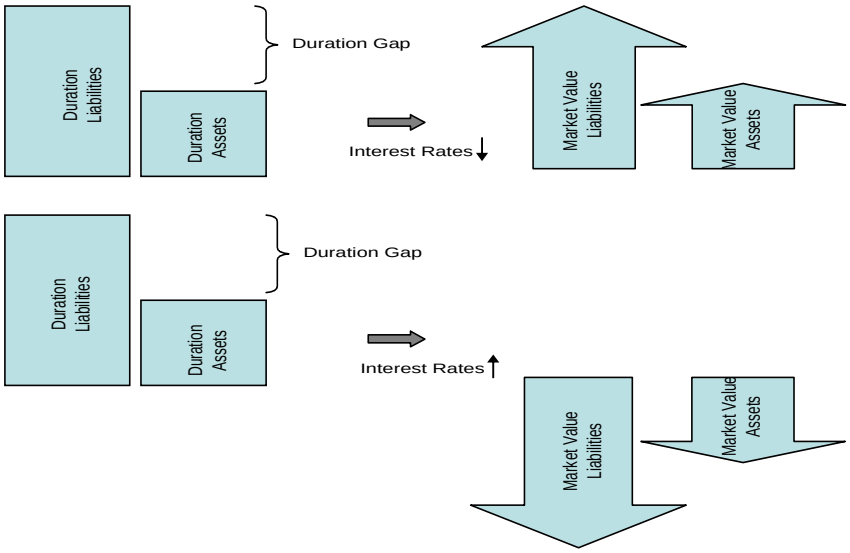
In this section we present our hypothesises. The hypothesises constitutes the foundation for the questions posed in our interviews.

4.1 Hypothesis 1

The IORP and the traffic light system will affect the life- and pension institutions' investment behaviour and increase the scope for ALM-solutions. We argue the effects will be most prominent with less solvent companies.

The Swedish life- and pension insurance institutions in general face a substantial degree of interest rate risk due to the characteristics of their asset portfolios and the nature of their liabilities. The average duration of the liabilities is approximately 15 years (*Webbsänd diskussion om diskonteringsräntan* (2006)). While, on the other hand, the duration of the asset portfolio is much shorter. Hence, many funds are characterized by a significant duration gap between the assets and the liabilities i.e. falling interest rates will affect the pension- and insurance companies negatively since the liabilities will outgrow the assets. The opposite is true under market conditions characterized by increasing interest rates. As a consequence we argue that there will be an increased demand for Swedish long term nominal government bonds and an amplified usage of interest rate derivatives such as swaps and swaptions in order to hedge the duration gap.

Chart 6 Interest rate impact when there is a duration mismatch between assets & liabilities



Source: Bodie,Z., Kane, A., Marcus, A.J., (2005), Investment Sixth Edition, McGraw-Hill, Chapter 16

4.2 Hypothesis 2

The low supply of Swedish long term nominal government bonds form a considerable problem to the life- and pension insurance companies.

We base our hypothesis on the fact that the total volume of the longest nominal government bond is SEK 47.7bn and the duration is roughly 10 years. On the contrary, the aggregated liabilities on the Swedish life- and pension market is somewhere between SEK 800bn and 1000bn with an average duration of 15 years. The problem has been recognized by the market as a critical explanatory factor to the inverted yield curve we are experiencing today. Moreover, the problem is likely to be aggravated in the future as Riksgälden (RGK), The Swedish National Debt Office, has no short-term plans to issue long term government bonds. (*Webbsänd diskussion om diskonteringsräntan* (2006))

4.3 Hypothesis 3

The IORP and the traffic light system will increase the alignment of the life- and pension insurance companies and enhance the destabilizing effects on the market.

We argue that the market valuation of the liabilities and the design of the traffic light system in combination with the small and illiquid supply of nominal government bonds will exacerbate the destabilizing effects on the market. In theory an increased demand for government bonds should result in decreased risk taking as funds are shifted from equities to bonds. Hence leading to falling equity prices and rising bond prices. Moreover in the advent of a bear market the demand for long term nominal government bonds will be further aggravated as the companies affected by the IORP and the traffic light system will have to reduce the risk in their investment portfolios, consequently putting additional downward pressure on the far end of the government yield curve. (*FI:s Rapport 2006:14*).

4.4 Hypothesis 4

The implementation of the IORP and the traffic light system will have implications on the life- and pension insurance companies' product portfolios.

In general the product portfolio can be broken down into unit-linked funds and traditional life insurances. The difference between the two is essentially the risk level and the bearer of the investment risk. In a unit linked fund the participant stands for the investment risk and he/she can chose from a variety of funds with different risk levels. Conversely, in traditional life insurance funds the provider of the fund stands for the investment risk and the saver is guaranteed a certain rate of interest. Any surplus either improves the collective consolidation that functions as a buffer for poorer years, or is directly allocated as bonus to the beneficiaries (Burström 2004).

The guaranteed interest rate in traditional pension insurance affects the size of the technical provisions, hence the size of the risk buffer and ultimately the possibility to take on risk in the traffic light system. Thus, we argue that some companies might find themselves in a situation where the high guaranteed interest rates erodes the companies' equity and forces the company to reduce the guaranteed interest rate or alternatively rearrange its product portfolio in order to be able to stay competitive.

4.5 Hypothesis 5

The IORP and the traffic light system will increase the segregation between highly solvent companies and less solvent companies.

We base our hypothesis on a believe that there will be larger discrepancies between the companies' ability to take on risk as a consequence of the IORP and the traffic light system. The companies with the higher risk in their investment portfolio should be rewarded with a higher expected return, leading to larger differences between the companies in the industry.

5 Results

In this section we present the main results of our interviews. The interviews are based on the hypothesises in section 4. However, we have also let the participants state any thoughts in close relation to the hypothesises.

5.1 General comments

In general, the companies have a positive attitude towards the occupational pension directive and the traffic light system. The market valuation of the liabilities seemed to be the most important consequence since it was put forward and welcomed by all interviewed companies in the sample but one. The company that took a negative stance argued that there should be an administrative set interest rate instead, that did not fluctuate with the market. A few institutions did also state that they appreciated the shift in focus from quantitative- to qualitative regulation. Another positive implication of the directive that was expressed by the companies was the enhanced incentives and possibilities for handling the interest rate risk.

Even though the general attitude toward the directive is positive, the companies have brought forth several problems with the system. Some institutions argue that the traffic light system in general is too harsh, while other comments have been that the system is too complicated and inadaptable. Views have also been expressed that the balance between the equity- and the interest rate risk in the traffic light system is asymmetrical. It is argued that the interest rate risk is underestimated in the model as compared to the equity risk. However, FI commented that the all scenarios considered should occur with equal probabilities. Finally, fears have been conveyed that the Swedish implementation of the occupational pension directive would inflict a competitive disadvantage to Swedish companies on the larger Euro market. In particular the rules regarding the discount rate have been the focus of attention. Other specific problems will be elaborated in more depth later in this chapter.

5.2 Altered investment behaviour

Two thirds of the companies stated that they in one way or another had altered their investment behaviour as a consequence of the occupational pension directive and the traffic light system. The companies that gave a positive response to this question were

the least solvent companies of our sample. However, one of the companies that answered that they had not changed their investment behaviour did not belong to the most solvent companies on the contrary to what was expected.

The companies that pronounced that they had not changed their investment behaviour mentioned that it was due to the fact that the traffic light system did not set any restrictions upon them and that they in some cases used internal methods that are even stricter than the traffic light system. One company said that there are two ways of manage one self in this world. One way is to use hedges; the other is to make sure that you have a large capital buffer. Hence, companies with high solvency have not the same incentive to hedge their duration gap. The company that we did not expect to answer negatively stated that they already had prolonged the duration of their assets before the directive and hedges had been part of their investment strategy for several years.

The main implication has been an increased ALM-philosophy and more precisely an extension of the duration on the asset side either through interest rate hedges or by adding long term nominal government bonds to the underlying bond portfolio. Two companies could not give an exact reply and a few institutions gave only a vague response. Out of the companies that replied, the dominating strategy has been to use interest rate swaps. However, prolonging the duration by investing in long term nominal government bonds has also been a frequently applied strategy. Both real interest rate bonds and Euro denominated bonds have been considered as a complement to the nominal government bonds. However, none of the alternatives poses a particular good hedge due to the inflation risk and the exchange rate risk respectively. Two of the companies in the sample answered that they had used swaptions in order to obtain some flexibility in their model while a few more answered that swaptions would be considered in the future. Increased usage of options was also mentioned as a consequence of the IORP and the traffic light system as well as the use of forwards and futures.

Several companies expressed concerns that the altered investment behaviour and the prospects of reduced risk levels would affect the insurance takers adversely. One company stated that pension is about saving purchasing power, giving up something

now to receive something in a remote future. Hence, substantial investments in long term nominal government bonds might not be optimal, considering the long investment horizon.

Moreover, there were comments regarding the assumed zero correlation between Swedish bonds and foreign bonds with the exception of Euro bonds. Consequently, these bonds are adversely affected in the traffic light system. One company stated that it was unfortunate if a regulatory framework affected the investment behaviour i.e. foreign bonds with attractive yields are exempt in order to optimize the outcome of the traffic light test.

5.3 Supply of long term nominal government bonds

All the interviewed companies stressed the fact that the low supply of long term nominal government bonds was a significant problem. The problem boils down to the fact that the Swedish government bond market is too small in comparison to the total debt of the life- and pension companies which makes it impossible for the companies to hedge their commitments. One company stated that the problem is impossible to solve since the long term nominal government bond in practise does not exist. There is only a buy side but no sell side. Moreover, the companies with the highest amount of assets managed, claim that it would be virtually impossible to completely hedge their liabilities even if that unlikely would be an attractive strategy.

The demand for long term nominal government bonds is directly linked to the discount rate applicable to market value the liabilities. Hence, the regulatory framework regarding the discount rate is a delicate issue to the companies. The majority of the companies were troubled by FI's referral (2006-11-16)[17]. The criticism was threefold; firstly the companies turned against the increased regulatory control the referral imposed since it opposed the qualitative stance of the directive. Secondly, it was argued that the proposition would put even further pressure on the far end of the government bond curve. Finally, several companies were alarmed by the fact that the swap curve should be used to discount the contracts with the longest maturities, since the swap curve in Sweden is very illiquid at the far end and thus argued to be

[17] See section 2.3

artificially set from time to time. At the point in time when FI presented its amended decision we had already conducted our interviews. However, the criticism towards the increased regulatory control and the application of the swap rate for the longest maturities remain.

Another consideration that has been expressed is that the longest nominal government bond as of today expires 2020. Hence, the maturity and thus the duration become shorter each year as opposed to the duration on the liability side that remains fairly stable due to the fact that the companies continuously receives new insurance premiums. Accordingly, the mismatch problem will grow larger in the future if RGK does not issue new debt. A view has been expressed that RGK should have more understanding of the altered market environment and further to act more on a short term basis to meet temporary increases in demand.

Several companies suggested various solutions to the problem. Three companies proposed that the discount rate instead should be a Euro rate, due to the higher supply and the more stable pattern that the Euro rates exhibits. Another suggestion has been to use the real interest rate curve and adjust it for implicit inflation. The reason behind the proposition is that the real interest rate curve is longer and that the supply of long term real interest rate bonds is greater.

5.4 Destabilizing effects on the market

In general the companies agree upon the fact that the IORP and the traffic light system exacerbate the alignment in the companies' investment behaviour that may lead to a destabilizing behaviour on the market. Furthermore, most companies argued that the alignment is expected to be most present among the less solvent companies at least in the early phases of an impending crisis. In particular the alignment of the investment behaviour in the bond market is expected to significantly increase. Several companies outline a scenario were the long term interest rates are falling, either by speculation or by natural causes, along with a substantial decline in the stock markets. Such a scenario would leave the affected companies with little choice than buying more long term government bonds in order not to become insolvent. Thus, the result would be a negative spiral that put even further pressure on the far end of the government bond curve. As a result companies will be unable to allocate their capital efficiently in the

event of a crisis. Furthermore, one company in particular mentioned that the qualitative rules per see entails an increased scope for destabilizing effects since previously the life- and pension insurance companies traded around the quantitative limits. Hence, the companies sold as prices moved up and bought when the prices were falling i.e. the fundamental nature of the system was stabilizing.

A counter weighting factor that has been brought forth is that the traffic light system encourages increased diversification, which arguable mitigate the destabilizing effects. Moreover, several companies welcome the fact that the traffic light system is expected to function more as an early warning system meaning that an imminent crisis scenario could be acknowledged earlier and thereby be somewhat alleviated.

5.5 Product portfolio

The vast majority of the companies have altered their product portfolio the last couple of years. The current trend is toward unit linked funds and lower guaranteed interest rate on the traditional pension insurance. However, only three companies answered that the change was a direct effect of the IORP or the traffic light system. These companies were some of the least solvent companies in the sample and a few companies commented that the less solvent companies are forced to find new products and niches in order to stay competitive.

The trend towards lower guaranteed interest rates is associated with the changed interest rate climate in Sweden. One company stresses the fact that at times when the interest rate was around 7-8 percent it was reasonable to have a guaranteed interest rate of 3-4 percent. Conversely, that is not the case today. Hence, companies need to consider their guaranteed interest rates in order to be able to take on adequate risk. One of the least solvent companies mentioned that by lowering the guaranteed interest rate the solvency ratio can be improved and in some cases such an approach would be more attractive than lowering the risk in the managed portfolio.

5.6 Market segregation

In general, the companies did not express a substantial concern that the directive will lead to an essential segregation of the market. However, half of the companies particularly expressed that the market could exhibit some separation since the more

solvent companies will be able to take on more risk. One of the most solvent institutions argues that the stronger companies will focus on traditional insurance whereas the others will concentrate on unit linked funds and hybrid products. Another company mentioned that the new rules have led to an effective barrier to entry; only the institutions with high solvency will be able to operate in the life- and pension insurance business.

6 Analysis

6.1 General comments

We can conclude that overall the life- and pension insurance industry welcome the new regulatory framework. We found a very strong positive support for the shift to market valuation of the liabilities regardless of the size of the companies and/or the solvency level. It is more difficult to draw any general conclusions about the industry's opinion of the traffic light system since the standpoint was not equally unanimously positive. However, we argue that the general tone is positive. The negative comments mainly concerned the sat risk levels and the relation between them. We disregard the opinion that the equity risk dominates the interest risk in the model. Instead we give support to FI's stance that the risks are balanced. Partly, the difference in opinion could be explained by the time period under consideration. FI considered long term data to calculate the proper risk levels. On the contrary, it is possible that some companies have had a shorter perspective on their assessments, hence the result.

Moreover, we do not draw any conclusions whether the Swedish life- and pension insurance companies will suffer from a competitive disadvantage in Europe associated with the implementation of the IORP in Sweden. The directive will be implemented differently in practically every member state and the process is still underway. The question itself is very extensive and as stated previously out of the scope of this thesis.

6.2 Altered investment behaviour

We find rather strong support for altered investment behaviour and increased scope for ALM-solutions. The result is in line with what we expected but is in contradiction to the evidence FI presents (*FI:s Rapport 2006:14*). Furthermore, we can as expected see that this behaviour dominates amongst the less solvent companies in the sample. The highly solvent companies have during several years built up large capital buffers which mean that the traffic light model does not set any restrictions upon them. Furthermore, for a highly solvent company, with assets in great excess of technical provisions, the equity risk is ought to be the dominating risk in the traffic light model. Hence, the incentive to reduce the duration gap is limited.

Several of the companies that had increased the duration on the asset side had done so by purchasing long term nominal government bonds. The result is in accordance with the long term ALM-optimization framework developed by Hoevenaars *et al.* (2005). However, the majority of the companies that had hedged the duration gap stated that they had used interest rate swaps. We argue that there are mainly two rationales that explain this pattern. Firstly, using interest rate swaps allows the long term investors to hedge their duration gap without significantly alter their strategic portfolio in line with the ALM-framework presented by Engel *et al.* (2005). Hence, the long term investor can to a greater extent allocate the funds according to the efficient frontier attributable to long term investors as elaborated by e.g. Campbell and Viceira (2005). Secondly, also in line with the reasoning of Engel *et al.* (2005), the outstanding supply of long term nominal government bonds[18] is too low in order for those securities to fully function as an attractive hedging tool.

Moreover, we did not find an equally strong support for the use of swaptions, which is in contradiction to the findings of Engel *et al.* (2005). According to their theory swaptions are preferred over swaps when the interest rates are low due to the negative risk premium associated with the swaps in the short term as the interest rates are expected to increase. The interest rates in Sweden have been on very low levels the last few years why one could have expected a higher propensity to hedge with swaptions than with swaps.

In terms of interest rate hedging in general, we can establish that there is a disadvantage for companies that increase the duration of their assets for the sole purpose of reducing the duration gap in order to pass the traffic light test since it implicates a higher volatility in the assets without a corresponding increase in expected return. The high solvency companies are not forced to lessen their duration gap in the same manner, due to large capital buffers, resulting in a possible competitive advantage for these institutions. On the other hand, all life- and pension insurance institutions could benefit from an actively managed interest rate exposure in order to optimize the overall risk/return characteristics of the portfolio.

[18] See section 6.3

We can beside the increased use of interest rate derivatives and long term nominal government bonds also determine a trend towards an increased application of equity derivatives. Furthermore, the fact that zero correlation is assumed between Swedish and foreign interest rates (other than EUR interest rate) mean that investments in foreign government bonds are discredited. Consequently, companies might turn away from that type of investment in favour of for example Euro bonds. However, we can conclude that the discrepancy will have no sizeable effect on the life- and pension institutions investment behaviour since it was of no great concern to the vast majority of the companies in the sample.

Finally, we find it difficult to draw any solid conclusions, concerning the possibility that there will be negative implications on the insurance-takers returns since there are two contradictory effects. On the one hand, an increased focus on nominal long term investments and lowered risk levels among the less solvent companies should in theory result in lower expected return considering long-term investors optimal asset allocation as elaborated by e.g. Campbell and Viceira (2005). On the other hand, the implementation of the IORP and the traffic light system will have implications on the less solvent companies' product portfolios[19]. Less solvent institutions tend to reduce the guaranteed interest rates on traditional pension insurance and/or a shift toward products with features of unit linked funds as a consequence of the IORP and the traffic light system, which enable the companies to increase the risk in the investment portfolio. Hence, both effects work in opposite ways and we can not establish sufficient proof to determine which of the effects is the greatest.

6.3 Supply of long term nominal government bond

We can conclude that all companies found the undersized supply of long term nominal government bonds a crucial problem regardless of size or solvency level. However, the problem is more imminent for less solvent companies. Although we found strong support for our hypothesis, we must question the result due to the change in regulation of the discount rate after the completion of our interviews. Yet, it is clear that the fundamental problem will remain in the new framework albeit the direct

[19] See section 6.4.

effects could be alleviated. Hence, we conclude the inverted yield curve is likely to pertain as long as this regulatory framework is in place.

We further found evidence for a potentially aggravated situation in the future as RGK as of today have no plans to issue any new long term government bonds i.e. the duration gap between the longest nominal government bond and the duration of the life- and pension companies liabilities' is expected to increase in the future.

As an alternative to the nominal government bond curve we found strongest support for the use of the swap curve which ultimately was accounted for by FI. Naturally the supply and demand in the swap market is more elastic and there has been an increase in the market for long term swaps the last year. More surprisingly we also found support for both the use of a Euro denominated rate as well as for the use of a real interest rate. Nonetheless, we find none of the alternatives appealing since both options would inflict risk on the model. In order to successfully be able to employ a EUR rate as discount rate, the spread between the EUR rate and the SEK rate would have to be fairly constant i.e. the correlation would have to be close to 1. However, in such an environment it would be straightforward for the swap providers to hedge their positions, hence they would be more willing to enter long term swap agreements resulting on a diminishing need to apply the EUR rate in the first hand. In terms of application of the real interest rate as discount rate we do not argue that the higher supply of longer maturity bonds outweighs the inflation risk.

6.4 Destabilizing effects

The result of our interviews confirm the theory that the IORP and the traffic light system aggravate the alignment of the life- and pension insurance companies' investment portfolios and thus enhance the destabilizing effects on the market. We found the strongest support for an increased alignment among the less solvent companies which follows naturally from the limited risk budget associated with those companies. However the evidence is not as strong as anticipated. None withstanding, the results oppose FI's findings (*FI:s Rapport 2006:14*). We argue that the divergence in results could derive from the fact that the stability report only considers the time period from the implementation to the publication date, whilst our study target the expected behaviour over the entire business cycle.

We found evidence that the alignment among the companies will be most prominent in bear markets due to the fact the companies will increasingly seek to match their book, leading to an increased demand for long term nominal government bonds which ultimately results in falling interest rates. Consequently, the stock market will have an increased influence on the Swedish interest rate market in the future. The problem is not mitigated through the use of interest rate derivatives since the swap providers also need to hedge their risk exposure through long term nominal government bonds. Moreover, the prospect of a negative spiral is imminent in which falling interest rates accelerate the demand resulting in even lower interest rates. Such a scenario could be further exacerbated by speculative players such as hedge funds, why we could see increased interest rate volatility in the future as interest rates fall. We argue in line with the findings of Devenow and Welch (1998) that high market volatility could contribute to herding among investors that amplifies market stress. Furthermore, Bodie (1991) reason that the herding can be particularly present with institutions subject to the risk that the assets fall short of the liabilities. Although the life- and pension institutions have been exposed to shortfall risk prior to the IORP and the traffic light system we reason that the shortfall risk has been augmented by the market valuation of the liabilities. Hence, we draw the conclusion that the prospects of herding and destabilizing behaviour have been enhanced with the new regulatory framework. However, we must stress that the immediate risk of significant destabilizing behaviour has been somewhat mitigated by FI's final decision regarding the discount rate, since the possibility for the companies to hedge will not be a directly dependent on the nominal government bond curve.

To illustrate the prospect of a negative spiral, consider the example in section 2.4.6. concerning the less solvent company (B) that has hedged its duration gap. If several players on the market seek to hedge their duration gap at the same time the price of long term nominal government bonds will increase resulting in falling interest rates i.e. the incentive to hedge the interest rate risk will be further aggravated leading to an even higher demand for long term nominal government bonds.

In addition, we can conclude that the shift from quantitative to qualitative rules could have some implications on the stability of the market. Quantitative systems can

function as a stabilising factor when companies trade around the quantitative limits i.e. the companies sell as prices move up and buy when prices are falling. Conversely, a qualitative system has no such features.

We argue the reason we did not obtain such strong evidence of alignment of the investment portfolios as expected is explained by the increased diversification that is encouraged by the traffic light system and the square root formula. Moreover, another variable to take into consideration is the wider dispersion of the product portfolios that, at least among the less solvent companies, partially can be explained by the implementation of the IORP and the traffic light system[20]. A larger variety of products with different investment strategies and niches clearly reduce the alignment effect on the market. Finally, if the prophecy that the traffic light system will function more as an early warning system is fulfilled it is possible that the worst alignment effect and thus destabilizing behaviour could be alleviated in the event of a crisis.

6.5 Product Portfolio

We did not obtain any real substance to our hypothesis that the life- and pension insurance companies would alter their product portfolios as a consequence of the IORP and the traffic light system. However, there is an ongoing shift towards lower guaranteed interest rates and towards unit-linked funds but there seem to be other variables that have had greater effect. The most prominent variable that explains the lowered guaranteed interest rates is, from an historical viewpoint, the low and stable current interest rate climate. Hence, it is no longer feasible to guarantee interest rates of 3-4 percent annually. In terms of the shift from traditional pension insurance to unit linked funds it could partially be explained by the ongoing shift from defined benefit schemes to defined contribution schemes in which part of the funds may be invested in unit-linked funds, thus accelerating the demand for those products.

However a few companies actually did modify their product portfolio as a consequence of the IORP or the traffic light system, and these were the less solvent companies. We argue that in the future, the only companies that will be able to offer traditional pension insurance as we know it today are the highly solvent companies.

[20] See section 6.5

The traffic light system effectively functions as a barrier to entry as the companies need a significant capital buffer in order to pass the solvency test. On the other hand, the shift towards unit-linked funds could open up the market to new players and a variety of new products.

6.6 Market segregation

The support for an increased separation of the market was vague. Half the sample argued that the IORP and the traffic light system could marginally increase the market segregation between highly solvent and less solvent companies, while the other half took an opposite stance. We argue that the companies that are required to lower the risk of their investment portfolio as a consequence of the new regulatory framework i.e. the least solvent companies, will have a reduced expected return. Future track records of returns should therefore outline a wider dispersion between the more solvent companies and the less solvent companies. However, the lack of solid support to our hypothesis could be explained by the fact that some companies argue that the wider divergences in risk levels instead are canalized to changes in the product portfolios. As mentioned in section 6.5 there is an ongoing reformation of the companies' product portfolios, not mainly as a consequence of the IORP and the traffic light system but for a variety of reasons. Hence, the direct effect of an increased market segregation and divergence in risk levels could be mitigated by an increased number of products with various niches, making a direct comparison more difficult.

7 Conclusion and suggestions for further research

7.1 Conclusion

We have conducted a study of the implementation of the IORP and the traffic light system in Sweden. The aim of the thesis was to analyze the implications on the life- and pension insurance business as well as any effects on the financial markets as a direct consequence of the altered regulatory framework. The study is based on interviews with twelve of the largest life- and pension insurance institutions in Sweden.

The main conclusions we draw from our findings are the following:

1. The implementation of the IORP and the traffic light system has altered the investment behaviour of the less solvent life- and pension insurance institutions in contradiction to the findings of FI (*Rapport 2006:14*). In particular, we can conclude that the new regulatory framework has increased the scope for ALM-solutions. We find the strongest support for an increased application of interest rate swaps. However, we can also establish evidence of an increased demand for long term nominal government bonds. By contrast, we can not find support for a significant employment of interest rate swaptions despite the low interest rate climate opposite to what we could have expected. Moreover, in terms of the prospects of adverse effects on the pension insurance-takers returns we found that the altered investment behaviour could lead to reduced risk taking among the least solvent companies that goes in conflict with the optimal asset allocation of long term investors. However, we must also consider that the very same companies are likely to alter their product portfolios in a way that enables them to increase the risk taking. Hence we can not draw any solid conclusions.

2. The low supply of long term nominal government bonds in combination with the new regulatory framework poses sincere predicament to the life- and pension insurance institutions regardless of solvency level. However, the problem is more imminent to less solvent companies.

3. We found support for an increased alignment of the life- and pension institutions investment portfolios among the less solvent companies in contradiction to FI (*Rapport 2006:14*). Furthermore, we found evidence that the alignment effect will be more salient in bear markets. Hence, we can conclude that the destabilizing effects on the market will be enhanced by the new framework. However, we did not find as strong proof as expected arguably due to the diversification effects associated with the traffic light system.

4. The IORP and the traffic light system have not had a major implication on the life- and pension insurance companies' product portfolios opposite to our hypothesis. However, we could establish a relationship between the few companies that had altered their product portfolios as a consequence of the new regulatory framework and relatively low solvency levels.

5. The implementation of the IORP and the traffic light system will not significantly exacerbate the market segregation between the companies in the life- and pension insurance business. The result is ambiguous since only the less solvent companies have been forced to reduce the risk as a consequence of the IORP and the traffic light system. However, we argue that the result can be partially explained by the fact that the divergence in risk levels to a certain degree is canalized through differences in the product portfolios.

7.2 Further research

The implications of the IORP and the traffic light system are still an unexplored area by academics, both in Sweden and in Europe. To inspire future research in the area, we present suggestions of how this thesis could be developed as well as point out interesting topics for future research. The aim of the thesis is to provide an introduction to the IORP and the traffic light system. Hence, an obvious extension would be to separate the various implications that have been considered in the thesis and analyse each segment more thoroughly. Moreover, we argue that a quantitative study would provide further depth. However, as stated in the thesis, due to the recent implementation of the directive and the traffic light system such a study cannot be

commenced until enough data points can be observed to draw statistically significant conclusions.

Moreover, there are several aspects that have not been discussed at all, but nonetheless would be interesting to consider. For example, a comparison between Sweden and other member states in terms of implementation of the directive and it's consequences on the financial markets and the life- and pension insurance business in different settings. In addition, it would also be interesting to separate mutually working companies and dividend paying companies to analyze any discrepancies between the different company forms in terms of the effects of the IORP and the traffic light system.

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