

Summary

Insurance firms are important players in the financial system. Life insurance firms in particular are major investors in the financial markets and an important source of funding for many market participants. However, unlike at banks, problems at insurance firms do not necessarily have a major impact on financial stability or the real economy. Insurance firms are not subject to as large liquidity risks as banks are; they hold plenty of assets that they can sell or pledge and their customers usually continue to pay in premiums, even during a crisis. Insurance firms are also not as interconnected with the rest of the financial system as banks are. As a result, a crisis at an insurance firm normally progresses slower than a crisis at a bank.

The greatest vulnerability within the insurance sector is related to the fact that insurance firms are very large players on the financial markets. The decisions they make regarding purchases/sales of assets can amplify price fluctuations and affect the balance sheets of other firms that own the same asset. This could impair the functionality of the financial markets. The insurance sector is also vulnerable if a situation were to arise where it would not be possible to sign up for a societally important insurance, such as third-party motor insurance.

In this report, we identify a number of quantitative indicators that we consider to capture the vulnerabilities in the insurance sector that are relevant from a financial stability perspective. These indicators demonstrate that resilience in the insurance sector in general was good at the end of 2015. The traffic-light ratios are high and do not indicate any notable deterioration. The solvency ratios are satisfactory in general, but there are some heightened vulnerabilities in certain segments. The large duration deficit in relation to the duration needed by life insurance firms' is also identified as a vulnerability. In addition to the impact through financial markets, we also analyse potential vulnerabilities that could arise if it were not possible to sign up for societally important insurance policies. We have not identified any heightened vulnerabilities here. Resilience is considered to be good, even given a stressed scenario.



Introduction

Finansinspektionen (FI) has long had the task of promoting financial stability and strong consumer protection. Financial stability refers to the ability of the financial system to maintain its core functions – making payments, transforming savings into financing and managing risks – even given unfavourable circumstances. It is important to have a stable financial system since the real economy could be negatively affected by disruptions to these core functions. FI has also been responsible for the macroprudential supervision in Sweden since 2014. This means that FI must intervene if financial developments unfold that could lead to problems in the economy, even if neither the stability of the financial system nor consumer protection is threatened.¹

FI regularly monitors the vulnerabilities in the financial system. As a complement to its ongoing supervision and the activities that it has conducted for years, FI has also developed indicators to identify whether certain vulnerabilities in the financial system are high or low.² To date, these indicators have focused on factors that are of particular relevance for monitoring resilience in the banking and household sectors. We are now expanding this analysis to include vulnerability indicators for an additional sector, the insurance sector. This work should be viewed as an initial analysis that will be developed and changed over time. We use thresholds to generate signals and group the indicators by vulnerability categories just as we have done before.

The purpose of FI's indicators is to contribute to the identification of vulnerabilities that in the long run could threaten financial stability or in any other way create problems in the real economy. In our analysis, we are therefore looking for indicators of vulnerabilities that either could threaten the core functions themselves or in any other way have a negative impact on the real economy.

Insurance firms' business and their role in the financial system

Insurance services can be broken down into two groups: non-life and life. Firms offering non-life insurance services make it possible for households and firms to manage risks of unexpected economic losses that arise from damages and illness. Such losses may include damages to household property, injury caused by a member of a household to a third person or a third person's property (liability insurance), illness and accidents. Firms offering life insurance services make it possible to sign up for insurance policies that provide financial protection in the event of death, retirement or longevity. Life insurance firms manage a very large percentage of the pension capital of Swedish residents.

One thing that non-life insurance and life insurance firms have in common is that they both undertake to pay compensation to the policyholder in accordance with the provisions set out in the insurance

¹ See Finansinspektionen (2014).

² See Finansinspektionen (2015).

contract.³ By bundling a large number of these types of contracts, the insurance firm is able to carry out what is known as a “risk transformation”, i.e. a risk that is random for each individual policyholder becomes to a large extent predictable for the insurance firm. This allows the insurance firm to accept payment in the form of a fixed amount (a premium), which the firm receives in advance from each policyholder and that together covers the expected compensation, operating costs and profit for the firm. The insurance firm manages these premiums until compensation must be paid, which may occur first well into the future, particularly in the case of life insurance.

All of the funds that an insurance firm lists as assets on its balance sheet are not its own to be freely distributed. Most of the funds are instead expected to be paid as compensation to policyholders. There is therefore an item called “technical provisions” (TP) under liabilities on the balance sheet. This item constitutes the expected present value of the total commitment to the firms’ policyholders.⁴ The item is calculated by the insurance firm’s actuaries using specially designed statistical methods.

Insurance firms manage the premiums they receive and invest in different kinds of assets, e.g. treasury and corporate bonds, shares and real estate. These investments are made in part based on the characteristics of the assets, which preferably match the characteristics of the expected future payments.⁵ This method of investment allows the firm to reduce the risk that it will not have enough funds to make payments when the payment claim is received.

Insurance firms therefore contribute to two of the three core functions in the financial system. They offer an efficient way for households and firms to manage their risks by paying a known premium instead of trying to save for a random, unknown expense that may arise in the future. They also manage policyholders’ premiums on their own balance sheets until the payments are made. During this time, they invest these funds, thus transforming savings into financing.

Insurance firms and financial stability

Insurance firms are important players in the financial system, and households, financial firms and non-financial firms are all directly or indirectly dependent upon them. Life insurance firms in particular are major investors in the financial markets and an important source of funding for many market participants. For example, at the end of 2015, life insurance firms owned 27 per cent of the banks’ covered bonds and 22 per cent of the Government’s outstanding bonds. They also act as counterparties in many different types of financial contracts. They primarily use derivatives as interest rate swaps to protect

³ More precisely, the firm pays compensation to the person entitled to payment in accordance with the insurance contract. Private accidental death insurance, for example, pays compensation to the policyholder’s survivors, and collectively bargained insurance policies signed by the employer (policyholder) lists the employee or the employee’s survivors as the beneficiary (person entitled to payment).

⁴ The current value of a future cash flow is usually called the “present value”. The present value is calculated by discounting future cash flows using an interest rate. The lower this rate is, the larger the present value.

⁵ Such characteristics include, for example, the time of the payment, the amount and the currency. This type of investment is called “matching” of assets and liabilities.

themselves against financial risks, but they also participate in repo transactions, securities loans, etc.

However, insurance firms are not as important for financial stability as, for example, banks are. Even if one or a number of insurance firms were to experience problems, this would not necessarily have a major impact on financial stability or the real economy. The course of events during a crisis in an insurance firm is normally slower than the course of events during a crisis in a bank. A bank that loses the confidence of the market will suffer immediate problems with its payments. Insurance firms do not face the same liquidity risks since they have plenty of assets that they can sell or borrow against. Their payments are also more predictable.⁶ Policyholders also tend to continue to pay their premiums even during a crisis since they do not want to risk being unprotected. These premiums provide the firm with a source of ongoing liquidity.

Insurance firms are also not as interconnected with the rest of the financial system as banks are.⁷ A crisis therefore rarely leads to a fear that the problems at an insurance company will spread quickly to others, which in the long run potentially could paralyse one of the core functions or have a negative impact on the real economy.

It is still possible for insurance firms to cause or increase the risk of financial instability and negative effects for the real economy. This could happen through financial markets if the insurance firms via their investment behaviour amplify price fluctuations or change their behaviour in such a manner as to weaken the financial markets. It is also conceivable that a situation could arise where it would not be possible to sign up for a societally important insurance, such as third-party motor insurance.

IMPACT THROUGH FINANCIAL MARKETS

Insurance firms invest large amounts of money and through purchases/sales can amplify price fluctuations on the financial markets. In a stressed situation, the value of riskier assets such as shares fall, while the value of more secure assets such as treasury bonds rises. This normally weakens the balance sheet of the insurance firms since their assets and liabilities are not perfectly matched, i.e. the present value of their technical provisions rises more than the value of their bond portfolios, at the same time as the value of their shareholdings fall. Insurance firms with a weak balance sheet may be forced to sell shares and buy treasury bonds, which would amplify the initial price fluctuation.

Falling asset prices means that other firms holding the same asset would see the value of their holding fall, which would weaken their balance sheet and force them to sell or recapitalise as well. The actions of insurance firms can thereby spread to other market participants, in particular to other insurance firms or banks. All of these events can increase the price volatility on the financial markets, and as

⁶ In practice, it is very unusual for there to be a run on an insurance firm which has lost the confidence of the market, in part because in many cases it is not possible for the policyholder to move or repurchase an insurance (and thus have the funds paid in returned from the firm) without incurring expenses and other disadvantages.

⁷ The banks borrow large amounts from one another through the inter-bank market and through cross-ownership of each other's covered bonds. There is no corresponding interconnectedness between insurance companies.

a result liquidity could disappear from some markets.⁸ In the end this might force some firms into bankruptcy. This happened both in 1998 in conjunction with the Long Term Capital Management crash and during the financial crisis in 2008-2009.⁹

Insurance firms are the Swedish institutional investors with the most assets under management. At the end of 2015, their investment assets totalled SEK 4,008 billion (see Table 1). This figure can be compared to Sweden's central government debt, which at the same point in time amounted to approximately SEK 1,403 billion.¹⁰

Table 1: Insurance firms' holdings of financial instruments

(SEK billion)

Market	Outstanding	Insurance firms' holdings
Equity market	5,753	2,337
Bond market	3,183	1,316
Money market	432	15
Other		340
Total		4,008

Note: The data refers to 2015. The equity market consists of all listed shares issued by Swedish companies. The bond and money markets refer to the total outstanding amount issued in SEK. For insurance firms, the reference is to their investment assets. The holdings of shares and participations (in total SEK 2,337 billion) includes shares in wholly owned real estate companies (SEK 90 billion) and shares and participations that constitute unit-linked insurance assets (SEK 801 billion).

Source: Statistics Sweden (2016).

Due to the strength of their large balance sheets, reallocations in insurance firms' portfolios may cause interest rates and asset prices to fall. Portfolio reallocations are therefore the largest source of financial instability caused by insurance firms.

EFFECT OF NOT BEING ABLE TO SIGN UP FOR INSURANCE

One of the central functions that insurance firms provide is risk management. If insurance firms are unable to provide this function, there may be direct consequences for the parts of the real economy that must be insured to conduct business. For example, aircraft are not allowed in the air if they are not insured and third-party motor insurance is mandatory for all motor-driven vehicles in Sweden. If these types of insurance were not available, this would have a negative impact on the economy since transports would be delayed and become more expensive. This is not a hypothetical scenario; after the events that occurred on 11 September 2001, insurance firms terminated terrorism insurance and liability insurance for air traffic. In order to prevent the paralysis of all commercial air traffic, the British government created its own insurance initiative, Troika, to fill this gap in insurance.

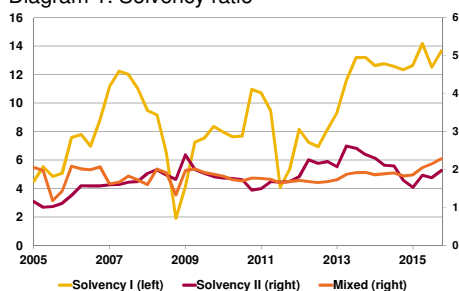
As this example demonstrates, from a systemic risk perspective, it is primarily the absence of new societally important insurance policies that can lead to problems rather than existing policyholders not getting paid.

⁸ See Brunnermeier and Pedersen (2009).

⁹ See Shleifer and Vishny (2011).

¹⁰ See Riksgälden (2015).

Diagram 1: Solvency ratio



Note. The diagram shows the solvency ratio for the life insurance firm with the lowest solvency ratio at a given point in time within each of the three groups: Solvency II, Solvency I, Mixed. Please refer to the text to the right for a description of the groups.

Source: FI.

The type of risk that is described here is different than the traditional risk where the functions of the financial system are undermined to a such an extent that it spills over to the real economy. In the above case, the financial system still functions well even though several specialised financial functions that play a central role in the real economy have ceased to exist.¹¹ When working with vulnerability indicators, it is therefore also relevant to take into consideration the availability of societally important insurances.

Vulnerability indicators

REALLOCATIONS

Insurance firms must always be able to fulfil their commitments to policyholders, even if their financial situation is stressed. When their balance sheets are weakened, they must therefore decrease the risks in their investments by matching more of their assets to TP. This means that more risky investments, such as shares, will be sold in exchange for interest-bearing assets that have risk profiles similar to the company's commitments. Since the volumes involved are rather large, these transactions affect the markets for both the financial instruments that are being sold and those that are being purchased. Indicators that measure insurance firms' solvency, i.e. their ability to manage unexpected losses, also capture the risk of reallocation, since reallocations can be triggered by weaknesses in the insurance firms' balance sheets.

Indicators that measure how much an insurance firm's assets deviate from risk-minimising allocations, i.e. the asset portfolio that perfectly matches the risk profile of the liability, are also relevant. The combination of these types of deviations and weak solvency elevates the risk of reallocation. Next we present the indicators that we use to follow reallocation risks.

Solvency ratio

It is natural to monitor the solvency ratio because low solvency in and of itself can force reallocations. The solvency ratio is defined as own funds divided by the required solvency margin.¹²

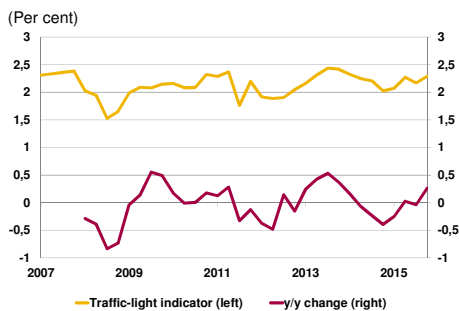
We have opted to monitor roughly ten life insurance firms. This selection is based primarily on the size of their investment assets, since we make the assessment that only large reallocations can have a negative impact on the financial markets. Unless otherwise mentioned, we use the same group of firms for all indicators.

The new Solvency II regulation went into effect for Swedish insurance firms on 1 January 2016. Due to the transition rules during the period 2016–2019, however, the reporting of life insurance firms will differ slightly. Some Swedish life insurance firms will apply the new regulations to their entire operations, while others will continue to apply the older Solvency I regulation to their entire operations. Furthermore, other firms will apply Solvency II to part of their operations (occupational pension insurance) and Solvency I to the remaining part (other life insurance). Since the conditions differ, we report these three groups separately: Solvency II, Solvency I and Mixed. For the period

¹¹ See French, etc. (2015) for presentation of similar reasoning.

¹² Required solvency margin is a term used in the Solvency I regulation. Since the new Solvency II regulation went into effect on 1 January 2016, the solvency ratio is defined as own funds divided by the solvency capital requirement. Since the indicators in this FI Analysis are based on time series up to and including 31 December 2015, we will use the Solvency I term here.

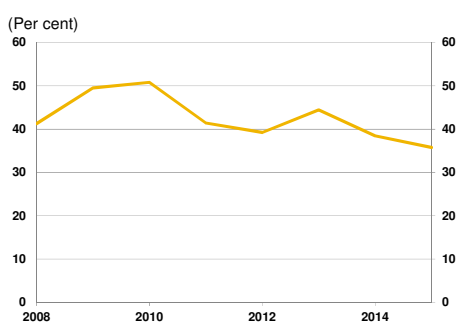
Diagram 2: Traffic-light ratio



Note. The diagram shows the traffic-light ratio for the 20th percentile of the included life insurance firms (traffic-light ratio indicator). The annual rate of change is also shown.

Source: FI.

Diagram 3: Duration deficit



Note. The diagram places the total duration supply of treasury bonds and covered bonds in relation to the life insurance firms' potential demand.

Source: Danske Bank, Sveriges Riksbank, Swedish National Debt Office and FI.

up to Q4 2015, when a single regulation applied, we use the same thresholds for all groups. After Q4 2015 we adapt the threshold values for each group.¹³ Since our indicators end in Q4 2015, the division of the indicators will first come into play at the next update.

We make the assessment that all life insurance firms that are included in our sample are large enough to affect the financial markets on their own. It is sufficient for one firm to experience problems for the financial system to be negatively affected. The indicator therefore consists of the firm with the lowest solvency ratio in each group (see Diagram 1).

Traffic-light ratio

The traffic-light ratio is calculated by taking the capital buffer with fair valuation¹⁴ and dividing it by a combined capital requirement that takes a number of risks into consideration.¹⁵ A good traffic-light ratio means that an insurance firm, even given a stressed scenario in which, for example, interest rates and share prices are falling, has sufficient assets to fulfil its commitments. The traffic-light ratio thereby captures vulnerabilities that are similar to that of the solvency ratio.

The firms that will apply the Solvency II regulations to their entire operations will not calculate the traffic-light ratio for any part of their operations after year-end 2015. We are therefore excluding these firms from the traffic-light indicators. Similarly, like we did for the solvency ratio, we are focusing on the life insurance firms that have a low traffic-light ratio. Here, the indicator of the traffic-light ratio corresponds to the 20th percentile of the firms included in the group, which basically corresponds to the firm with the second lowest ratio (see Diagram 2).¹⁶

Change in traffic-light ratio

It is not solely the level of the traffic-light ratio that can signal elevated vulnerability. Rapid changes in the ratio can also indicate that the vulnerabilities are about to rise. Changes are also more sensitive than the level itself, which is why we also use the annual change in the traffic-light indicator as a separate indicator (see Diagram 2).

Duration deficit

The possibilities available to life insurance firms for managing the risk of falling interest rates are limited in that there is not a sufficient number of participants on the market who would like to protect themselves against rising interest rates. Insurance firms therefore use treasury bonds as well as covered bonds and derivatives to protect themselves from falling interest rates. The nominal amount of the stock of outstanding treasury bonds (real and nominal) is approximately SEK 800

¹³ Finansinspektionen (2015) offers a more detailed description of how the threshold values are determined.

¹⁴ "Realistic measurement" is a measurement at fair value, i.e. with a larger impact from the market value and without the built-in security margins that traditionally have been used for insurance measurements.

¹⁵ <http://www.fi.se/Rapportering/Trafikljuset/>.

¹⁶ Note that for the solvency indicator we first divided the insurance firms into three groups and then focused on the insurance firms with the lowest solvency ratio in each group. Assume that the insurance firms with the three lowest solvency ratios end up in three different groups. An average of the groups then corresponds to approximately the second lowest solvency ratio of the included insurance firms. This is the average we use in the section entitled, Aggregation. This is approximately comparable to the second lowest (20th percentile) traffic-light ratio.

billion.¹⁷ If insurance firms were to protect themselves against falling interest rates by fully matching their liabilities, this would require almost SEK 1,500 billion.¹⁸ The potential demand therefore greatly exceeds the supply. Insurance firms also use covered bonds with an outstanding stock of SEK 1,600 billion.¹⁹ One problem here is that covered bonds as a rule have a short maturity (typically shorter than 5 years) while the liabilities that the insurance firms want to match are long (typically between 15 and 20 years). There is thus an imbalance between the outstanding maturity and the maturity in demand.²⁰

The imbalance between the size and maturity of supply and demand comes into play when insurance firms are experiencing low solvency. The high demand for interest-bearing securities may lead to insurance firms not being able to fully match their liabilities. This may also lead to extremely low interest rates and thus major losses. As a whole, this would weaken the insurance firms' solvency in a situation where solvency is already low.

In order to catch both dimensions, i.e. the imbalance in both the stock of bonds and maturity, we weigh the stock with the maturity. The maturity is captured by the so-called "duration".²¹ We call the final product "supply and demand of duration".

The supply of duration corresponds here to the duration of the stock of treasury bonds and covered bonds.²² We also take into consideration the Riksbank's purchase of government securities (QE) since the Riksbank cannot be expected to act as a "normal" market participant. The Riksbank is not driven by profit considerations and would not necessarily sell its holding simply because the price is high. We consider the Riksbank's bonds to be partly inaccessible for the insurance firms, and the Riksbank's holdings were therefore excluded from the calculation.

We approximate potential demand of duration based on the size of FTA and taking into consideration the duration of the guarantees.

We calculate *duration deficit* as the ratio between the outstanding duration of the stock of treasury bonds and covered bonds that is available in the market and the duration of FTA (see Diagram 3).²³

17 This refers only to bonds issued in SEK, see Riksgälden (2015).

18 Corresponds to life insurance firms' total FTA at year-end 2015 based on FI's calculations.

19 This refers only to bonds issued in SEK, see ASCB (2016).

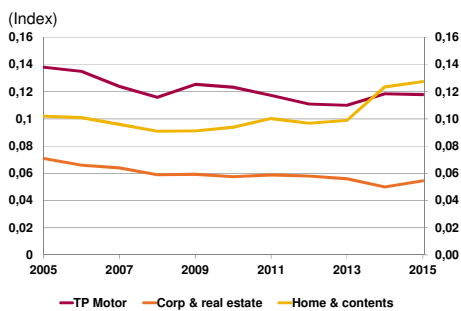
20 Insurance firms also use derivatives to protect themselves against falling interest rates, which does not assume access to the underlying bond. The market maker issuing the derivative, however, does not want to carry the risk and in turn protects itself by purchasing or selling an underlying bond. Increased demand for interest rate derivatives thereby also leads to increased demand for the underlying bond.

21 From a purely mathematical perspective, the so-called "Macaulay duration" can be described as a weighted average of the maturities of a bond's cash flows. The weights corresponds to the discounted value of the cash flows in relation to the value of the bond. If a bond only has one cash flow, the Macaulay duration is equal to the maturity of the cash flow, measured in years, which is the maximum duration a bond with a given maturity can have.

22 Conceptually, duration is created in the financial markets when a market participant raises a loan, regardless of whether it is a bank loan or the issuance of a bond. Since duration is a function of the maturity of the loan, variable rate loans generate a duration of almost zero. Thus duration is mainly created by the fixed (long) interest rate loans.

23 Outstanding duration corresponds here to the stock of nominal and real treasury bonds and covered bonds multiplied by the average duration. Treasury bonds purchased by the Riksbank as part of its QE program have been excluded. Potential demand for duration is estimated as total FTA for the included life insurance firms multiplied by average duration. Average

Diagram 4: Concentration of societally important non-life insurance lines



Note. The diagram shows the concentration within the three societally important non-life insurance lines measured through a Herfindahl index.

Source: FI.

ACCESS TO KEY INSURANCE POLICIES

In order to determine if a certain part of the insurance sector is crucial from a societal perspective, we have considered

- the size of impact a lack of insurance would have on the real economy, and
- whether other market participants would be able to take over transactions and commitments with little advance notice if an important insurance provider were to fail.

We consider an insurance sector to be key from a societal perspective if the lack of insurance in a sector would have a major impact on the real economy and no other market participants could take over the sector's business with little advance notice. One example of a part of the Swedish insurance sector that does *not* fulfil the criteria to be societally important is transport insurance. There is no arguing that transport insurance has a major impact on the real economy, but there are a large number of international participants who could probably easily take over the commitments if the domestic non-life insurance firms were to fail. This also applies to the part of the non-life insurance line called "credit and sureties", where Pensionsgaranti (PRI) holds a market-leading position. Despite PRI's strong position, we consider there to be plenty of international participants who would be able to take over if PRI were to experience problems. Finally, the non-life insurance line, worker's compensation insurance, is completely dominated by AFA Trygghetsförsäkring, which has a market share of 100 per cent. We also exclude this line of non-life insurance since we make the assessment that the real economy would not suffer major problems if it were not possible to sign up for insurance with AFA. Other firms would be able to take over the business.

Given the criteria specified above, we have identified three of the eleven non-life insurance lines to be societally important: home and home contents insurance, corporate and real estate insurance and third-party motor insurance.

Concentration of societally important non-life insurance

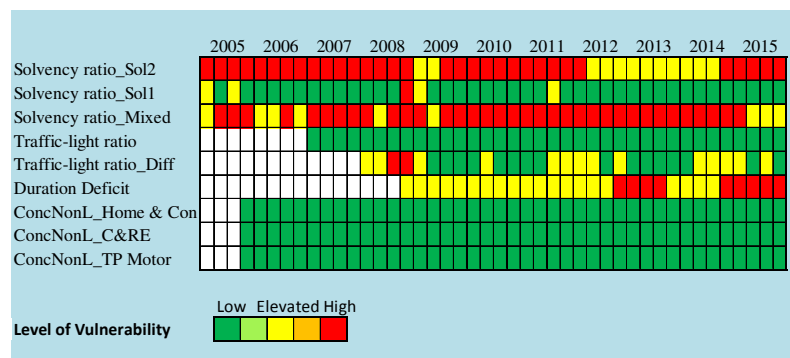
In order for a non-life insurance line to be robust, it needs to be strongly diversified in that there are many participants willing to offer the insurance. A non-life insurance line is therefore sensitive if there are only a few dominant firms, since one bankruptcy could create instability. Households and firms may suddenly find themselves without insurance protection, but the biggest problem is that the reduced supply cannot be immediately filled by other participants. As a result, households and firms may not have insurance for a long period of time, which could lead to large costs for the real economy.

The degree of concentration of the three societally important non-life insurance lines is measured through a Herfindahl index. If the concentration is high, the index approaches one, and if concentration is low, the index approaches zero. The indicator for concentration uses the average of the Herfindahl index for the three lines (see Diagram 4).

Results

Given the selected indicators, we apply expert assessments to set two thresholds for each indicator. When an indicator falls below (rises above²⁴) the first threshold, the indicator goes from green (low vulnerability) to yellow (elevated vulnerability). When it falls below (rises above) the other threshold, the indicator turns red (high vulnerability). Figure 1 shows the results for each indicator.

Figure 1: Vulnerability indicators for the insurance sector



Source: FI.

The results in Figure 1 are dependent on the choices FI made regarding the selected indicators, including firms, calculation methods for the indicator level and the level of the threshold. Each of these choices affects the results and are living matter that we will continue to work with in the future. The results below should be interpreted in terms of the choices that were made.

The indicators for solvency factors show that there are primarily vulnerabilities in the groups *Solvency II* and *Mixed*. The vulnerability level in *Solvency I* is generally low, even if it increased over a period of several quarters in conjunction with the financial crisis in 2008 and an additional quarter in 2011, when interest rates and stock exchanges fell. In 2015, *Mixed* changed to indicate an even lower level of vulnerability than during the prior period, while *Solvency II* indicated a higher vulnerability level compared to the prior period.

The indicator for the traffic-light ratio has shown low vulnerability since 2006. During the financial crisis, however, the ratio fell sharply (see Diagram 2) and the indicator for the annual change turned red during the second half of 2008. The indicator for the annual change in the traffic-light ratio also showed elevated vulnerability during other periods of sharply falling interest rates, such as in 2011 (where falling stock markets also contributed) and in 2014.

The indicator for duration supply in recent years has shown high vulnerability. This is primarily due to the low level of interest rates (which resulted in rising TP), but also because of the Riksbank's QE, which has decreased the supply of treasury bonds. Despite these variations, the indicator primarily reflects a structural imbalance that is not expected to disappear within the foreseeable future.

²⁴ High values mean higher vulnerability for the concentration indicators, but the opposite applies for the other indicators.

Finally, the concentration indicators show that vulnerability is low in the non-life insurance lines that we consider to be societally important. Even these indicators reflect a structural phenomenon that changes very slowly over time.

AGGREGATION

In the next step, we break the indicators down into one of the following vulnerability categories: solvency, exposure and liquidity.²⁵ The reallocation indicators, as we already described, capture the solvency in the insurance firms and naturally are assigned to solvency. Indicators that are related to risk, such as duration deficit but also the degree of concentration, are assigned to exposure.

When it comes to liquidity, insurance firms, compared to banks, are much less exposed to the risk of a run and thus rarely have problems with insufficient liquidity.²⁶ We therefore have no indicators in this category.

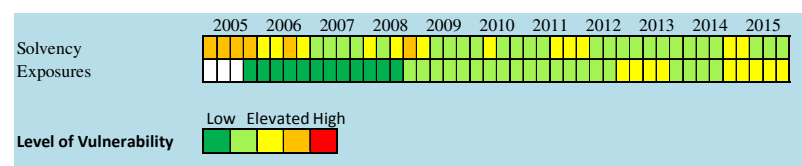
Just like in Finansinspektionen (2015), we use sub-categories. We have separated the solvency ratio indicators into one subcategory (Solvency Ratio), the traffic-light-related indicators into another (Traffic-Light Ratio) and the concentration indicators into a third (Concentration). Other indicators are not broken down into subcategories. Table 2 summarises the final groupings.

Table 2: Groups of indicators

Indicators	Sub-category	Category
Solvency ratio_Sol2	Solvency ratio	Solvency
Solvency ratio_Sol1	Solvency ratio	Solvency
Solvency ratio_Mixed	Solvency ratio	Solvency
Traffic-light ratio	Traffic-light ratio	Solvency
Traffic-light ratio_Diff	Traffic-light ratio	Solvency
Duration Deficit	-	Exposure
ConcNonL_Home&Content	Concentration	Exposure
ConcNonL_C&RE	Concentration	Exposure
ConcNonL_TP Motor	Concentration	Exposure

The subcategories are aggregated in a final step in the two main categories, solvency and exposure (see Figure 2).

Figure 2: Aggregation of vulnerability indicators in categories



Source: FI.

²⁵ See Finansinspektionen (2015) for more details about the vulnerability categories.

²⁶ Pure unit-linked insurance companies are one exception since they can experience liquidity problems.

The figures show that at the end of 2015 the insurance sector in general had good solvency, even if it is important to remember that some of the underlying indicators are signalling high vulnerability.

Historical data shows weaknesses prior to the financial crisis in 2008, but also during the financial crisis itself, since both the solvency ratio for insurance firms in *Solvency I* and the traffic-light ratio fell sharply. Similar falls, if not as extensive, were also present in 2011/2012 and 2014.

The exposure indicators are structural in nature and therefore change slowly over time. Vulnerability has increased in recent years primarily because of the rising duration deficit. At the end of 2015, vulnerability was at an elevated level within the category *exposure*.

References

ASCB (2016), Association of Swedish Covered Bond issuers, http://www.ascb.se/Pages/5_statistics.aspx.

Finansinspektionen (2014), “Finansinspektionen and financial stability”, Ref. 14-16747.

Finansinspektionen (2015), “Finansinspektionen’s vulnerability indicators”, FI Analysis, No. 2.

French, A., M. Vital and D. Minot (2015), “Insurance and financial stability”, *Quarterly Bulletin* 2015 Q3, Bank of England.

Riksgälden (2015), “Sveriges statsskuld”, Report 30 December.

Brunnermeier, M. and L. H. Pedersen (2009), “Market Liquidity and Funding Liquidity”, *Review of Financial Studies*, 22(6), 2201–38.

Shleifer, A. and R. W. Vishny (2011), “Fire Sales in Finance and Macroeconomics”, *Journal of Economic Perspectives*, 25(1), 29-48.