FINANCIAL STABILITY REPORT

June 2019

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FOREWORD BY THE CHAIRMAN

The economic environment has become more challenging for European insurers and pension funds in recent months. Growing trade tensions, uncertainty around Brexit and an unstable economic outlook in certain emerging markets have all contributed to a slowdown in economic growth in both, the euro area and the European Union. Consequently, central banks have become more cautious on monetary tightening amid concerns over economic growth and subdued inflation. Interest rate increases for the euro area have now been put on hold until at least mid-2020 and overall monetary conditions remain loose. These developments have made the risk of a prolonged low yield environment again more prominent, which is particularly challenging for life insurers and pension funds with long-term liabilities. As it is becoming increasingly difficult to generate sufficient investment returns to meet their long-term financial obligations, the low yield environment could also trigger further search for yield behaviour by insurers and pension funds. EIOPA will therefore continue to monitor closely this risk to identify any potential vulnerabilities at an early stage. In this regard, this Financial Stability Report also includes an analysis of the investments in Collateralized Loan Obligations (CLOs) by insurers. This asset category has significantly increased in recent years and has attracted particular supervisory attention for its relatively high use of leverage and similarities to the type of collateralized securities that played a key role in the recent financial crisis.

Looking at financial markets it seems that the increase in volatility and price corrections towards the end of 2018 was only temporary, as financial markets have recovered in the beginning of 2019. Consequently, valuations continue to remain stretched in certain equity, bond and real estate markets, indicating that market prices may not fully reflect underlying vulnerabilities. The risk of a sudden reassessment of risk premia therefore remains high, reflecting political risks and debt concerns in some European countries, which could be exacerbated and reinforced during a period of economic slowdown. The imminent withdrawal of the United Kingdom from the European Union adds to economic and financial markets uncertainty. While most insurers with cross-border business between the United Kingdom and European Economic Area - EEA30 have implemented contingency planning to ensure service continuity on cross-border contracts even in the case of a hard Brexit, the risk remains that a disorderly Brexit will have second round effects with potential significant repercussions across financial markets. We will therefore continue to monitor closely the situation.

Moreover, climate and cyber risk are key emerging risks for insurers and pension funds. Extreme weather related events are expected to become more frequent and severe, with potential impact on the liabilities of non-life insurers and reinsurers, while the move towards a low carbon economy carries significant transition risks in the investment portfolios of insurers and pension funds. In addition, the digital transformation and the onset of cyber attacks makes insurers and pension funds increasingly susceptible to cyber risk, while also bringing new opportunities for insurers in the form of cyber underwriting. EIOPA will use the results from the questionnaire on cyber risk included in the 2018 Insurance Stress Test to analyse the exposure towards cyber risk and cyber underwriting in more detail in the course of 2019.

Going forward, EIOPA will continue to deliver on its mandate in the financial stability area, assessing vulnerabilities at both macro- and micro-prudential level. In particular, incorporating new emerging risks in the stress test methodology will be investigated further. In this regard, enhanced transparency will help improve market discipline and contribute to making insurers and pension funds resilient in the short-, medium- and long-term.

Gabriel Bernardino

EXECUTIVE SUMMARY

In the past months, the economic environment has become more challenging due to ongoing political uncertainty around Brexit, growing trade tensions, a slowdown in the world economy and an unstable economic outlook in certain emerging markets. As a consequence, economic growth projections for both the EU and Eurozone have been revised downwards, while central banks have become more cautious on rolling back non-conventional monetary policy stimulus in Europe and have put interest rate increases on hold until at least mid-2020. This has made the risk of a prolonged low yield environment more prominent again.

Despite some increase in volatility toward the end of 2018, financial markets have recovered in the beginning of 2019 and valuations remain stretched in certain equity, bond and real estate markets, indicating that market prices may not fully reflect underlying vulnerabilities. The risk of a sudden reassessment of risk premia therefore remains high, reflecting political risks and debt concerns in some European countries, which could be exacerbated and reinforced during a period of economic slowdown. On the other hand, the prolonged low level of interest rates continues to pose significant challenges for life insurers and pension funds, making it increasingly difficult to generate sufficient investment returns to meet their long-term financial obligations. This could trigger further potential search for yield behaviour by insurers and pensions funds, as already highlighted in EIOPA's Investment Behaviour Report (2016). The search for yield is slowly becoming visible in the investment portfolio of insurers, as reflected by the gradual change in the investment composition.

Emerging risks, such as climate-related risk and cyber risks, also continue to demand attention. Climate-related physical risks remain present in the underwriting activities of insurers, while transition risks affect the investment portfolios of insurers and pension funds. Although the impact of the natural catastrophe scenario included in the EIOPA 2018 Insurance Stress Test Exercise was relatively limited, further analysis suggests a potential concentration risk in the ceded losses to reinsurers, in particular for exposures to Switzerland. Furthermore, cyber threats have become more prominent, making insurers not only increasingly susceptible to cyber attacks themselves, but also to potential 'silent' cyber risk exposures in their underwriting portfolios. The industry is moving towards actions to mitigate such risks, but correctly monitoring and assessing climate-related risks and exposures to cyber risk remains challenging.

Overall Solvency ratios of European insurers have slightly improved further in 2018 and remain high around 200%, but the profitability of insurers is under increased pressure. Investment returns have deteriorated in the current low yield environment, making it increasingly difficult for insurers to cover guaranteed rates on policies issued in the past. Insurers in certain countries also continue to show a high degree of home bias in fixed-income and equity investments and remain highly interconnected with banks, while exposures to real estate markets are also substantial in certain jurisdictions. This could make insurers susceptible to potential spillover effects from sovereigns, (domestic) banking sectors and/or a potential downturn in real estate markets. Although the overall investment composition has remained broadly stable, the EIOPA qualitative risk assessment survey suggests that close monitoring of potential search for yield behavior is

warranted in the current low yield environment. Collateralized Loan Obligations (CLOs) and leveraged loans have attracted particular attention in this regard recently following its significant increase, but EIOPA analysis suggest that the exposure of insurers to CLOs remains limited at the moment.

Concerning the reinsurance sector, 2018 ended up the fourth costliest year ever in terms of insured catastrophe losses, despite a relatively benign start of the year. In general, natural catastrophe losses are showing an upward trend, with the 10 costliest years in terms of overall losses all occurring after 2004. Nevertheless, the European reinsurance sector remains well capitalized overall, indicating that the sector has proved resilient under challenging circumstances. The alternative reinsurance capital market in particular continued to show a strong appetite for insurance risks, while the reinsurance renewals in 2018 saw only moderate price increases, indicating potential excess capacity in the re-insurance market. Against this background setting risk-adequate prices at the upcoming renewals is crucial for reinsurance undertakings.

The European occupational pension fund sector continues to be negatively affected by the persistent low interest rate environment, in particular for the Defined Benefit (DB) pension schemes. The sector has also come under increased pressure in 2018 by the fall in stock values towards the end of the year, pertaining to significant losses in IORPs' equity investments, with the weighted average return on assets falling from 5% in 2017 to -1% in 2018.

The report consists of two parts – the standard part and the thematic article section. The standard part is structured as in previous versions of the EIOPA Financial Stability Report. The first chapter discusses the key risks identified for the insurance and occupational pension fund sector. The second, third and fourth chapter elaborate on these risks covering all sectors (insurance, reinsurance and pension). The fifth chapter provides a more in-depth qualitative and quantitative assessment of the risks identified. Finally, a thematic article discusses the impact of green bond investment policies on the share price performance of European insurers.

PART I

1. KEY DEVELOPMENTS

Growing trade tensions, political uncertainty around Brexit and concerns over debt sustainability have led to a slowdown in economic growth in Europe. Inflation in both the Eurozone and the EU remains subdued, while central banks have become more cautious on rolling back non-conventional monetary policy stimulus in Europe and have put interest rate increases on hold until at least mid 2020.

Despite a short increase in volatility toward the end of 2018, financial markets have recovered in the beginning of 2019 and valuations remain stretched in certain equity, bond and real estate markets, indicating that market prices may not fully reflect underlying vulnerabilities. The risk of a sudden reassessment of risk premia therefore remains high, reflecting political risks and debt concerns in some European countries, which could be exacerbated and reinforced during a period of economic slowdown. Sharply increasing yields could cause immediate losses in fixed-income investment portfolios of insurers and pension funds, with the overall balance sheet impact depending on the type of products and the interaction between rising bond spreads, risk-free rates and potential higher than expected lapses. A sudden repricing of risk could also trigger further 'flight to quality' investment behaviour, putting additional pressure on insurers and pension funds in affected countries, while a high degree of interconnectedness could lead to spillovers from the banking sector. On the other hand, the prolonged low level of interest rates continues to pose significant challenges for life insurers and pension funds, making it increasingly difficult to generate sufficient investment returns to meet their long-term financial obligations. This could trigger further potential search for yield behaviour by insurers and pensions funds.

Equity markets have recovered after a correction in the US stock market in December, amid concerns of a global economic slowdown. Despite increasing volatility and political uncertainty, the overall impact of recent financial market developments on European insurers and pension funds has so far been limited. While the partial correction in equity prices and limited impact on the financial system is positive from a financial stability perspective, the risk of a sudden repricing cannot be ruled out.

Furthermore, climate-related risks continue to demand supervisory attention, in particular for insurers. Climate-related losses were again elevated by historical standards in 2018 and extreme weather events are expected to become more frequent and severe due to climate change, putting significant pressure on non-life insurers. Transition risks could also significantly affect the investment portfolio of life insurers and pension funds in case of a disorderly transition to a low-carbon economy. In response to this, some insurers have become more active in sustainable finance, increasingly taking actions against 'brown' industries in their investment and underwriting strategies. Investments by insurers in green bonds amounted to the highest amounts ever recorded in 2018. A rapid increase in green bond issuance can also be observed recently. However, challenges in monitoring and mitigating climate-related risks in both underwriting and investment activities still remain.

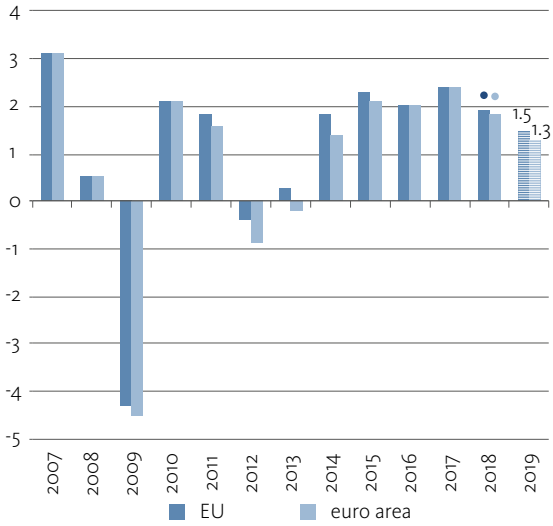
Finally, cyber threats have become more prominent, making insurers not only increasingly susceptible to cyber attacks themselves, but also to potential 'silent' cyber risk exposures in their underwriting portfolios. Silent cyber exposures refers to instances where cyber coverage is neither explicitly included nor excluded within an insurance policy. The industry is moving towards actions to mitigate such risks, but correctly pricing and assessing exposures to cyber risk remains challenging.

1.1. MARKET RISKS

The economic slowdown in the euro area and in the EU in the second half of 2018 was more pronounced than expected, amid increasing global and domestic uncertainties. GDP growth in 2018 was 1.8% and 1.9% in the euro area and in the EU respectively, against a forecast of 2.1% for both regions (Figure 1.1) This outcome reflects a weaker global trade growth involving further tensions between the US and China, elevated political uncertainties (Figure 1.2) as well as other domestic factors, such as bottlenecks in the car industry. The backdrop is also reflected in the European Commission's Economic Sentiment Indicator (ESI), which has been decreasing in recent months (Figure 1.3).

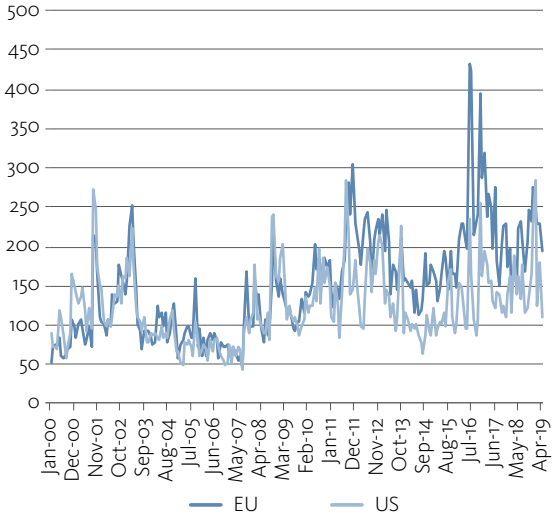
Although projections show that the European economy is expected to grow for the seventh year in a row in 2019, the pace of growth is slowing down compared to recent years. The economic growth forecasts have been revised down in

Figure 1.1: Real GDP growth (%) per annum



Source: Eurostat
Last observation: December 2018
Note: The circles represent the European Commission Autumn forecasts for 2018. The horizontal stripes are the correspondent forecasts for 2019.

Figure 1.2: Political Economic Uncertainty (index)



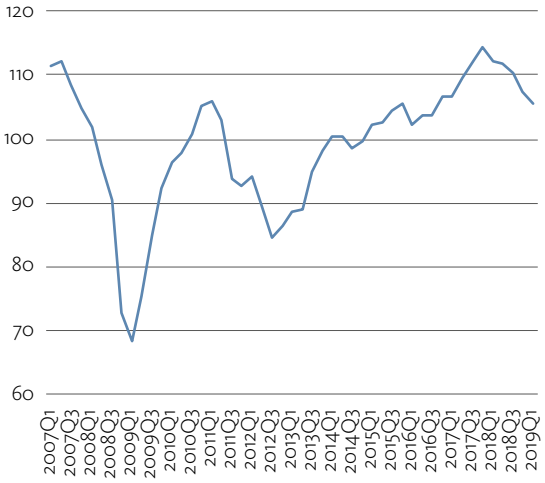
Source: "Measuring Economic Policy Uncertainty" by Scott R. Baker, Nicholas Bloom and Steven J. Davis at www.PolicyUncertainty.com.
Last observation: April 2019

the euro area and the EU for 2019, from 1.9% to 1.3% and from 1.9% to 1.5%, respectively.[1]

Despite the economic slowdown, labour market conditions have continued to improve in 2018, with overall unemployment rates steadily declining in the euro area and the EU (Figure 1.4), although significant disparities remain across countries, with unemployment ranging from 1.9% in Czech Republic to 18% in Greece.

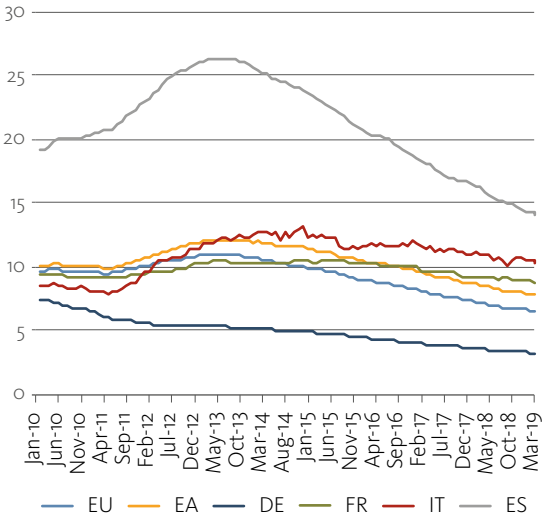
Overall inflation has been slowing down driven by lower energy prices and, to a lesser extent, by food prices (Figure 1.5 and Figure 1.6). After following an increasing trajectory with an average of 1.7% in 2018, the

Figure 1.3: Economic Sentiment (euro area)



Source: Eurostat
Last observation: April 2019

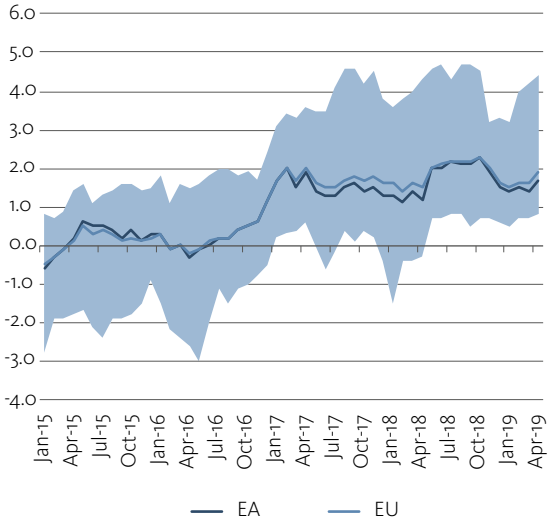
Figure 1.4: Unemployment rates



Source: Eurostat
Last observation: March 2019

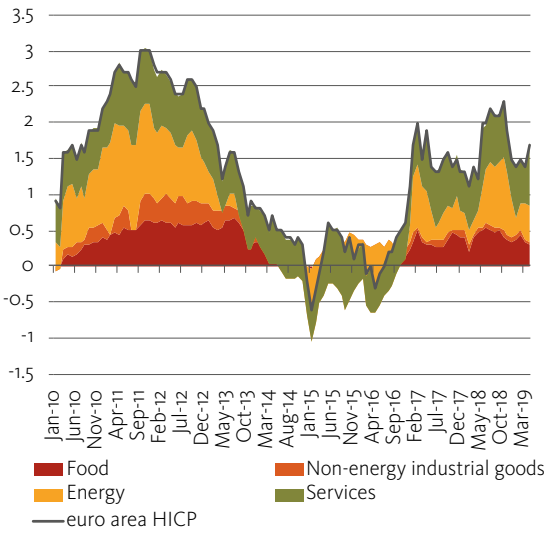
1 European Economic Forecast Winter 2019 (European Commission, February 2019)

Figure 1.5: Average inflation euro area and EU (in %)



Source: ECB and Eurostat
Last observation: April 2019
Note: The shadow area corresponds to the minimum and the maximum values of annual average inflation (HICP) within the EU.

Figure 1.6: HICP main components (annual % changes)



Source: Eurostat
Last observation: April 2019

Harmonised Index of Consumer Prices (HICP) for the EA was 1.5 per cent at the end of February. The recent drop in inflation is primarily due to lower energy prices, which have substantially declined since the first half of 2018. HICP is projected to average around 1.4% in 2019, but core inflation (excluding energy and food prices) remains well below the HICP, around 1%.[2]

Overall monetary and financial conditions remain loose. While the European Central Bank (ECB) has ended its net asset purchases programme in December 2018, it still continues to reinvest the principal payments from maturing securities purchased under the asset purchase program.[3] Furthermore, the yields on 10-year government bonds have decreased on average over recent months for the US, UK and the EU (Figure 1.7) as central banks are holding back plans to increase interest rates. Benchmark interest rates in the Eurozone are expected to remain unchanged until at least the end of 2019. The interest rate swap curves for the euro are back down to historically low values observed in June 2016 (Figure 1.8).

Furthermore, the ECB announced in March 2019 the third quarterly Targeted Long-Term Refinancing Operation (TLTRO-III), planned to be launched in September 2019. TLTRO-III aims at preserving favourable bank lending conditions by providing long-term loans to banks and offering them an incentive to increase their lending to businesses and consumers in the euro area. It is expected to end in March 2021.

Considering the current monetary policy stance and the economic outlook, the "low for long"[4] risk has become more prominent again. The magnitude of the impact of low interest rates on the insurance sector depends on the different product or business lines offered, maturity of liabilities and varying levels of guaranteed interest rates. In general, life insurers with relatively long durations of liabilities and high guaranteed rates in the past are the most affected (see also Chapter 2).

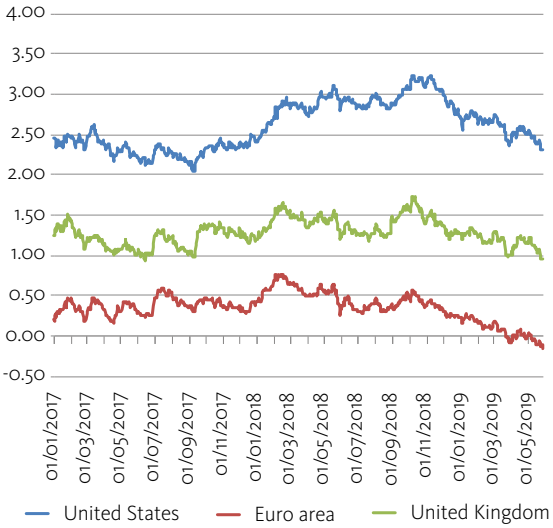
A deteriorating global economic outlook reflecting concerns over trade tensions, a slowdown in China's economic growth, political tensions in Europe and instability in certain emerging markets contributed to a challenging economic environment in the past months. Concerns have been growing over a slowdown in the Chinese economy following the recent trade tensions with the US, which could have repercussions across

2 European Economic Forecast Winter 2019 (European Commission, February 2019) and ECB macroeconomic staff projections.

3 https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html

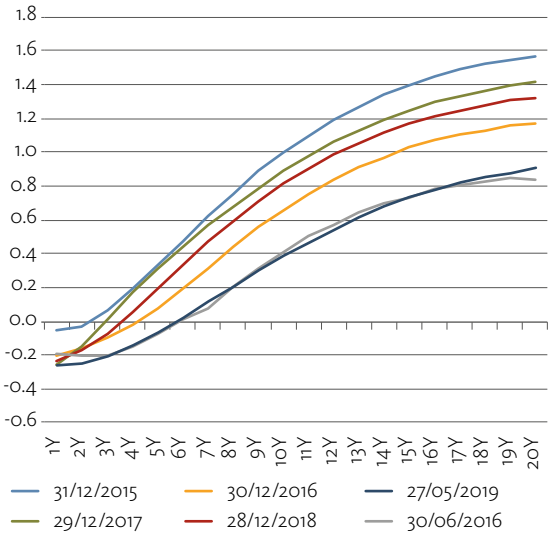
4 The "low for long" scenario is defined as a situation when short and long-term nominal interest rates are assumed to remain low over the next decade, combined with a period of low economic growth. The rationale behind this scenario is that structural factors, such as demographic trends, total factor productivity or an increased preference for scarce safe assets, along with cyclical factors, have pushed interest rates down to low levels. See more on Macroprudential policy issues arising from low interest rates and structural changes in the EU financial system, ESRB (2016).

Figure 1.7: 10-year government bond yields



Source: Bloomberg
Last observation: 27 May 2019

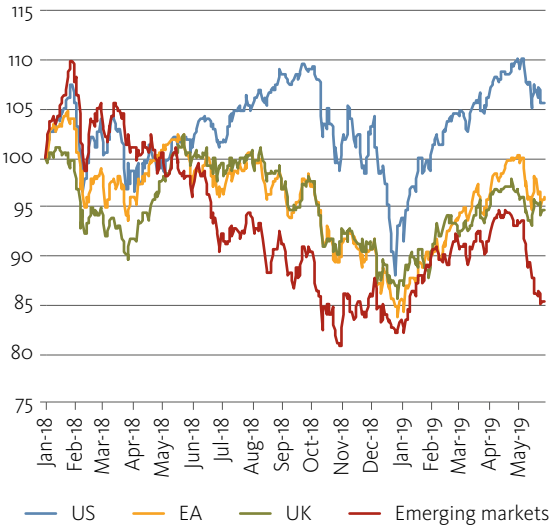
Figure 1.8: Swap curves



Source: Bloomberg
Last observation: 27 May 2019

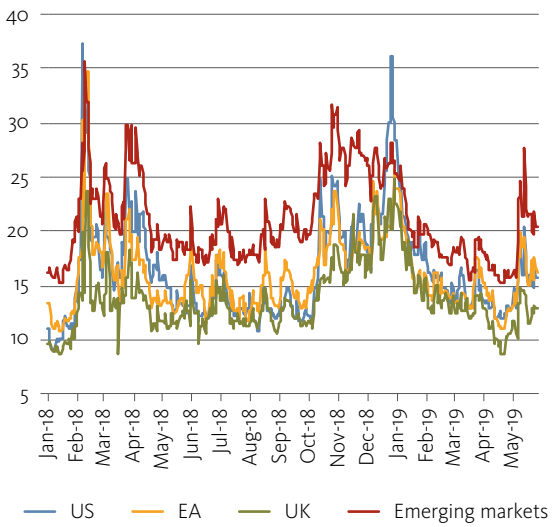
the global economy. Real GDP growth in China was the weakest since 1990 at 6.6% in 2018, well below the 8.1% average of the last 10 years.[5] Although equity markets have rebounced after a correction in the US stock market in December, the risks remains that the potential impact from escalating trade tensions, a disorderly Brexit (Box 1.1) and a global economic slowdown are not fully priced in yet (Figure 1.9). The European and the emerging equity markets have also rebounded following the losses in 2018, but less drastically. Financial market volatilities increased at the end of 2018, revealing underlying vulnerabilities, but quickly came down again in the beginning of 2019 (Figure 1.10).

Figure 1.9: Equity market performance



Source: Bloomberg (Index, where 100 corresponds to the values on 01.01.2018)
Last observation: 27 May 2019
Note: US: S&P 500 INDEX, EA: Euro Stoxx 50 Pr, UK: FTSE 100 INDEX, Emerging markets: MSCI EMERGING

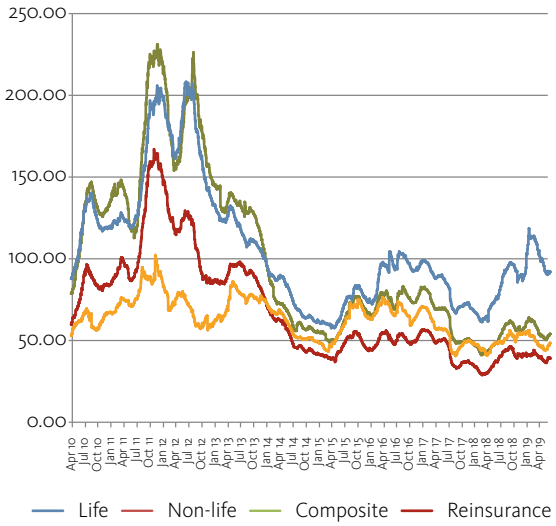
Figure 1.10: Market volatilities



Source: Bloomberg
Last observation: 27 May 2019

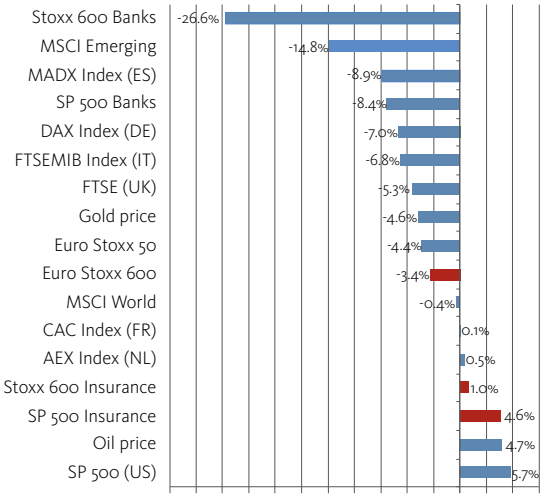
5 See IMF World Economic Outlook: https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEOWORLD/CHN

Figure 1.11: Insurance CDS spreads



Source: Bloomberg
Last observation: 27 May 2019
Note: the 5 Year CDS (credit default swap) spread implied by the Bloomberg Issuer Default Risk model Likelihood of Default.

Figure 1.12: Selected markets performance (year-to-date)



Source: Bloomberg
Last observation: 27 May 2019

Despite increased political uncertainty and short spike in volatility toward the end of 2018, the overall impact of recent financial market developments on European insurers has so far been limited. The insurance sector has outperformed the general market in Europe on a year-to-date period in May (1.0% versus -3.4%, see Figure 1.12). However, corporate CDS spreads have increased slightly since the beginning 2018, in particular for life insurers (Figure 1.11). That might reflect the current challenges faced by life insurance companies in an environment of prolonged low interest rates. Life insurers have a relative larger amount of long-term liabilities, which increase in value by low long-term interest rates. Notably, life insurers that offered high guaranteed rates issued in the past are more likely to face difficulties to achieve the required investments returns to cover policyholder obligations.

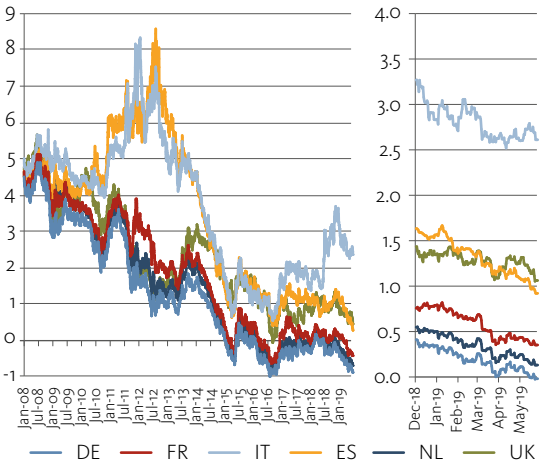
The risk of a sudden reassessment of risk premia remains high reflecting political risks and sovereign debt concerns in some European countries. The recent increase in market volatilities at the end of 2018 already highlighted underlying vulnerabilities in financial markets. A pronounced economic slowdown combined with a disorderly Brexit could trigger a sharp reversal of the risk premia leading to potential downgrades and higher default rates, as the repayment of debts becomes more challenging. This could lead to sudden increases in credit spreads, in particular for lower-quality assets, causing immediate losses in the investment portfolios of insurers and pension funds, which are mostly composed of bonds. Moreover, as the investments of the insurance sector are characterized by strong home bias and interconnectedness with banks (see Chapter 5), insurers in affected countries are likely to suffer more severe losses, with potential spillover effects from the banking sector as well.

A sudden reassessment of risk premia could also trigger flight to quality investment behaviour. That might put additional pressure in the coming months on lower-rated European sovereigns and insurers in the affected countries. Sovereign bonds yields have been falling in the recent months following the announcement of continued loose monetary policy until at least the end of 2019 (Figure 1.13), but sovereign credit default swap remained relatively elevated in countries that face structural fiscal and debt challenges (Figure 1.14).

A sudden reassessment of risk premia could have different implications, depending on the interaction between rising bond spreads and the risk-free-rates. While rising yields are in general favourable for life insurers and (DB) pension funds, the overall impact of rising yields depends mainly on the relation between increasing credit spreads and the risk-free interest rates used for discounting long-term liabilities (technical provisions).

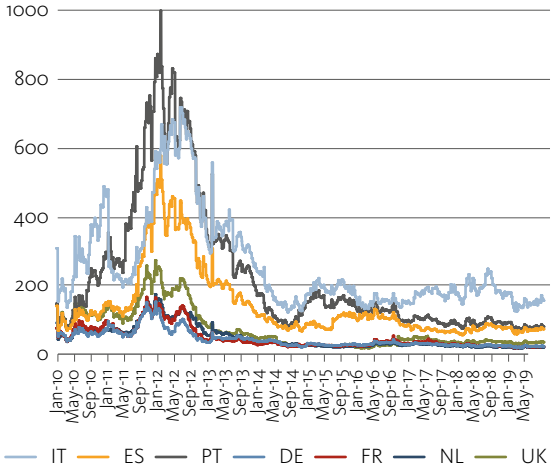
If the increase in yields is primarily driven by rising risk-free-rates, the losses on the asset side are most likely more than compensated by the decrease in the value of liabilities, depending on the maturity mismatches, types

Figure 1.13: 10-year government bond yields (in %)



Source: Bloomberg
Last observation: 27 May 2019

Figure 1.14: Sovereign Credit Default Swap



Source: Bloomberg
Last observation: 27 May 2019
Note: the 5 Year CDS (credit default swap) spread implied by the Bloomberg Issuer Default Risk model Likelihood of Default.

of guaranteed contracts and interest hedging of individual undertakings. In case of negative duration gaps, this would improve the financial position of the company. However, in case the rise in yields is primarily due to rising credit spreads, insurers and pension funds would suffer immediate losses in their fixed-income investment portfolios, which may only be partly offset through a lower value of liabilities (which are typically discounted based on the risk-free-rate[6]). Hence, losses on the assets side may not be fully compensated through lower liabilities in this case, leading to a worsening financial position in the short term. This type of double-hit scenario could therefore be particularly problematic for insurers and pension funds, should it materialize.[7]

In addition, in case of sudden increase of interest rates, life insurers could also suffer a sudden increase in lapses and surrenders following a sharp increase in yields, as other financial investments become more attractive or because policyholders can no longer sustain their premium payments (insofar as the rise in yields is accompanied by an economic downturn negatively affecting households). As a result, life insurers could face an increase in both lapses and surrenders in the short term, leading to possible liquidity constraints. Although several legal implications, such as penalties or fiscal benefits, could limit the impact of lapses and surrenders in some countries, its ramifications could add additional strains on insurers' financial position once yields start increasing.

6 For pension funds this depends on the relevant accounting framework. Also, for insurers the Volatilty Adjustment (VA) under Solvency II does partially compensate for the rise in risk premia, by adding a premium to the risk-free-rate curve to be used for discounting liabilities. The VA is based on 65% of the risk-corrected spread between the interest rate that could be earned from a reference portfolio of assets and the risk-free interest rates without any adjustment.

7 Both the EIOPA Insurance 2016 and 2018 Stress Test exercises found substantial losses in a sudden yield-up scenario, while the EIOPA IORP 2017 Stress Test exercise also showed a significant impact on European pension funds in a double-hit scenario (a decrease in long-term risk free interest rates combined with increasing credit spreads).

BOX 1.1: UPDATE ON BREXIT

EIOPA continues to assess the potential impact of Brexit on insurers and policyholders and measures to prepare for a no-deal scenario have been initiated by EIOPA, national competent authorities and the industry. In case of a disorderly Brexit, insurers in the UK and Gibraltar on the one side and in the EEA30 on the other side can no longer operate under Internal Market conditions. This poses a risk to the service continuity of existing contracts and may create uncertainties for polichholders. In order to mitigate the risks for policyholders and insurers in the EEA30 member states EIOPA issued a variety of opinions issued between July 2017 and June 2018 relating to supervisory converence, service continuity, impact on solvency and disclosure of Brexit impacts. [8]

EIOPA is closely monitoring service contingency and the associated risks. From a financial stability perspective the current direct exposure of EU-based insurers to the UK industry are considered to be rather limited. Secondary effects, however, resulting from the impact of a no-deal scenario on the wider economy are more difficult to assess. EIOPA will continue to closely monitor and assess the developments and take all necessary actions as part of its mandate.

In order to ensure sound prudential and conduct supervision over cross-border operating (re)insurance undertakings and maintain financial stability of the financial markets within the EEA and the UK in a no-deal scenario ("hard Brexit"), EIOPA and its Members agreed on memoranda of understanding with the Bank of England and the Financial Conduct Authority on supervisory cooperation, information exchange and mutual assistance in the field of insurance regulation and supervision. In the area of occupational pension institutions' supervision EIOPA and its members agreed upon similar memoranda of understanding with The Pension Regulator (TPR).

8 https://eiopa.europa.eu/publications/eiopa-opinions

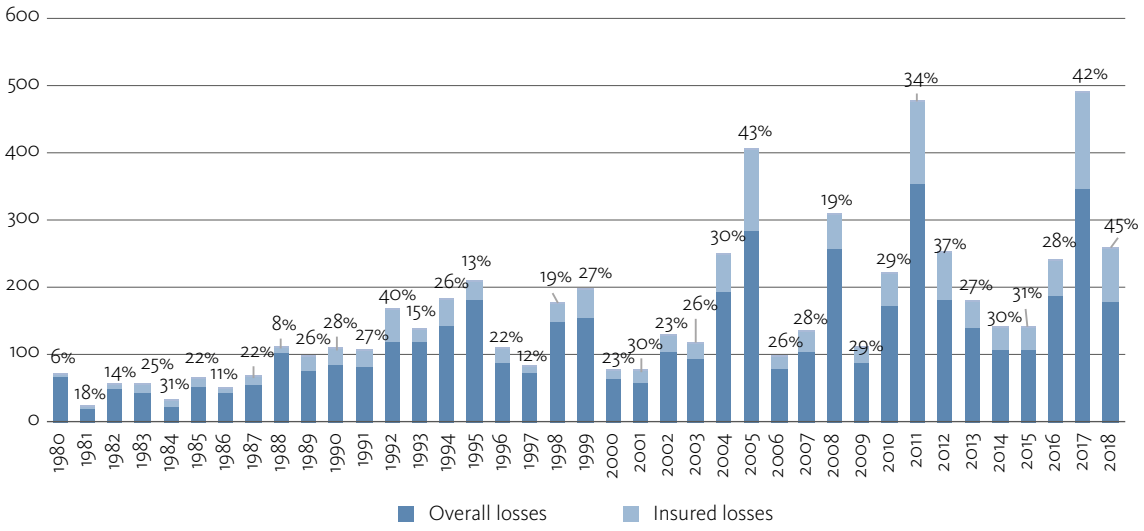
1.2. CLIMATE RISK AND SUSTAINABLE FINANCE

Despite relatively low losses in the first half of the year, total weather related events were again elevated by historical standards in 2018. The total global costs of natural catastrophes and weather related losses nearly quadrupled in the second half of 2018, rising from approximately USD 33 bn in the first half of 2018 to USD 178 bn by the end of the year.[9] 2018 was also the fourth costliest year for insurers, with the total insured costs amounting to USD 80 bn, well above the 10-year and 30-year average losses (see Figure 1.15 and also Chapter 3). Overall losses in Europe were around USD 16 bn, from which nearly 37% was insured. Extreme weather events are also expected to become more frequent and severe due to climate change, putting significant pressure on non-life insurers. Although the ability to re-price annually or to withdraw cover can mitigate risks to non-life insurers in the short-term, it is important that insurers and catastrophe model vendors take into account recent climate trends and possible future scenarios in their risk modelling. Ultimately, the increased occurrence of extreme weather events could lead to some risks becoming uninsurable, leading to a widening natural catastrophe protection gap, which currently stands at 55% of total losses (uninsured losses as percentage of total losses).

In response to climate related risks, insurers are also becoming more active in sustainable finance. Insurance companies have a high potential to contribute to a substantial acceleration to the transition to a low-carbon economy. As risk managers and investors, they play an essential role in driving investments towards particular sectors and long-term projects. Insurers are increasingly incorporating climate-related risks in their underwriting and investment activities as part of an enhanced approach towards so-called Environmental, Social and Gov-

9 Source: Munich Re NatCatSERVICE available at https://natcatservice.munichre.com/overall/1?filter=eyJ5ZWFyRnJvbSI6MTk4MCwieWVhclRvIjoyMDE4fQ%3D%3D&type=1

Figure 1.15: Overall and insurance losses for relevant natural loss events worldwide (in US$ 2018 values)



Source: Munich RE NatCatSERVICE
Notes: (1) According to NatCatSERVICE, relevant natural losses are those that exceed defined thresholds of normalised overall losses and/or fatalities.These events are considered in number statistics and trend analyses. Threshold values are: (i) Fatalities ≥ 1 (ii) Normalized overall loss ≥ US$ 100k, 300k, 1m, or 3m (depending on assigned World Bank income group of each affected country).
(2) The percentage values in the labels indicate the share of insured losses in total losses.

ernance (ESG) factors. To date, at least 19 insurance companies have officially divested from coal. The combined assets covered by divestment policies amounted to USD 6 trillion in 2018.[10]

Another growing trend in the insurance market is investments in green bonds, which fund projects that have positive environmental and/or climate benefits. Insurance and pension funds are the most important investors in this type of investment in the EU, covering on average 64% of the total investments.[11] 2018 recorded the highest investments in green bonds by EU insurers, amounting to EUR 2.7 millions.[12] Furthermore, a rapid increase in green bond issuance can be observed recently in Europe and in emerging markets. Issuers from France, Germany, Spain, Sweden and the Netherlands appear in the top 10 green bond issuers worldwide.[13] Recently, a few EU insurance companies are also increasingly involved in green bond issuance in particular in Scandinavian countries and in France. These issuances account from 0.35% to 1.54% of the issuance to correspondent total assets of these groups.

Despite these initiatives, there are still challenges in monitoring and mitigating climate-related risks in both underwriting and investment activities. On top of physical risks, insurers and pension funds remain exposed to considerable climate-related transition risk[14] in their investment portfolios, which are still hard to properly quantify. The industry still lacks a standardized reporting on green investments, emission metrics and climate impact of exposures which would help to enhance the use of scenario analysis in risk modelling and portfolio management. EIOPA therefore welcomes and actively contributes to the EC Action Plan on Sustainable Finance, which aims at developing a European Taxonomy for green investments, among others. It is important that insurers and pension funds continue their efforts in mitigating climate risks to strengthen their business models in the long run.

10 See Insurance Coal No More. The 2018 Scoreboard on Insurance, Coal and Climate Change. Unfriend Coal (December 2018).

11 Source: Crédit Agricole CIB, December 12, 2017

12 Sources: Market data, annual data 2012 – 2018

13 Source: Climate Bonds Initiative, Green Bond Market Summary (Q3 2018)

14 Transition risks arise in the transition to a more carbon-neutral economy, with potentially significant and disorderly write-downs in certain financial assets, in particular for exposures to carbon-intensive industries.

1.3. CYBER RISKS AND THE INSURANCE SECTOR

Cyber threats continue to present a major risk to the stability of the financial system and the economy as a whole. Economic loss due to cybercrime is predicted to reach $3 trillion by 2020, and 74% of the businesses around the world can expect to be hacked in 2019.[15] These alarming projections highlight the growing importance of cyber resilience for financial institutions and the increasing relevance of insurance companies in this context. While cyber resilience is a challenge for all organisations, the systemic nature of cyber threats makes it particularly important for critical services, including the financial system. In March 2018, the segments most targeted by cyber attacks were single individuals (23%), multiple industries (15.1%), public administration(11.2%) and finance services (9.2%).[16]

The growing threat of cyber incidents has implications for the cyber insurance market as well, in particular for potential silent exposures. The increased frequency and severity of cyber incidents, together with new regulation, has raised awareness of the importance of cybersecurity and cyber insurance coverage, bringing new opportunities for the insurance sector. However, significant challenges remain in further developing the nascent European cyber insurance market, ranging from properly quantifying risks to assessing potential accumulation risks, which can be exacerbated by the recent trend to broaden the coverage for cyber risk, as also highlighted by EIOPA in its 2018 report on Cyber Insurance.[17] Moreover, insurers may also be exposed to silent cyber risk, referring to instances where cyber exposure is neither explicitly included nor excluded within an insurance policy. While insurance companies specialized on cyber risks typically offer cyber coverage as either stand-alone products or explicit endorsement on traditional policies, some insurers still have broad cover extensions under their traditional business interruption, property and/or liability policies. Common initiatives in the market to address silent risks are under way (including the development of risk profiles, revision of wording in contracts, evaluation of losses using surveys, use of realistic disaster scenarios and development of risk assessment guidelines), but further effort is needed to properly address the risks associated with silent cyber exposures.

15 See Centre for Cybersecurity, World Economic Forum: https://www.weforum.org/centre-for-cybersecurity

16 Source: https://www.hackmageddon.com/2018/04/19/march-2018-cyber-attacks-statistics/

17 See Understanding Cyber Insurance – A Structured Dialogue with Insurance Companies, EIOPA (2018).

2. THE EUROPEAN INSURANCE SECTOR

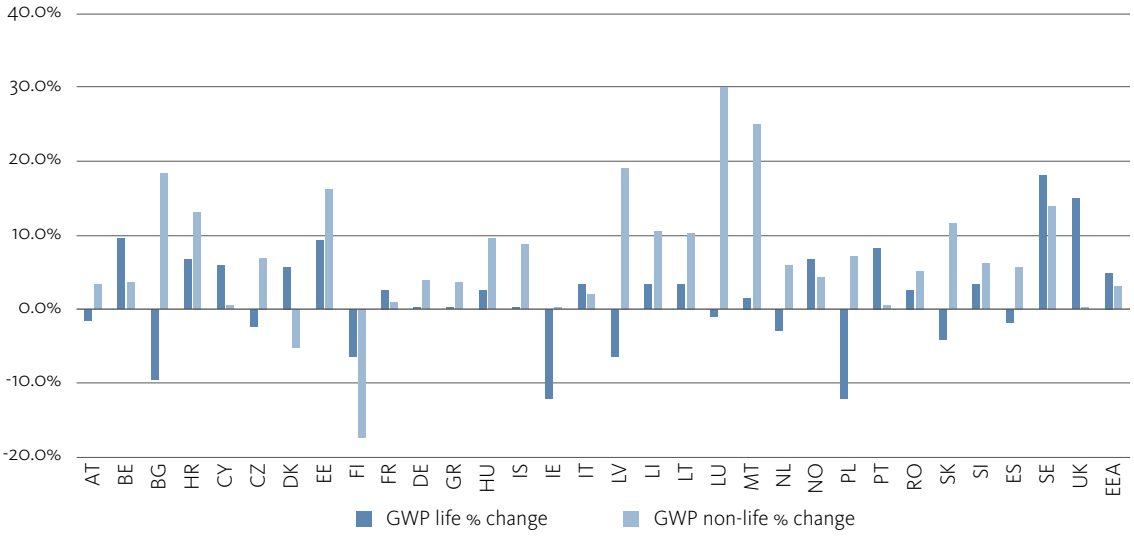
The prolonged low interest rate environment continues to challenge the European insurance sector. More recently, the economic slowdown due to political uncertainty and growing trade tensions has added additional strain on insurers and a sudden repricing of risk premia cannot be ruled out. Even though life insurers are trying to adapt to these challenging circumstances by lowering guaranteed rates and focusing on unit-linked products, profitability remains under pressure. For non-life insurers, the challenge is mostly related to increasing losses stemming from climate-related risks and cyber events, which may not be adequately reflected in risk models based on historical data.

2.1. MARKET SHARE AND GROWTH

Total GWP grew in 2018, but remained broadly stable as a percentage of GDP. The sum of GWP for both life and non-life insurance sector grew by 4.2% on an annual basis and amounts to around EUR 1.3 trillion at the end of 2018. Overall GWP as a percentage of GDP remained stable around 9% for the total European insurance market, while total assets as a share of GDP slightly decreased from 74% to 70%. Life GWP grew most in SE and UK, whereas a significant decrease in life GWP was observed in IE, LU, PL and SK (Figure 2.1). Non-life GWP increased in most countries, though a significant decline could be observed in FI. The insurance sector remains large relative to the economy in most countries, as measured by the total assets to GDP ratio (Figure 2.2).

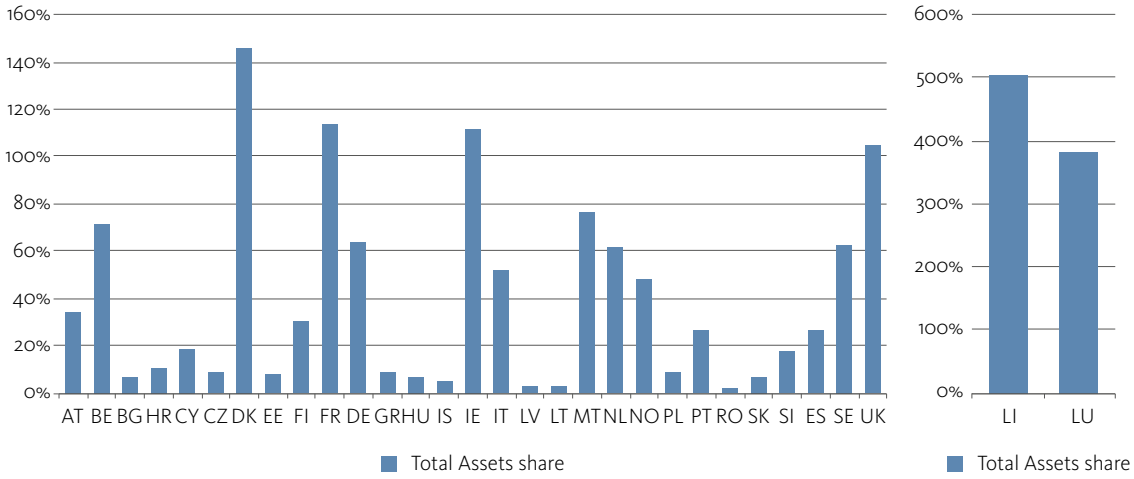
The share of unit-linked business remains overall constant also in 2018. Although the overall share of unit-linked business in life GWP decreased from 43% in Q4 2017 to 41% in Q4 2018, the median remains stable around 34% (Figure 2.3). Partly in response to the low-yield environment, insurers continue to focus on unit-linked products as these contain few financial guarantees, and hence, are cheaper to provide and have a lower capital charge under Solvency II. However, considerable differences remain across countries (Figure 2.4), due differences in national markets and past misselling issues.

Figure 2.1: Total Life and Non-Life GWP growth in 2018 (in %, year-on-year)



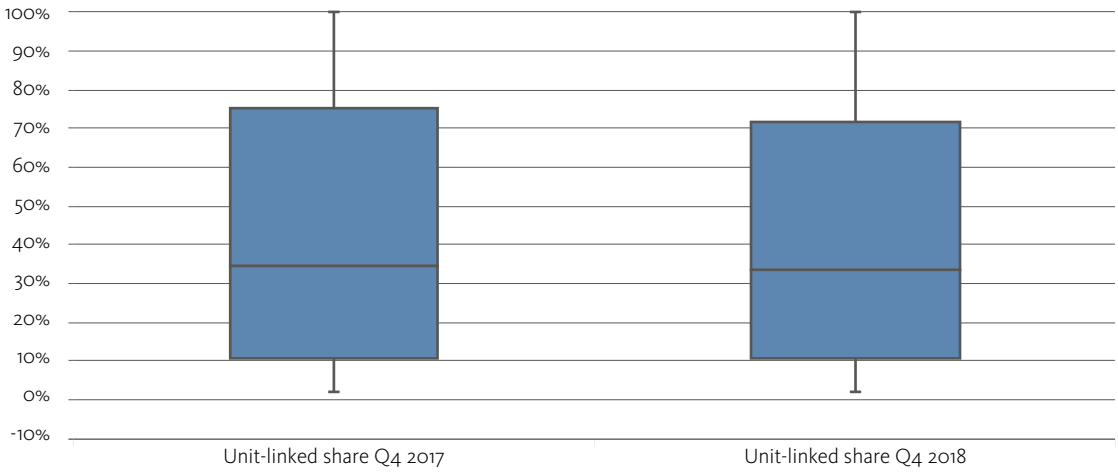
Source: EIOPA Quarterly Solo
Reporting reference date: Q4 2018
Note: Growth rates based on local/reporting currency. Please note that changes in GWP per country could also be due to structural changes in the market, such as a relocation of business. This applies in particular for FI and SE.

Figure 2.2: Insurers' total assets to GDP (in %)



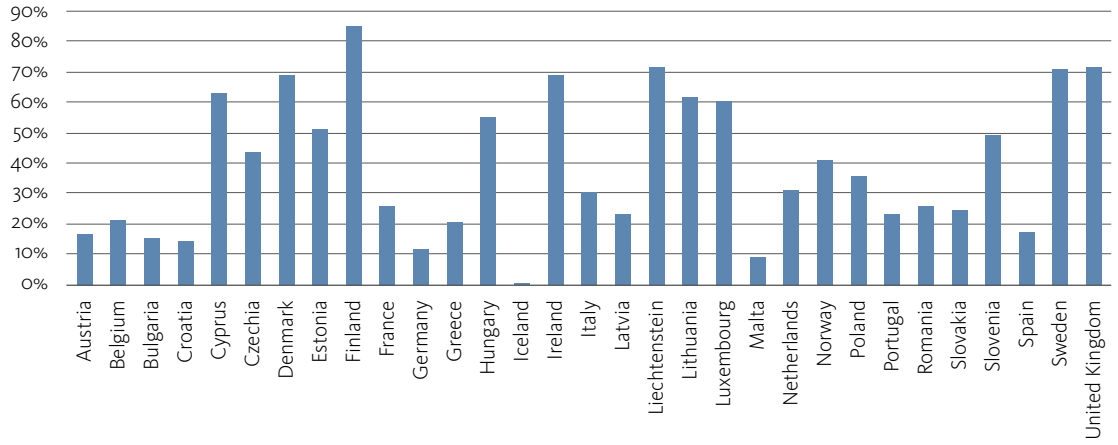
Source: EIOPA Quarterly Solo
Reporting reference date: Q4 2018

Figure 2.3: GWP-Life business: Unit-linked share (in %; median, interquartile range and 10th and 90th percentile)



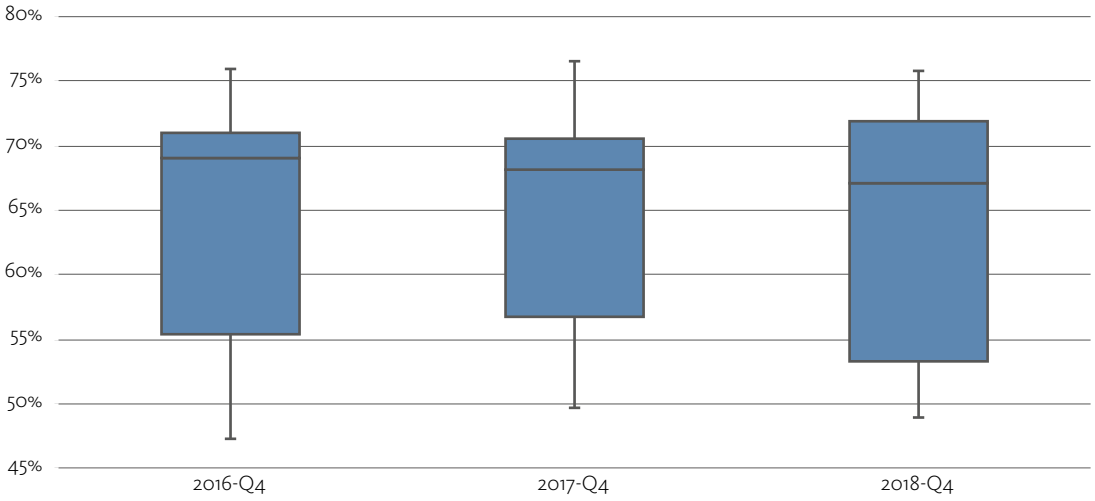
Source: EIOPA Quarterly Solo
Note: Sample sized on insurance companies which have reported unit-linked business (life and life part of composite insurance companies)

Figure 2.4: GWP-Life business: Unit-linked share across countries (in %)



Source: EIOPA Quarterly Solo
Note: Aggregate share of unit-linked GWP in total direct Life GWP per country

Figure 2.5: Liquid assets ratio (in %)



Source: EIOPA Quarterly Financial Stability Group Reporting (QFG)
Note: The liquid assets ratio shows the proportion of liquid assets on total assets (excluding assets held for unit-linked). The ratio is calculated by applying different weights (ranging from 100% for cash to 0% for intangible assets) to different assets, according to their liquidity profile).

The liquid asset ratio slightly deteriorated in 2018. The median value for liquid asset ratio decreased by 1 percentage points from 68% in 2017 to 67% in 2018, while the distribution moved slightly down (25th percentile reduced by 3 p.p. to 53%). Liquid assets are necessary in order to meet payment obligations when they are due and the overall share of liquid assets remains high for European insurers..

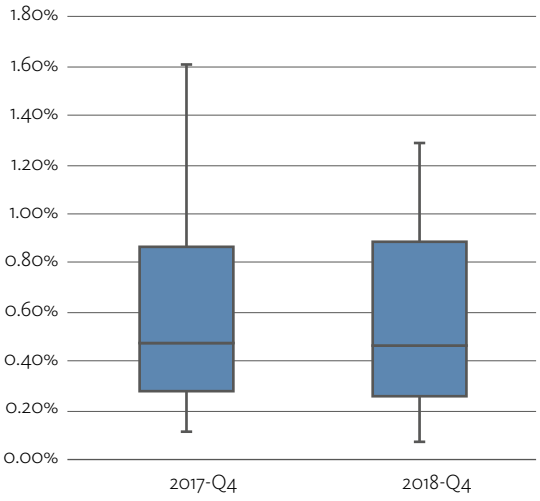
Lapse rates in the life business remained overall unchanged in 2018, with the median value stable around 2.6%. However, a potential sudden reversal of risk premia and abruptly rising yields could trigger an increase in lapse rates and surrender ratios as policyholders look for more attractive alternative investments. Although several contractual and fiscal implications could limit the impact of lapses and surrenders in some countries, its ramifications could add additional strains on insurers' financial position once yields start increasing.

2.2. PROFITABILITY

The profitability of insurers is under pressure in the current low yield environment and has deteriorated further in 2018. Returns on fixed-income investments, accounting for around two-thirds of total investments of insurers, remain low amid historically low yields. This is particularly challenging for life insurers, who rely on investment returns to cover long-term policyholder obligations with guaranteed rates issued in the past. Although the median ROA remained stable in 2018, the distribution has shifted slightly downward, with both upper and lower tail of distribution declining (Figure 2.6). Furthermore, the median return on excess of assets over liabilities dropped from 5.6% in 2017 to 4.9% in 2018 (Figure 2.7).[18]

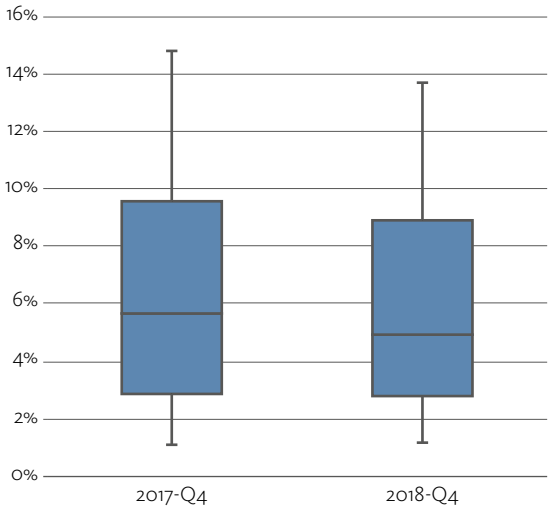
18 The return on excess of assets over liabilities is used as a proxy for return on equity.

Figure 2.6: Return on Assets (in %; median, interquartile range and 10th and 90th percentile)



Source: EIOPA QFG (templates S.39.01.11 and S.02.01.02)
Note: Data is cumulative

Figure 2.7: Return on Excess of Assets over Liabilities (in %; median, interquartile range and 10th and 90th percentile)

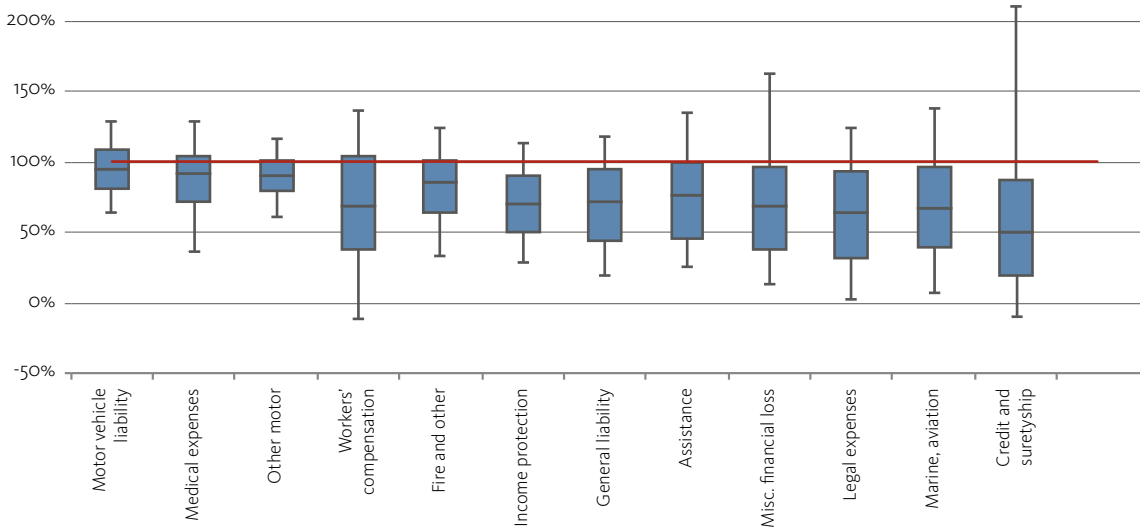


Source: EIOPA QFG (templates S.39.01.11 and S.02.01.02)
Note: Data is cumulative

The medium combined ratio remains below 100% for all lines of business in 2018. Although significant differences are still observed across all lines of business, most EU insurers were able to generate positive underwriting results in a challenging market environment (Figure 2.8)[19]. Underwriting performance remains under pressure for motor insurance, the biggest non-life market in terms of GWP, with a significant number of insurers reporting a combined ratio of over 100% for motor vehicle liability insurance. This partly due to the strong competitive pressures in the motor insurance markets and the effects of medical expense inflation and higher vehicle repair costs. The biggest dispersion in underwriting performance continues to be reported for credit and surety line of business. In fact, some insurers could generate huge profits while others enormous losses. However, the median combined ratio for this particular line of business reached 50% in 2018.

19 The gross Combined Ratio is the gross loss ratio plus the gross expense ratio (excluding profits from the investments)

Figure 2.8: Gross Combined Ratio across lines of business (in %; median, interquartile range and 10th and 90th percentile) as of Q4 2018



Source: EIOPA Quarterly Solo
Reference date: Q4 2018
Note: Premiums, claims and expenses by line of business (Claims Incurred Gross Direct Business + Expenses incurred by line of business divided by Gross Earned Premiums)[20]

2.3. SOLVENCY

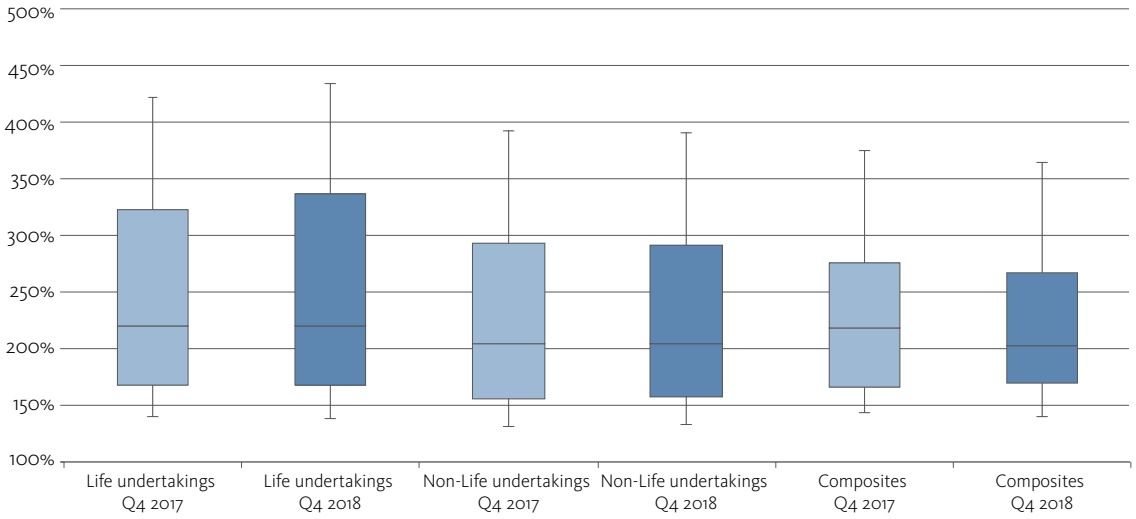
The European insurance sector remains well capitalized (Figure 2.9). Despite lower profitability, the solvency position of life insurers has slightly improved in 2018 due to a slight increase in the interest rates used for discounting liabilities. [21] On the other hand, non-life insurer's capitalization remains generally at the same level also in 2018, while the SCR ratio median for composites slightly decreased from 220% in 2017 to 204%.

Although the solvency position of EU insurers significantly differs across EU countries, it remains above 100% for all countries. The 10th and 90th percentile for all EU countries is ranging from 108% to 664% in 2018 (Figure 2.10). The highest median is notably observed in DE (322%), DK (288%) and NO (258%). It should be noted that these figures are including the transitional and LTG measures. This should be taken into account when comparing the figures, as the application of the transitional and LTG measures differs across countries and can have a significant impact on the solvency ratios. The number of non-life insurers with a Solvency ratio below 100% improved from 7 to 4, but 1 composite insurer now suffered a breach of the SCR. For life insurers the numbers remained stable with 1 life insurer with a Solvency ratio below 100% (Figure 2.11).

20 Nominator S.05.01.02 ([R0310+ R0550, C0010-C0160]); Denominator S.05.01.02 [R0210, C0010-C0160]

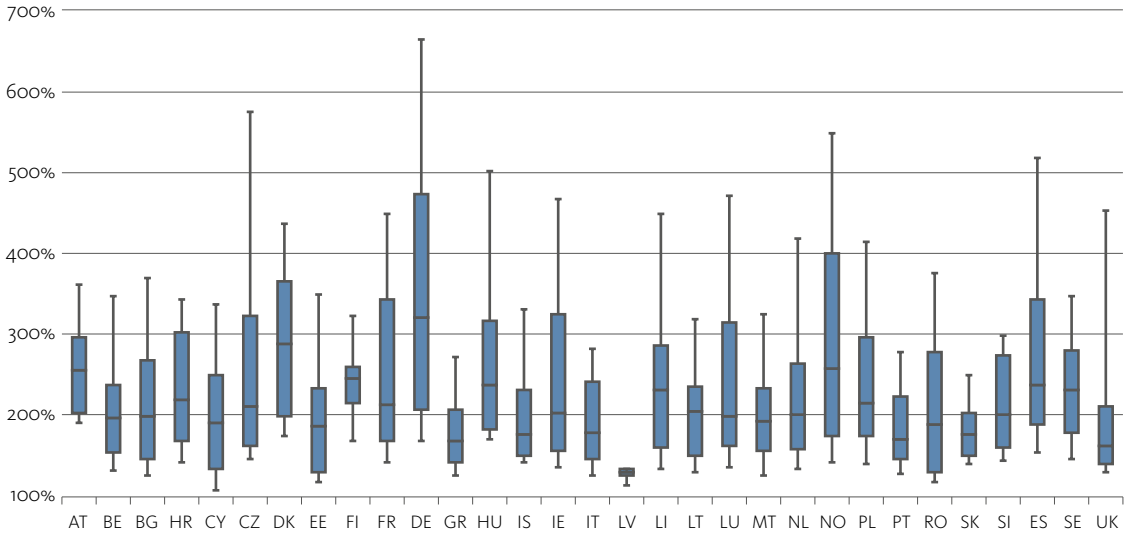
21 It should be noted however that the increase in the discount rate is primarily due to a higher Volatility Adjustments, as the risk free rates have slightly decreased in 2018. Furthermore, the Ultimate Forward Rate (UFR) used in the derivation of the risk free rate curve for discounting long-term liabilities under Solvency II was lowered by 15bps as of 1-1-2018, following the application of the EIOPA methodology to derive the UFR. This has counterbalanced the observed rise in interest rates for long-term liabilities.

Figure 2.9: SCR ratio per undertaking type (in %; median, interquartile range and 10th and 90th percentile) in Q4 2018



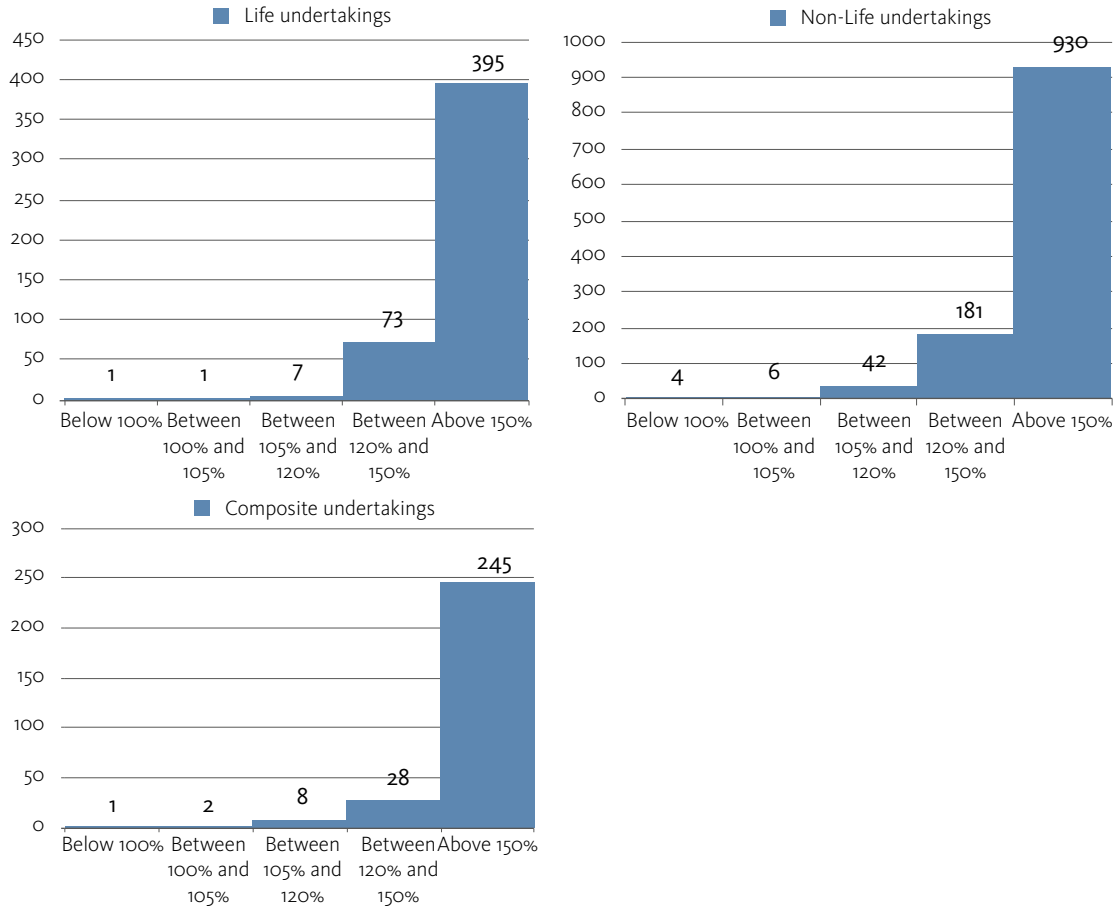
Source: EIOPA Quarterly Solo

Figure 2.10: SCR ratio by country (in %; median, interquartile range and 10th and 90th percentile)



Source: EIOPA Quarterly Solo
Reference date: Q4 2018

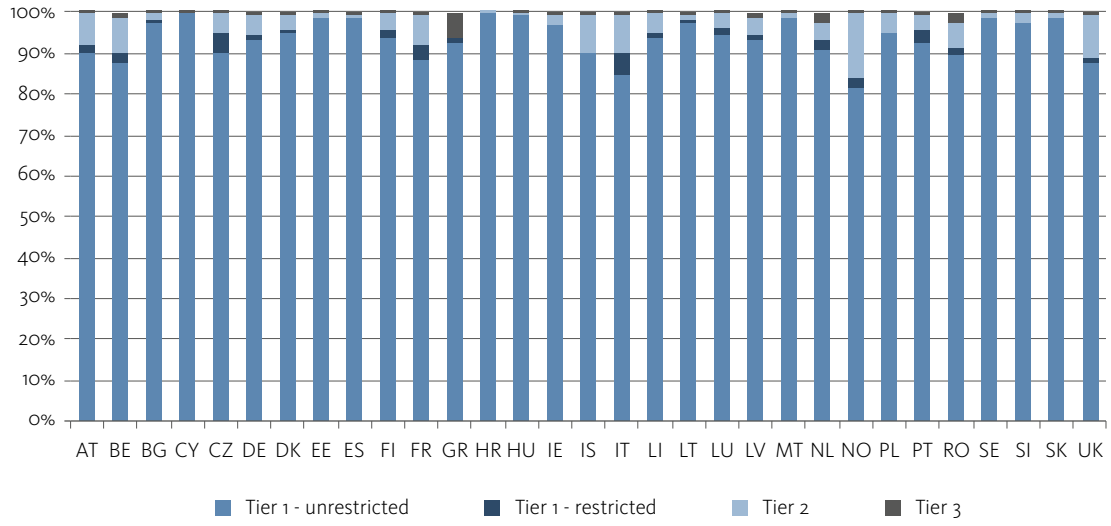
Figure 2.11: Intervals of SCR ratios for solo undertakings as of Q4 2018 by type of undertakings



Source: EIOPA Quarterly solo
Reference Date: Q4 2018

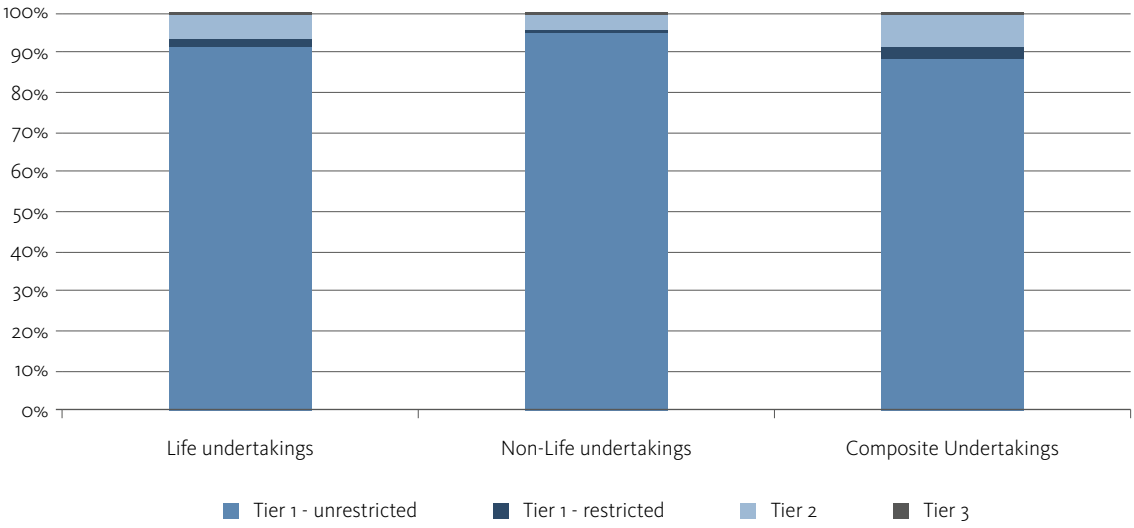
The quality of own funds remains high in the European insurance sector. Total amount of own funds was reported at almost EUR 1.5 tn in Q4 2018. The vast majority of own funds (91%) represents Tier 1 unrestricted capital per solo undertaking whereas 6% consists of Tier 2 own funds capital (Figure 2.12). To be more specific, countries like AT, BE, FR, IS, IT, NO and UK rely relatively more on Tier 2 own funds capital whereas Tier 3 own funds items are more pronounced in GR. Moreover, the quality of own funds slightly differs across type of undertakings (Figure 2.13). In 2018, Tier 1 unrestricted own funds capital dominates in non-life undertakings in amounts of 95.1% of all own funds. Tier 1 restricted and Tier 3 own funds capital is evenly distributed across all types of business whereas Tier 2 capital is mostly held in composite undertakings amounting at 8%.

Figure 2.12: Split of Own Funds per country (in %)



Source: EIOPA Quarterly solo
Reference Date: Q4 2018

Figure 2.13: Split of Own Funds per type of undertaking (in %)



Source: EIOPA Quarterly solo
Reference Date: Q4 2018

2.4. REGULATORY DEVELOPMENTS

The European Commission has initiated work on the review of Solvency II Directive foreseen for 2020. On 11 February 2019 EIOPA received a request for technical advice on the 2020 review of the Solvency II Directive from the European Commission.[22] The request covers a broad range of topics, including the long-term guarantees measures, the risk margin, the SCR standard formula, the MCR, group supervision, reporting and disclosure, proportionality, macro-prudential issues (see also below), recovery and resolution and insurance guarantee schemes. EIOPA will provide the technical advice in June 2020, after having publically consulted upon it.

EIOPA submitted its advice to the European Commission on the integration of sustainability risks in Solvency II and the IDD on April 30th 2019. The advice is related to the Sustainable Finance Action Plan and the Capital Markets Union of the European Commission (see box 2.1). The EIOPA advice include proposals in the areas of risk management, investment strategy, stewardship and product oversight. In particular with respect to Solvency II, EIOPA advices that insurers should reflect the impact of their investments on sustainability, promoting a stewardship approach by insurers and reinsurers. At the same time, EIOPA emphasises the relevance of integrating sustainability risks in the investment decisions and underwriting practices. In respect of product design and distribution, EIOPA calls for the introduction of a clear reference to ESG considerations in the implementing rules of the IDD on product oversight and governance as well as on conflicts of interest. Furthermore, EIOPA proposes an explicit link between the prudent person principle and the target market assessment in the product oversight and governance arrangements to ensure the delivery of ESG characteristics of a product, if promoted as such.

On 21 December 2018, EIOPA published an Opinion on non-life cross-border insurance business of a long-term nature and its supervision. The Opinion is addressed to National Competent Authorities with the objective to ensure the appropriate application of the legal requirements and consistent supervisory practices with regards to the calculation of technical provisions and quantitative information on non-life long-term business with distinctive features or a high degree of local specificities.

On 7th March 2019 the Joint Committee of the European Supervisory Authorities (ESAs) proposed amendments to the key information document (KID) for packed retail and insurance-based investment products (PRIIPs). The amendments are included in the draft regulatory technical standards submitted to the European Commission and relate to the Commission Delegated Regulation 2017/653 for the key information document (KID) for packaged retail and insurance-based investment products (PRIIPs). The objective of the amendments is to provide an extension of two years, until 31 December 2021, of the transitional period during which PRIIPs manufacturers are allowed to continue using key investor information documents drawn up in accordance with the UCITS Directive. Such amended is needed for consistency with the change introduced in the PRIIPs Regulation which provides similar extension of the transitional period under which UCITS and relevant non-UCITS funds are exempted from preparing a PRIIPs KID.

EIOPA published a Discussion Paper on Systemic Risk and Macroprudential policy in insurance on 29 March 2019. This Discussion paper is based on a series of three papers previously published by EIOPA on systemic risk and macroprudential policy.[23] This work should now be turned into a specific policy proposal for additional macroprudential tools or measures (where relevant and possible) as part of the Solvency II review. For this purpose, and in order to gather the views of stakeholders, EIOPA has published the Discussion Paper on systemic risk and macroprudential policy in insurance, which focuses on potential new tools and measures. Special attention is devoted to the four tools and measures specifically highlighted in the recent European Commission's Call for Advice to EIOPA: the ORSA, a systemic risk management plan; liquidity risk management planning and liquidity reporting and the prudent person principle.

22 https://ec.europa.eu/info/files/190211-request-eiopa-technical-advice-review-solvency-2_en

23 See EIOPA's publications "Systemic risk and macroprudential policy in insurance", "Solvency II tools with macroprudential impact", and "Other potential macroprudential tools and measures to enhance the current framework". All three papers can be found at https://eiopa.europa.eu/financial-stability-crisis-prevention/crisisprevention.

BOX 2.1: EC SUSTAINABLE FINANCE ACTION PLAN DEVELOPMENTS

As part of the Sustainable Finance Action Plan and the Capital Markets Union, the European Commission adopted in May 2018 a package of measures on sustainable finance. The package included proposals aimed at establishing a unified EU classification system of sustainable economic activities ('taxonomy'); improving disclosure requirements on how institutional investors integrate environmental, social and governance (ESG) factors in their investment and advisory processes; and creating a new category of benchmarks which will help investors compare the carbon footprint of their investments.

Following the Commission's proposals, a compromise text was agreed by EU co-legislator in March 2019 on both the Regulation on sustainability-related disclosures in the financial services sector ("Disclosures Regulation") and the Regulation amending Regulation (EU) 2016/1011 as regards EU Climate Transition Benchmarks ("Benchmarks Regulation"). The text of the Commission proposal for a Regulation on the establishment of a framework to facilitate sustainable investment ("Taxonomy Regulation") is still under political discussion.

The Benchmarks Regulation creates two new categories of low-carbon benchmarks: a climate-transition benchmark and a specialised benchmark which brings investment portfolios in line with the Paris Agreement goal to limit the global temperature increase to 1.5˚above pre-industrial levels. The two new categories are voluntary labels designed to orient the choice of investors who wish to adopt a climate-conscious investment strategy. The climate-transition benchmark will offer a low-carbon alternative to the commonly used benchmarks while the Paris-aligned benchmark will only comprise companies that can demonstrate that they are aligned with a 1.5˚ target. The new labels are designed to give additional assurances to avoid "greenwashing", i.e. that investors are deceived by misleading or unsubstantiated claims about the environmental benefits of a benchmark.

The "Disclosures Regulation" sets out sustainability disclosure requirements for a broad range of financial market participants, financial advisers and financial products with a view to strengthening protection for end-investors and improve disclosures to them in order to eliminate greenwashing and increase market awareness on sustainability matters. The Regulation lays down the obligation on the financial market participants and financial advisers which provide investment advice or insurance advice with regard to IBIPs respectively to publish written policies on the integration of sustainability risks and ensure the transparency of the integration of sustainability risks. It also sets uniform rules on how those financial market participants should inform investors about their compliance with the integration of sustainability risks and opportunities. The Regulation also provides requirements on the disclosure of adverse impact of investment decisions to ensure the sustainability of investments.

The Regulation includes transparency requirements regarding sustainability risks policies, integration of sustainability risks and sustainable investments in websites, pre-contractual disclosures and in periodical reports. In order to further specify these requirements, EBA, EIOPA and ESMA are empowered to deliver six mandatory Regulatory Technical Standards (RTS) related to pre-contractual disclosures, transparency on websites and periodical reports and one optional Implementing Technical Standard (ITS) on marketing communications under the Sustainable Disclosure Regulation.

3. THE EUROPEAN REINSURANCE SECTOR

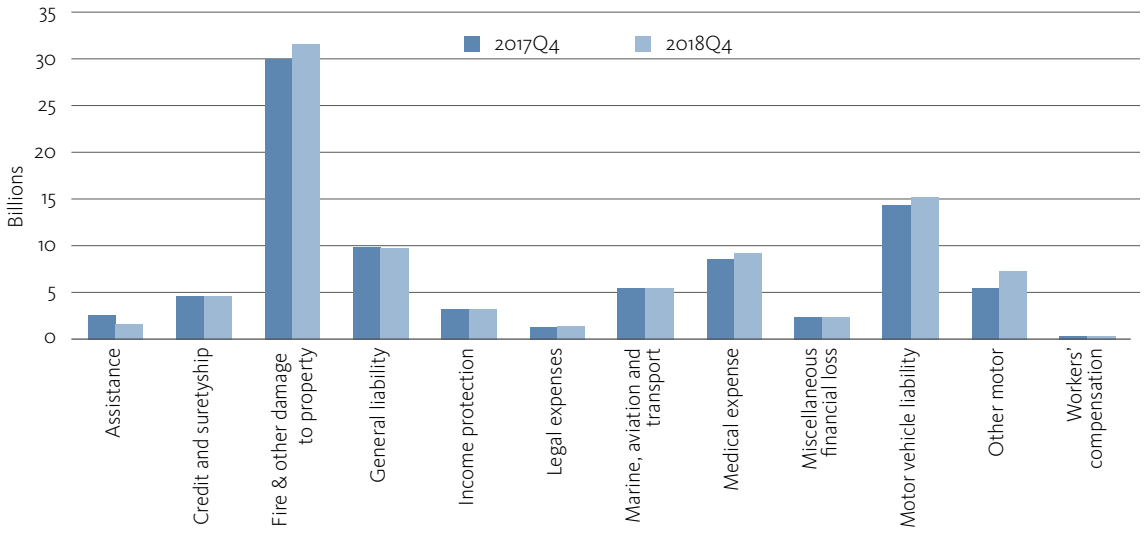
Despite a relatively benign start of the year, 2018 ended up the fourth costliest year ever in terms of insured catastrophe losses. Total global catastrophe losses amounted to around USD 160 bn in 2018, with half of the losses insured (USD 80 bn).[24] While losses were considerably lower compared to the extreme global catastrophe losses of 2017, which totalled USD 350 bn (of which USD 140 bn insured), total insured losses in 2018 were still considerably above the 10-year average and 30-average of USD 61 bn and USD 41 bn, respectively.

Despite the huge insured losses in 2017, which were driven mainly by record hurricane losses (Harvey, Irma and Maria), and the considerable insured losses in 2018, the renewals in 2018 as well as in January 2019 had only moderate price increases, mostly in the regions and lines of business affected by the catastrophe events. The alternative market has continued to show strong appetite for insurance risks leading to a considerable capital supply in the reinsurance market. A re-strengthening of the soft market is therefore not unlikely amid high competitive pressures. Moreover, the ability to release reserve from previous years appears to have been diminished amid lower solvency positions. Against this background setting risk-adequate prices at the upcoming renewals is crucial for reinsurance undertakings.

3.1. MARKET SHARE AND GROWTH

The overall share of reinsurance GWP in total GWP increased across EEA countries. Total reinsurance GWP amounted to EUR 214 bn, approximately 15% of total GWP, an increase of 2 percentage points from 2017Q4. This trend can also be observed when separating total GWP for non-proportional (which increased from EUR 25 bn to EUR 27 bn) and proportional (EUR 89 bn to EUR 92 bn) in the same period. The proportional LoB that had the highest increase compared to 2017Q4 was other motor (33%) followed by legal expenses (7%). For non-proportional, casualty was the line LoB with the biggest increase (23%), followed by property (5%), while health had a decrease of 18% (Figures 3.1 and 3.2).

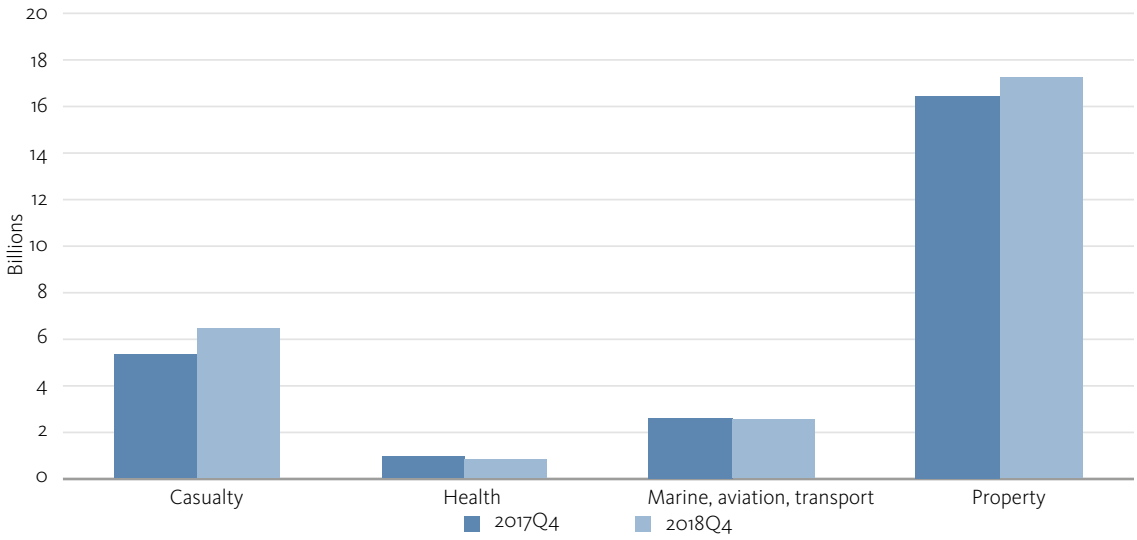
Figure 3.1: Gross Written Premiums for proportional reinsurance by Line of Business



Source: EIOPA Quarterly Solo
Reference date: Q4 2018

24 NatCatSERVICE: Natural catastrophe review 2018, MunichRE and sigma SwissRe estimates.

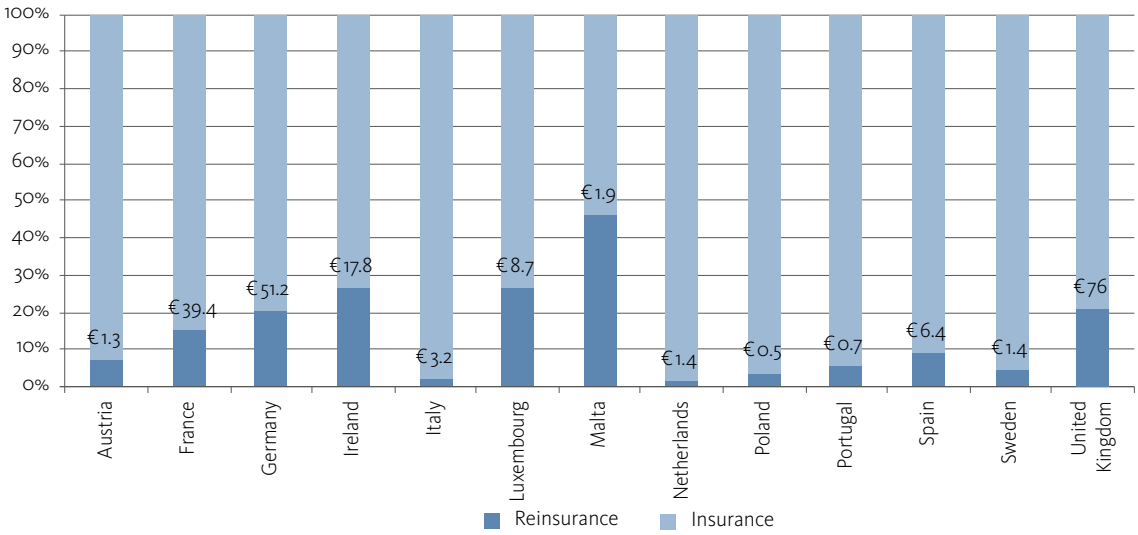
Figure 3.2: Gross Written Premiums for non-proportional reinsurance by Line of Business



Source: EIOPA Quarterly Solo
Reference date: Q4 2018

The biggest reinsurance markets in absolute terms are located in the UK, Germany and France, whereas the reinsurance sector is relatively large in Malta, Ireland and Luxembourg compared to total GWP in these countries (Figure 3.3). Globally, total reinsurer capital reached USD 595 bn in the end of September 2018, back to the same levels as YE 2016, after a slight decrease of around 2 percent since YE 2017 (USD 605 bn). The share of traditional capital fell by 4 percent to USD 296 bn, driven mainly by unrealised investment losses in the light of rising interest rates in the United States. Overall, reinsurer capital has increased by 75 percent over the last decade, but traditional capital remained nearly unchanged in the last 5 years, around USD 460 bn.

Figure 3.3: GWP reinsurance as a share of Total GWP (in % and EUR bn)



Source: EIOPA Quarterly Solo
Reference date: Q4 2018
Note: Only countries with material reinsurance GWP are shown. The values in percentage in the y-axis refer to the share of Gross Written Premium reinsurance with respect to the total while the absolute numbers are shown in the labels.

Alternative reinsurance capital rose sharply in the first 9 months of 2018. Despite the huge insured losses in 2017, alternative capital rose by 11 percent to USD 9 bn in 2018, reflecting renewed investor appetite for insurance risk. The total outstanding insurance-linked securities (ILS) amounted to USD 36.7 bn by YE 2018[25], an all-time high, while issued ILS also a registered a record in 2018, reaching USD 13.9 bn. Nevertheless, collateralized reinsurance transactions still represent the bulk of the alternative capital.

The ILS-market proved itself resilient, despite the heavy disasters of autumn 2017, which can be perceived as the first real resilience test for the market. The issuance record in 2018 shows that the alternative reinsurance market is still attracting investments. The relatively high yields as well as the diversifying nature of catastrophe exposed business appeal to investors searching for alternative investments opportunity in the current low yield environment. Consequently, the capital inflow into the reinsurance market - especially the alternative reinsurance market - is likely to continue.

3.2. PROFITABILITY

In 2018, the global insurance industry catastrophe losses were below the 2017 record figures, but considerably above the long-term average. According to estimates, natural catastrophes caused worldwide economic losses of USD 160 bn, a decrease of USD 350 bn from last year. The insured losses amounted to USD 80 bn, against a total of USD 140 bn in 2017. The overall economic losses were below the 10-year average of 190bn USD, whereas the insured losses were considerably higher than the 10-year average of USD 61 bn.

Wildfires and severe tropical cyclones were most prominent in terms of losses, for both total and insured losses. The costliest natural disaster event was the wildfire Camp Fire with overall losses of USD 16.5 bn and insured losses of USD 12.5 bn making the wildfire season in California together with the Woolsey Fire to the worst-ever wildfire season in history.

In addition, the hurricane season was eventful: the second and third highest economic losses were caused by hurricanes. Typhoon Jebi was the costliest natural disaster in Asia. In Europe, a long, hot and exceptionally dry summer caused billions in losses, especially in agriculture. The draughts caused direct losses of USD 3.9 bn, which does not include indirect losses through lost production or high commodity prices. Only a fraction of these losses was covered (USD 0.3 bn).

After very severe losses in 2017 and still considerable high losses in 2018, the reinsurance rates increased only moderately, mostly in the regions and lines of business affected by catastrophe events. This can be explained mainly by the large supply of alternative capital. As sources of investments such as pension funds and sovereign wealth funds have continued to show strong appetite for insurance risk, the reinsurance market continued to receive large amounts of capital inflows. That also feeds expectations of stable or even decreasing prices across all lines of business and regions in the renewals ahead.

The 2018 and January 2019 renewals revealed that the competitive pressure in the reinsurance sector remains high. The combination of the continuing capital inflow into the reinsurance market with large catastrophe losses and increasingly low investment returns put pressure on

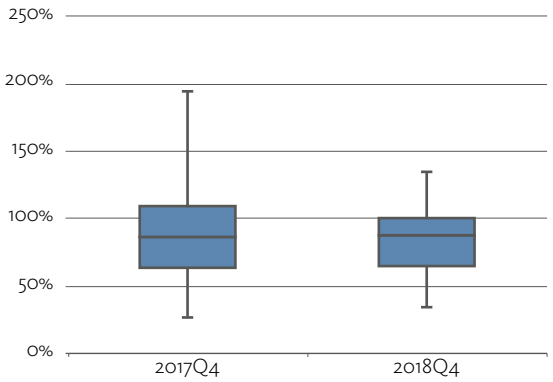
Table 3.1: The five largest natural catastrophes in 2018, ranked by insured losses

Date	Event	Region	Overall losses (USD bn)	Insured losses (USD bn)
8-25.11.2018	Wildfire	USA	16.5	12.5
8-10.10.2018	Hurricane Michael	USA, Cuba	16.0	10.0
1-6.9.2018	Typhoon Jebi	Japan, Taiwan	12.5	9.0
10-27.9.2018	Hurricane Florence	USA	14.0	5.0
8-22.11.2018	Wildfire	USA	5.2	4.0

Source: Munich Re, NatCatSERVICE.

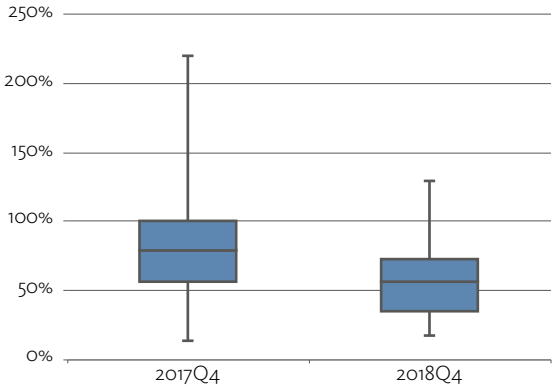
25 According to the AR-TEMIS-Website, See ARTEMIS Website: http://www.artemis.bm/blog/2016/09/15/reinsurance-rate-softening-to-continue-ils-to-grow-influence-sp-execs/

Figure 3.4: Gross Combined Ratio proportional reinsurance (in %; median, interquartile range and 10th and 90th percentile)



Source: EIOPA Quarterly solo
Last observation: Q4 2018

Figure 3.5: Gross Combined Ratio non-proportional reinsurance (in %; median, interquartile range and 10th and 90th percentile)



Source: EIOPA Quarterly solo
Last observation: Q4 2018

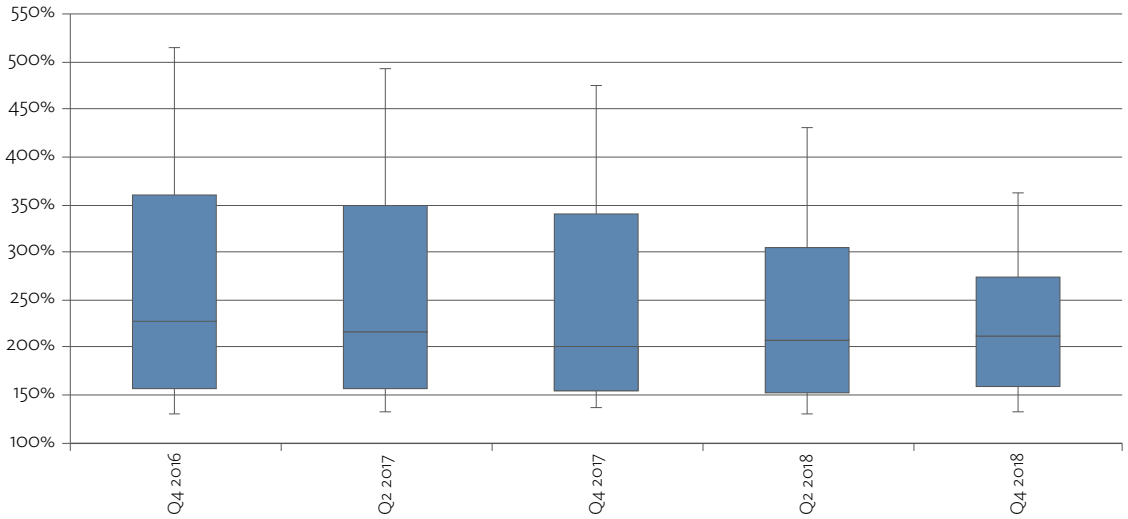
the profitability of the reinsurance business. Moreover, the ability to release reserves from previous years seems to have been diminished. Against this background, obtaining adequate risk prices at the upcoming renewals is crucial for the reinsurance companies.

The median gross combined ratio for the European reinsurance improved in 2018. The median gross combined ratios decreased in particular for non-proportional reinsurance, reflecting the relatively lower natural catastrophe losses last year. The median combined ratio remained relatively stable for proportional reinsurance, but for both proportional and non-proportional reinsurance the dispersions has significantly narrowed, indicating that the number of reinsurers suffering severe underwriting losses has reduced in 2018. The gross combined ratio for proportional reinsurance is on average higher than the gross combined ratio for non-proportional reinsurance. The overall median gross combined ratio in 2018 was approximately 88% for proportional reinsurance business and 56% for non-proportional reinsurance (Figures 3.4 and 3.5).

3.3. SOLVENCY

Median solvency positions improved over 2018, but are still below the levels achieved in 2016. Overall, the reinsurance companies generally coped well with the record catastrophe losses in 2017 and the considerable high losses in 2018. Despite these losses, the median reinsurance company remains well capitalized, indicating that the European reinsurance sector has proved resilient under challenging circumstances. The median SCR ratio recovered in 2018Q4 reaching 213% after falling from 227% in 2016Q4 to 201% in 2017Q4. However, the solvency positions of reinsurers are becoming more concentrated, with the number of reinsurers with very high solvency ratios decreasing further, as reflected in the downward shift of the upper tail of the distribution. Moreover, as the future price development is largely uncertain among significant competitive pressures, the general outlook remains challenging.

Figure 3.6: Solvency position reinsurance sector



Source: EIOPA Quarterly Solo
Reference date: Q4 2018

4. THE EUROPEAN PENSION FUNDS SECTOR

The European occupational pension fund (PF) sector continues to be negatively affected by the persistent low interest rate environment. Additionally, in 2018 the sector came under increased pressure by the fall in stock values pertaining to significant losses in IORPs' equity investments. Providing long-term guarantees becomes expensive in an environment with low long-term interest rates, so that Defined Benefit plans' (DB) balance sheets are primarily affected, as they provide employees with a pre-defined level of pension. However, also Defined Contribution schemes (DC) have lost values and are affected by the low interest rate environment. Here, the investment risk is with the member and beneficiary of the pension fund and will have to cater for the consequences in their savings.

The negative effects of the challenging economic environment are mitigated by initiatives to increase funding and a shift towards DC pension schemes, but demographic developments add additional strain. Initiatives like auto-enrolment and automatic increases in contribution levels help to increase funding and bring more assets under management. Some reforms promote consolidation of the pension fund sector and bring much needed efficiency gains, also facilitated by the transposition of the IORP II Directive (Directive (EU) 2016/2341). However, people living longer and other demographic challenges push the shift from DB to DC, which is indeed incentivised by recent national legislative developments. DB schemes are often closed for new members and in a 'run off' state.

4.1. KEY DEVELOPMENTS

Total assets held by occupational pension funds increased by 0.4% for the EEA and decreased by -0.5% for the Euro Area (EA) during 2018 (Figure 4.1). In 2018, the European IORPs sector manages around EUR 3.8 trillion of assets. The UK and NL continue to represent the two largest IORPs markets with an increase of total assets by 1.2 percentage points (p.p.) for UK (EUR 1.8tn) and a slight decrease of -1.1 p.p. for NL (EUR 1.3tn). This is a substantial decrease from the considerable growth (of over 5%) in recent years. Whilst contributions remained stable or increased, supported by national initiatives, this decrease – or slight increase – evidences the impact of the significant impairment of the asset values in 2018.

The UK and the Netherlands account for about 82.2% of the European Occupational pensions sector in terms of assets under management (Table 4.1). The relative share of private and public pensions, cultural and historical differences drive the pension sectors in the EEA. Both UK and NL social security and pension systems rely heavily on private pensions and in particular on retirement income provided by IORPs.

The penetration rate of the occupational pension fund sector continued to decrease in 2018 (28% for EEA and 21% for the EA) (Figure 4.2).[26],[27] For the majority of the countries, the rates decreased in 2018, but overall remained relatively stable. The highest decrease was observed in NL (-11 p.p.) and in IS (-7 p.p.). Again, this is linked to the stark decrease in asset values in 2018. Due to the widely diverse pension systems in the EEA, penetration rates vary significantly across European countries, also considering that the IORP sector is still fairly small or inexistent in a number of Member States.

26 Penetration rate is calculated as the total size of assets relative to GDP and gives an indication of the relative wealth accumulated by the sector.

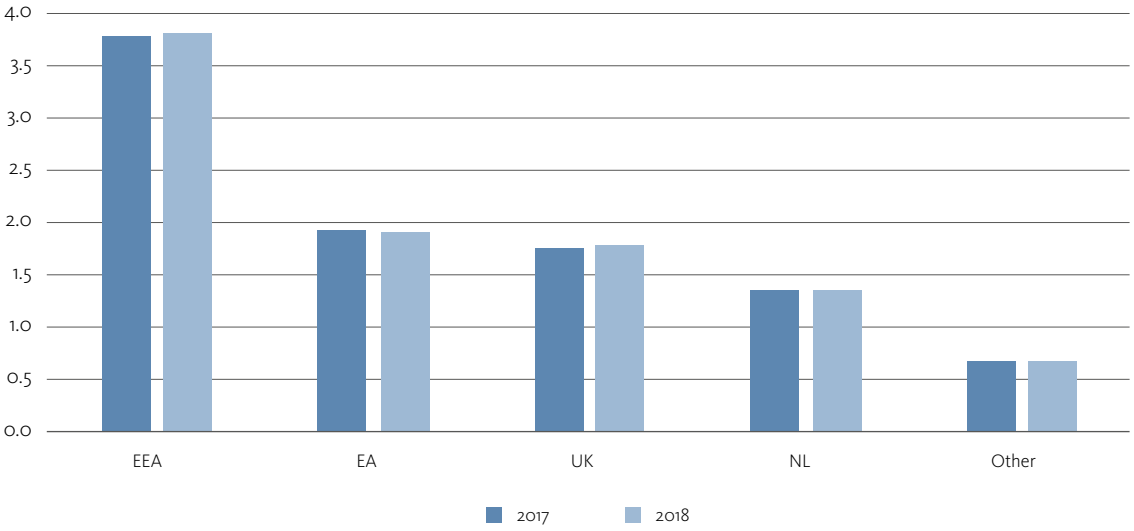
27 EEA and EA regions exclude FR as 2018 data is not yet available.

Table 4.1: Total assets per country as a share of EEA total assets reported for 2018[29]

UK	NL	DE	IT	IE	ES	NO	BE	IS	AT	SE	PT	RO
46.8%	35.3%	5.8%	3.5%	2.6%	0.9%	0.9%	0.8%	0.7%	0.6%	0.5%	0.5%	0.3%
DK	**LI**	**FI**	**SK**	**LU**	**GR**	**SI**	**PL**	**LV**	**HR**	**BG**	**HU**	**MT**
0.2%	0.2%	0.1%	0.1%	0.042%	0.036%	0.021%	0.011%	0.012%	0.003%	0.0002%	0.0001%	0.0002%

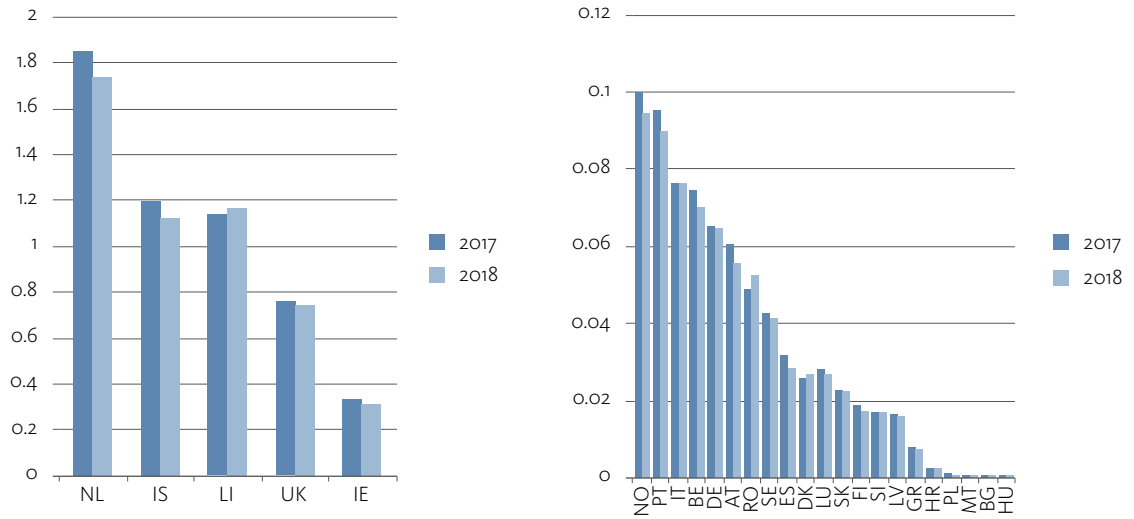
Source: EIOPA Quantitative Survey
Note: Figure for UK contains DB and HY schemes only

Figure 4.1: Total Assets (in EUR trn)



Source: EIOPA
Note: The 2018 data is preliminary and subject to revisions. For the UK data refers only to DB and hybrid schemes.
Figure 4.1 is based on data received by 26 countries (EEA) and 15 countries (EA) which provided total assets for 2018. The category 'Other' includes all countries except UK and NL.

Figure 4.2: Penetration rates (total assets as % of GDP)



Source: EIOPA
Note: Figure 4.2: Penetration rates for BG, HR, HU, MT and PL are lower than 1%.

28 Table 4.1 excludes info on FR, LU and MT as 2018 data is not yet available.

BOX 4.1: FIRST AUTHORISATIONS OF PENSION FUNDS IN FRANCE

Until recently, France was a Member State without any pension fund and where insurers (including mutual insurers and provident institutions) were the only authorised providers of supplementary occupational pension schemes. In the context of Directive 2003/41/EC (IORP I Directive), France chose to apply Article 4 to insurers subject to Directive 2002/83/EC until 2016. The resulting Article 4 ring-fenced funds' assets represent a small portion of the occupational pension schemes' total assets held by French insurers: the retirement liabilities are mainly held outside these funds and are mainly regulated by the 2009/138/CE Directive (Solvency II Directive) since its entry into force on January 1st, 2016.

In light of the introduction of the Solvency II Directive and in the context of the IORP Directive's revision, the French government introduced in 2017 a new type of undertaking, aiming at providing only occupational pensions schemes (and linked guarantees such as disability and death), referred to as supplementary occupational pension funds (Organismes de retraite professionnelle supplémentaire (ORPS)). ORPSs are not subject to Solvency II's provisions, but to the transposition of the Directive (EU) 2016/2341 (IORP II Directive). Their regulatory governance prescriptions are largely inspired from Solvency II pillar 2. As to pillar I, the quantitative requirements consist of Solvency I pillar I, supplemented with stress tests (low interest rates, longevity shock, etc.) in order to set possible add-ons. The intention was to establish a prudential treatment suitable to the very long-term characteristics of the pension liabilities. In particular, this prudential framework aims for ORPSs to invest in diversified assets, with a long-term view, and allows for ORPSs' balance sheets to be measured at historical cost.

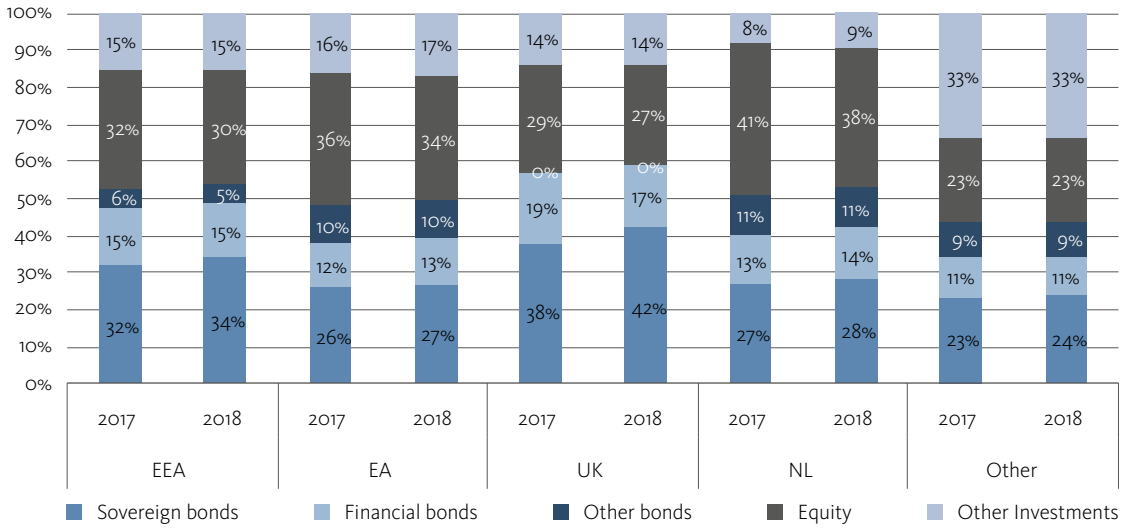
Insurers may establish and transfer parts of, or their entire assets and liabilities related to the existing occupational pensions schemes, into an ORPS until the end of 2022,subject to the approval of the national supervisory authority, the Autorité de Contrôle Prudentiel et de Résolution (ACPR). Article 4 ring-fenced funds of insurers ceases to exist from 2023, therefore insurers will have either to incorporate the related commitments under the insurance activity following the Solvency II Directive or to transfer these to an ORPS before 2023.

The first three ORPSs have been authorised in 2018, resulting from transfers of insurance activities or transformation of the insurance legal entity into an ORPS and representing around 8 billion of assets. Further authorisations are expected in the coming years: the occupational pension's schemes eligible to an ORPS and currently held by insurers potentially represent up to around 180 billion of assets.

4.2. INVESTMENT ALLOCATION, MARKET PERFORMANCE AND FUNDING OF THE SECTOR

The investment allocation of pension funds remained broadly unchanged in 2018 for the EEA and EA (Figures 4.3 and Table 4.2). The following changes in investment allocations compared to 2017 figures are observed at the EU country breakdown: in the proportion of sovereign bonds in the portfolios in UK and NL increased by 3.8 p.p. and 1.0 p.p. respectively, whereas the proportion of equity investments decreased across EA by 2.1 p.p. The decline in equity portfolio of pension funds seems predominantly related to the strong decline in equity values in the third quarter of 2018. However, further implications on a change in investment behaviour cannot be excluded, such as perceived risks relating to political instability (Brexit, trade tensions), asset volatility or repricing of risk premia promoting switching from equity to other investment classes. In 2018, fixed income securities continue to be the main investment asset class, representing more than 54% of total investments in EEA and 50% in EA.

Figure 4.3: Investment Allocation in 2017 and 2018 (in %)

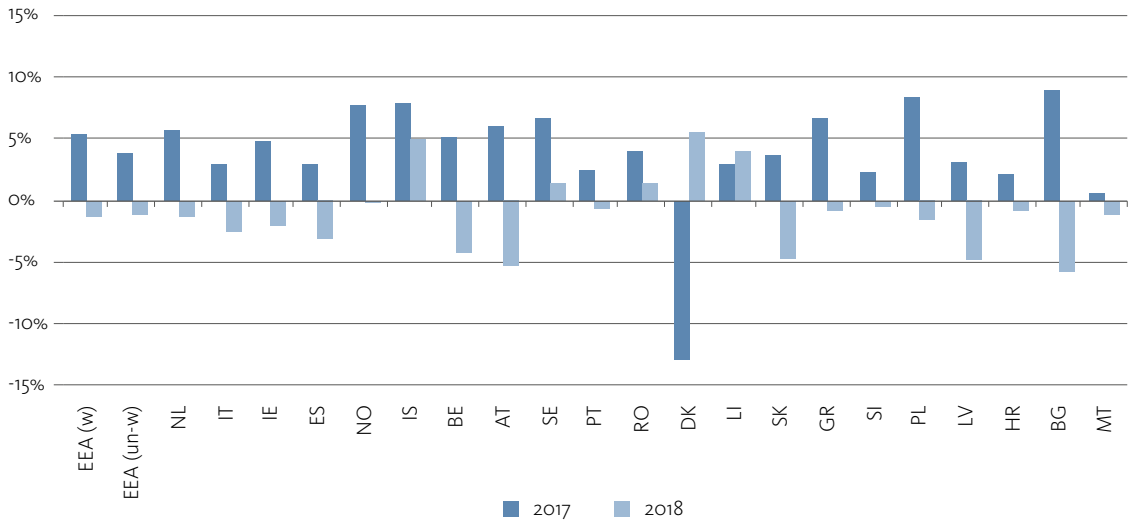


Source: EIOPA
Note: Data for 2018 is preliminary and subject to revisions. Figures 4.3 is based on 26 countries for the EEA and 13 countries for the EA that provided the investment breakdown for 2018. Data for FI, FR and NO is not yet available. Data for the UK includes DB and HY schemes only. The category 'Other' includes all the countries except the UK and NL.

The EEA weighted and un-weighted average rate of return on assets decreased significantly since 2017 (Figure 4.4). The average IORPs rate of return on assets was negative for most Member States in 2018. This is linked to the poor performance and substantially decreased asset values, in particular due to devaluations on the stock markets, and a persistently low interest rate environment.

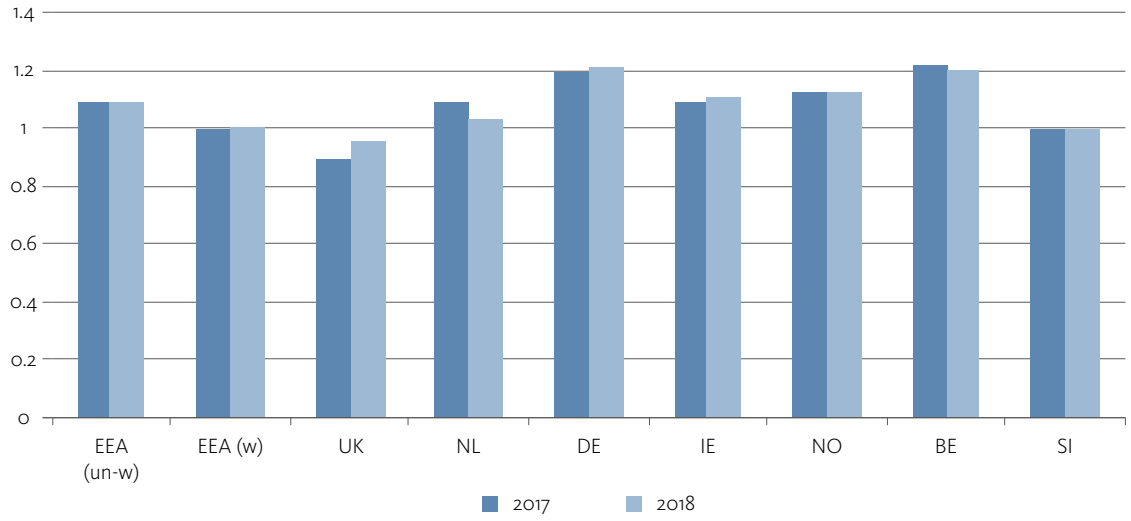
Due to NL's large amount of assets under management and its relatively big exposure to equity investments, the effect on the EEA and EA average rate of return is mostly explained by this: the annual performance of investments in NL reduced by 7 p.p. to -1.2% in 2018, bearing a large weight in the calculation of this average.

Figure 4.4: Rate of Return on Assets (in %)



Source: EIOPA
Note: Data for 2018 is preliminary and subject to revisions. Both the weighted and un-weighted averages for the EEA are calculated based on the 21 countries, which provided data and are depicted in the chart. The weighting is based on total assets. Please note that data on UK, DE, FI, FR, LU and HU for 2018 is not yet available.

Figure 4.5: National cover ratios for selected countries (in %)



Source: EIOPA
Notes: Data for 2018 is preliminary and subject to revisions.
Both the weighted and un-weighted averages for the cover ratio are calculated on the basis of the 7 countries that provided data and are depicted in this chart. The weighting is based on total assets. Cover ratios refer only to DB schemes. Due to different calculation methods and legislation, the reported cover ratios are not fully comparable across jurisdictions.

The weighted average cover ratio[29] for DB schemes remains overall the same in 2018 (Figure 4.5). However, the preliminary 2018 data was available only for a small sample of countries. The EEA weighted average of cover ratio increased by 0.7 p.p. to 101% in 2018 whereas EEA un-weighted average slightly increased by 0.2 p.p. to 109.1%. The preliminary 2018 data show that only UK and SI cover ratios are slightly below 100%.

A cover ratio below 100% raises concerns about the sustainability of the pension promises, as at that point in time IORPs do not have sufficient assets to cover their liabilities. In case of need, sponsors or pension protection mechanisms would need to support the IORP in order to prevent cuts in pension payments or increased contributions.

EIOPA is carrying out a stress test in 2019 to assess potential vulnerabilities of the European occupational pension sectors. This exercise is expected to allow important and relevant insights into the resilience and potential vulnerabilities of the European occupational pension sector. For the first time, a European stress test includes an assessment of Environmental, Social and Governance (ESG) exposures. The core assessment refers to the direct impact of a stressed market scenario, which is characterised by a sharp repricing of risk premia and continuous low yields in the long term, on the sustainability and funding of Defined Benefit (DB) pension funds and on the projected future retirement income of members of Defined Contribution (DC) pension funds.

Developing further the methodologies and approaches used for previous exercises, the 2019 stress test has been complemented to assess pension funds' potential reaction to the adverse market scenario on their investment allocation to understand better possible conjoint investment behaviours that may be relevant for the stability of the financial markets. Also, the effects of conditional cash in- and out-flows, which may mitigate or amplify the effects of the adverse market scenario on DB pension funds, can be assessed following an enriched cash flow analysis.

For the 2019 exercise, EIOPA decided to add an analytical component to focus on pension funds' current exposures and risk management practices regarding ESG factors, which will provide a relevant starting point for ESG-related financial stability assessments of the European financial sector.

29 Cover ratios are defined as net assets covering technical provisions divided by technical provisions.

5. RISK ASSESSMENT

5.1. QUALITATIVE RISK ASSESSMENT

EIOPA conducts twice a year a survey among national supervisors to determine the key risks and challenges for the European insurance and pension fund sectors, based on their perceived likelihood and potential impact.

The EIOPA qualitative Spring 2019 Survey[30] reveals that low interest rates remain the main risk for both the insurance and pension fund sectors (Figure 5.1 and Figure 5.2). Life insurance is typically the most affected segment in an environment of prolonged low interest rates, given their higher propensity for duration mismatches. In addition, companies that offered high guaranteed rates issued in the past face higher challenge to achieve the required investment returns to cover policyholder obligations (see Chapter 1).

Equity risks also remain prevalent for both insurers and pension funds, ranking as the second biggest risk for both sectors. Cyber risk, which was considered the third biggest risk for insurers in the autumn 2018 FSR edition, was now surpassed by macro risks, reflecting the recent economic slowdown in some countries and concerns about the trends towards trade protectionism, debt sustainability and uncertainty concerning the future Brexit landscape.

Geopolitical risks raised to the 6th position in the ranking for both pensions and insurance sectors. ALM risks continue to be present in the insurance sector, but less prominently given the increase in macro and geopolitical risks. For the pension fund sector, credit risk for sovereigns has remained unchanged throughout the year in 3rd place, while credit risk for financials has fallen from the 4th to 8th position in the ranking compared the autumn 2018.

Figure 5.1: Risk assessment for the insurance sector

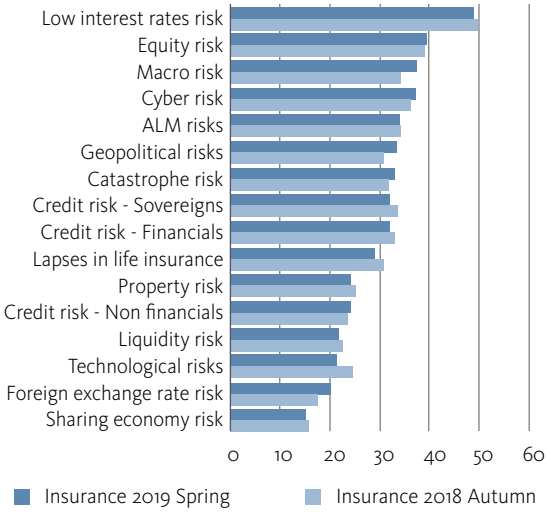
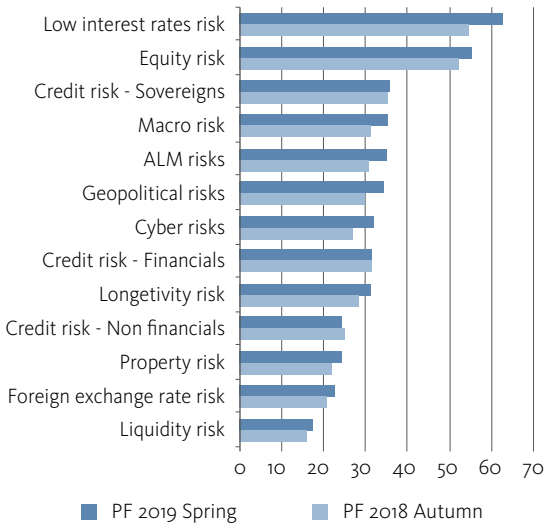


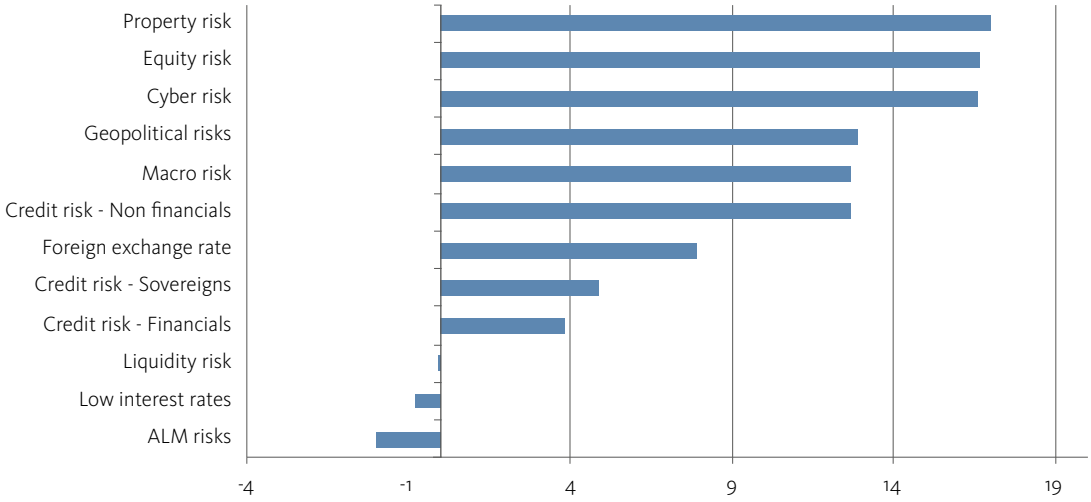
Figure 5.2: Risk assessment for the pension funds sector



Source: Qualitative EIOPA Spring 2019 Survey
Note: Based on the responses received. Risks are ranked according to probability of materialisation (from 1 indicating low probability to 4 indicating high probability) and the impact (1 indicating low impact and 4 indicating high impact). The figure shows the aggregation (i.e. probability times impact) of the average scores assigned to each risk. The results were subsequently normalised on a scale from 0 to 100.

30 The survey was carried out in February – March 2019 and only reflects market developments until then. Therefore, the survey does not reflect concerns over the recent market developments such as sovereign spreads widening for some countries.

Figure 5.3. Supervisory risk assessment for insurance and pension funds - expected future development



Source: Qualitative EIOPA Spring 2019 Survey
Note: Based on the responses received. EIOPA members indicated their expectation for the future development of these risks. Scores were provided in the range -2 indicating considerable decrease and +2 indicating considerable increase.

The survey further suggests that in particular property, equity and cyber risks are expected to increase over the coming year (Figure 5.3). This is in line with the observed market developments highlighted in Chapter 1, indicating the increasing concerns about stretched valuations in certain real estate and equity markets, more frequent and more sophisticated cyber-attacks, economic slowdown and increasing climate catastrophes, which could all potentially affect the financial position of insurers and pension funds. This is coupled with an expected increase in geopolitical and macro risks following the trade tensions across the globe. On the other hand, ALM risks and low interest rates risks are expected to decrease in the coming period.

Credit risk for sovereigns is the risk that is expected to affect most the insurance and pension sector, should they materialize. The combined indicator (probability and impact) is relatively low due to the low perceived probability of widespread credit risks for sovereign. However, should sovereign debt concerns resurface in some countries, triggered by factors such as political uncertainties or a reversal of risk premia, this is expected to have a significant impact on insurers and pension funds. As further detailed below, investments of the insurance sector are characterized by strong home bias, so the companies in affected countries would suffer immediate negative impacts on their bond portfolios.

The survey shows that insurance undertakings in many jurisdictions have been applying risk-mitigating actions to address the low-for-long and catastrophe risks. Low yields negatively affect profitability and put increased pressure on regulatory capital in the context of typically negative duration gaps for life insurance companies. In particular, the risk-mitigation actions by insurers target a reduction of the volume in products entailing minimum guaranteed rates and a move towards unit-linked businesses. The majority of jurisdictions have, moreover, implemented measures (such as stress testing and sensitivity analysis) to evaluate potential consequences of a prolonged period of low interest rates with regard to key regulatory indicators. Regarding catastrophe risks, insurance companies used the yearly renewals of contracts and reinsurance treaties as key risk mitigating actions.

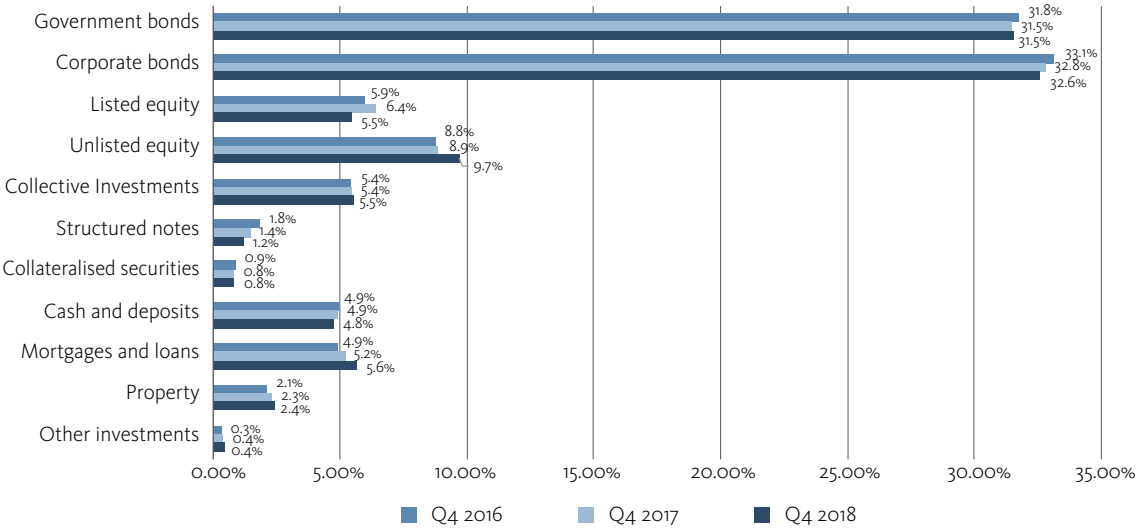
5.2. QUANTITATIVE RISK ASSESSMENT EUROPEAN INSURANCE SECTOR

This section further assesses the key risks and vulnerabilities for the European insurance sector identified in this report. A detailed breakdown of the investment portfolio and asset allocation is provided with a focus on specific country exposures, interconnectedness with the banking sector and a thorough analysis of collateralized loans and mortgages obligations. Moreover, follow-up on insurance stress test 2018 is presented.

INVESTMENTS

Insurance companies' investments in fixed income assets have slightly decreased during the last three

Figure 5.4: Investment split in Q4 2018 compared to Q4 2017 and Q4 2016

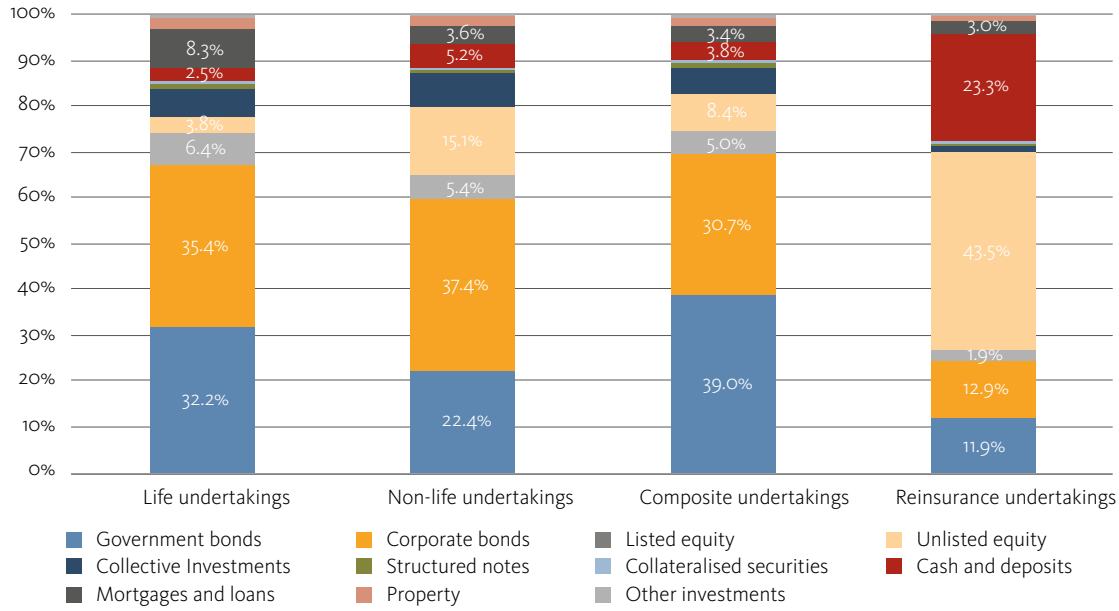


Source: EIOPA Quarterly Solo
Reference Date: Q4 2018
Note: Look-through approach applied. Assets held for unit-linked business are excluded. Equities include holdings in related undertakings.

years while unlisted equity and mortgages as well as loans have increased in a persistent low yield macro-economic environment. However, insurers remain heavily invested in government and corporate bonds, making them vulnerable in case of a sudden reassessment of risk premia and increase in credit spreads. Government and corporate bonds make up around two-thirds of the total investment portfolio, with life insurers relying most heavily on fixed-income assets, due to the importance of asset-liability matching of their long-term obligations (Figure 5.4 and 5.5).

In the last three years, insurers have increased their exposure towards non-traditional investments such as unlisted equities (approx. 10% at the end of 2018) and mortgages and loans (approx. 6% at the end of 2018).

Figure 5.5: Investment split in Q4 2018 by type of undertaking



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018
Note: Look-through approach applied. Equities include holdings in related undertakings, which account for most equities held by reinsurers. Assets held for unit-linked business are excluded.

Insurers' investment portfolios at country level continue to be heterogeneous across countries (Figure 5.6). Insurers from HU, LT and RO invest more than two thirds of their portfolio in government bonds while insurers from IS, NO and SE hold other types of investments, such as equity. SE insurers are the largest investors in equity, closely followed by IE and DK insurers, whereas NL insurers invest more than a quarter of their assets in mortgages and loans.

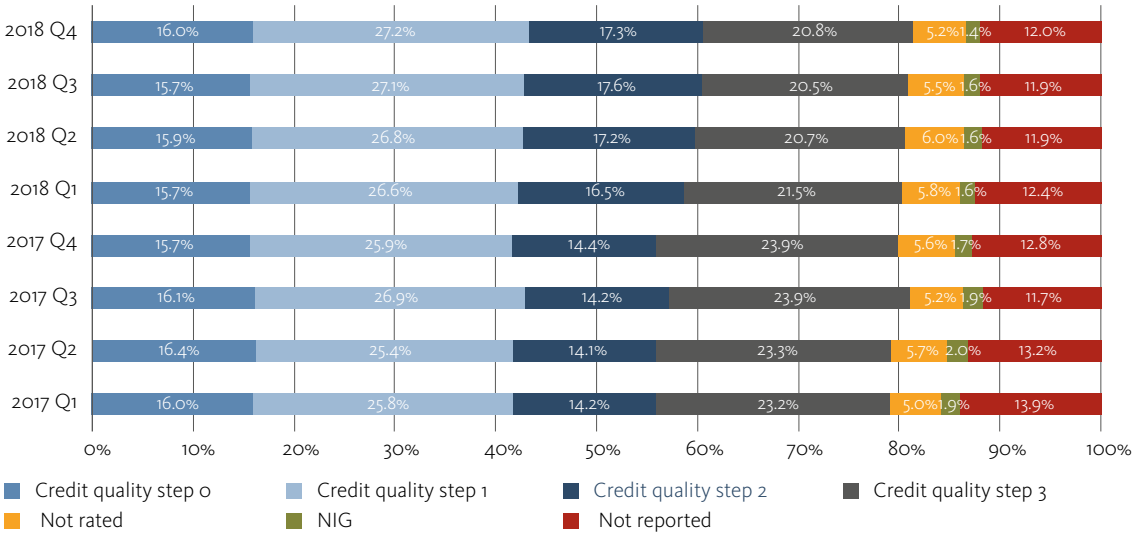
Figure 5.6: Investment split at country level

	Government bonds	Corporate bonds	Equity	Cash and deposits	Mortgages and loans	Property	Other
EU/EEA	31.5%	32.6%	15.2%	4.8%	5.6%	2.4%	7.9%
AUSTRIA	25.8%	31.5%	20.0%	4.4%	4.3%	7.3%	6.7%
BELGIUM	48.3%	22.1%	8.6%	3.0%	11.9%	2.9%	3.2%
BULGARIA	49.0%	16.3%	11.0%	11.5%	4.7%	4.0%	3.6%
CROATIA	63.6%	4.9%	8.1%	5.3%	7.6%	7.9%	2.6%
CYPRUS	18.8%	37.2%	13.0%	15.7%	2.9%	5.9%	6.6%
CZECH REPUBLIC	48.8%	18.0%	11.7%	6.2%	8.9%	0.4%	6.0%
DENMARK	18.1%	40.9%	26.9%	2.6%	3.5%	2.9%	5.1%
ESTONIA	27.1%	45.1%	1.5%	22.2%	0.6%	0.0%	3.5%
FINLAND	10.6%	35.8%	13.8%	15.9%	5.0%	5.7%	13.1%
FRANCE	33.5%	34.9%	12.5%	3.3%	2.0%	2.4%	11.3%
GERMANY	25.2%	36.6%	20.9%	3.7%	5.6%	2.2%	5.7%
GREECE	60.6%	20.5%	5.2%	7.4%	1.0%	1.9%	3.3%
HUNGARY	80.0%	3.8%	4.9%	4.6%	0.4%	0.1%	6.1%
ICELAND	26.3%	20.7%	32.2%	7.2%	2.3%	0.0%	11.3%
IRELAND	28.2%	32.5%	7.1%	20.4%	4.4%	1.5%	5.8%
ITALY	51.9%	21.1%	13.3%	2.2%	1.2%	1.1%	9.1%
LATVIA	61.1%	17.5%	2.3%	13.4%	1.4%	1.0%	3.2%
LIECHTENSTEIN	23.9%	36.3%	5.8%	22.8%	5.7%	0.1%	5.4%
LITHUANIA	69.1%	14.9%	2.1%	7.5%	1.2%	0.8%	4.4%
LUXEMBOURG	29.3%	35.1%	8.3%	11.4%	9.0%	1.1%	5.8%
MALTA	36.0%	18.6%	8.9%	19.6%	5.2%	2.0%	9.7%
NETHERLANDS	34.4%	17.0%	6.3%	4.3%	26.7%	2.3%	9.0%
NORWAY	14.3%	46.8%	21.8%	2.3%	10.2%	0.5%	4.1%
POLAND	56.7%	5.0%	21.4%	4.9%	4.6%	0.3%	7.2%
PORTUGAL	55.8%	23.2%	1.6%	8.4%	5.7%	3.2%	2.0%
ROMANIA	69.0%	7.6%	6.2%	13.5%	1.3%	1.6%	0.8%
SLOVAKIA	51.5%	33.3%	3.7%	5.8%	0.9%	0.6%	4.2%
SLOVENIA	38.6%	33.4%	18.1%	3.8%	1.5%	1.8%	2.8%
SPAIN	56.9%	21.8%	6.0%	7.8%	1.0%	2.5%	4.0%
SWEDEN	15.2%	32.8%	32.5%	4.2%	3.5%	3.4%	8.4%
UNITED KINGDOM	20.9%	36.5%	12.9%	10.1%	9.1%	2.7%	7.7%

Source: EIOPA Quarterly Solo
Reference date: Q4 2018
Note: Red - above 90th percentile, Blue - below 10th percentile; look-through approach applied. Other investments include collective Investments, structured notes, collateralised securities and other investments not classified in the mentioned categories. Assets held for unit-linked business are excluded.

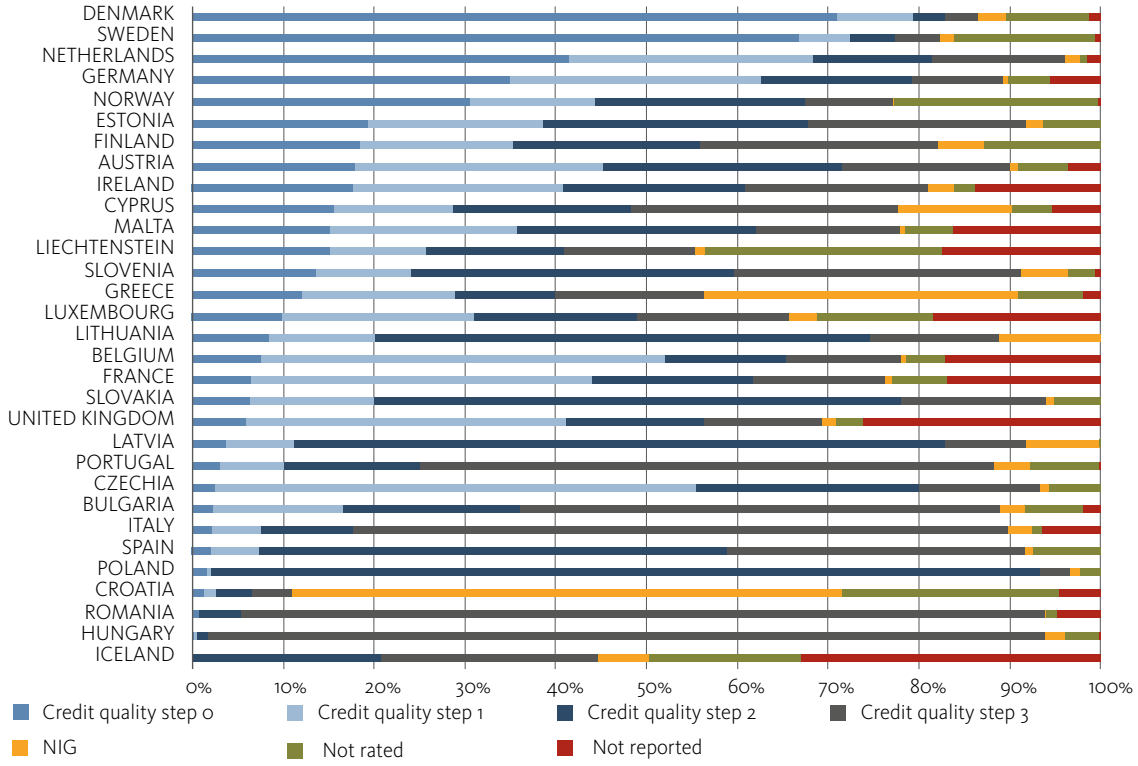
The overall credit quality of the bond portfolio is broadly satisfactory, although slight changes are observed in 2018 (Figure 5.7). The vast majority of bonds held by European insurers are investment grade, with most rated as CQS1 (AA). However, the share of CQS2 has increased in particular in 2018, and significant differences can be observed for insurers across countries (Figure 5.8).

Figure 5.7: Credit quality of bond portfolio



Source: EIOPA Quarterly Solo
Note: Government and corporate bond portfolios combined. Assets held for unit-linked are included.

Figure 5.8: Credit quality of bond portfolio across countries

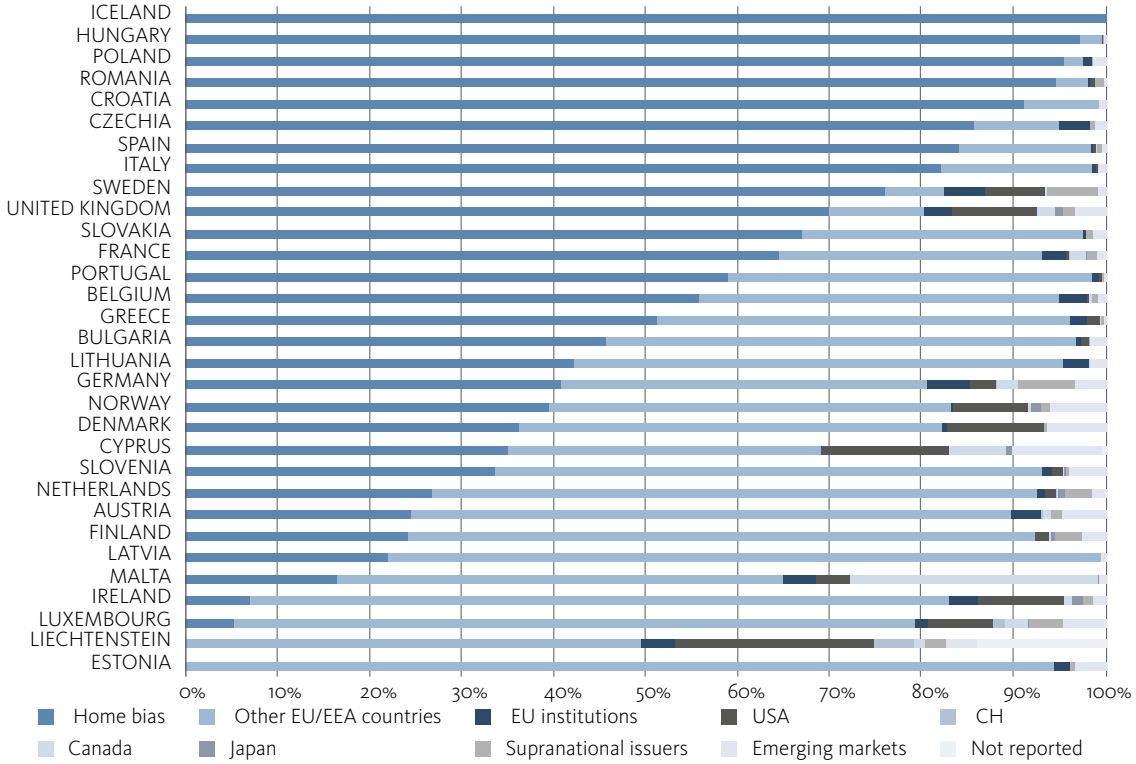


Source: EIOPA Quarterly Solo
Reference date: Q4 2018
Note: Government and corporate bond portfolios combined. Assets held for unit-linked are included.

Insurers also continue to show significant home bias for government bonds investments, while direct exposures of the European insurance sector towards emerging markets are limited. In order to assess the risk of a sudden reassessment of risk premia, it is important to analyse investment exposures from a geographical point of view. In particular, government bonds holdings of insurers continue to show significant home bias, which is particularly relevant should concerns over debt sustainability resurface in the EU (Figure 5.9-5.10). A significant home bias poses a higher concentration risk in affected countries.

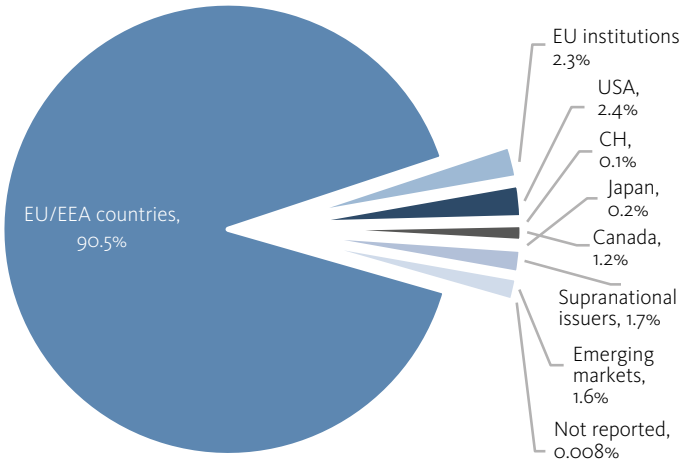
Additionally, insurers' exposures towards emerging markets that are currently one of sources of a potential instability are relatively limited for most countries. However, insurers from CY, NO and DK seem to have larger investments in this markets compared to insurers from other EU/EEA countries. In addition, interconnectedness with banks exposed to emerging markets and second-round effects could still have an impact on insurers with limited direct exposure towards emerging markets, in case of economic distress.

Figure 5.9: Home biased behaviour for insurers' holdings of government bonds



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018
Note: Look-through approach applied. Assets held for unit-linked business are included.

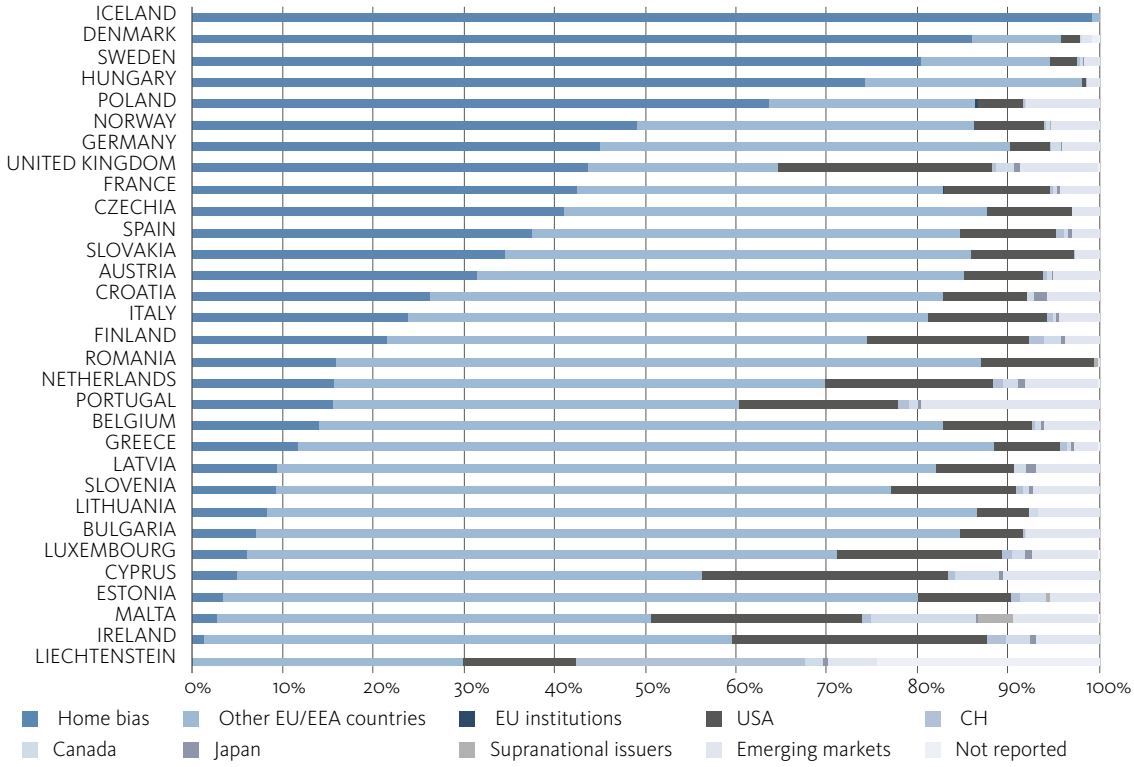
Figure 5.10: Overall government bonds exposures of the European insurers to different countries in Q4 2018



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018
Note: Look-through approach applied. Assets held for unit-linked business are included.

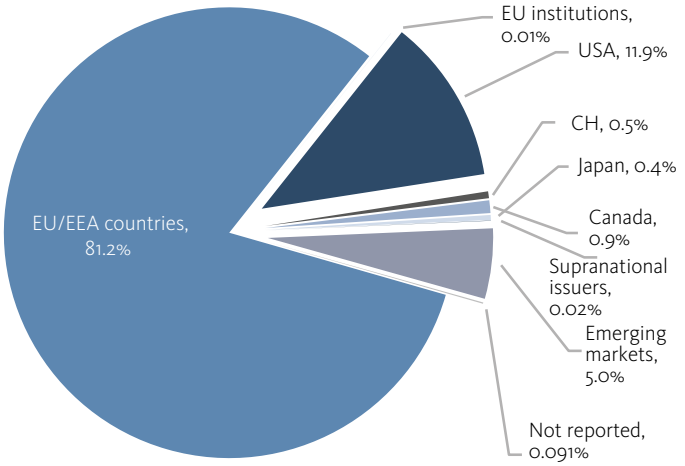
The overall corporate bonds exposures of the European insurers seems to be also oriented towards home bias behaviour but to a lesser extent when comparing to government bonds (Figure 5.11 - 5.12). In this case, the exposures towards emerging markets is slightly higher, with insurers from PT allocating almost a quarter of their corporates bonds portfolio to companies from emerging markets. On average, EU/EEA insurers have 5% of their corporate bonds portfolio allocated in emerging markets' firms.

Figure 5.11: Home biased behaviour for insurers' holdings of corporate bonds



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018
Note: Look-through approach applied. Assets held for unit-linked business are included.

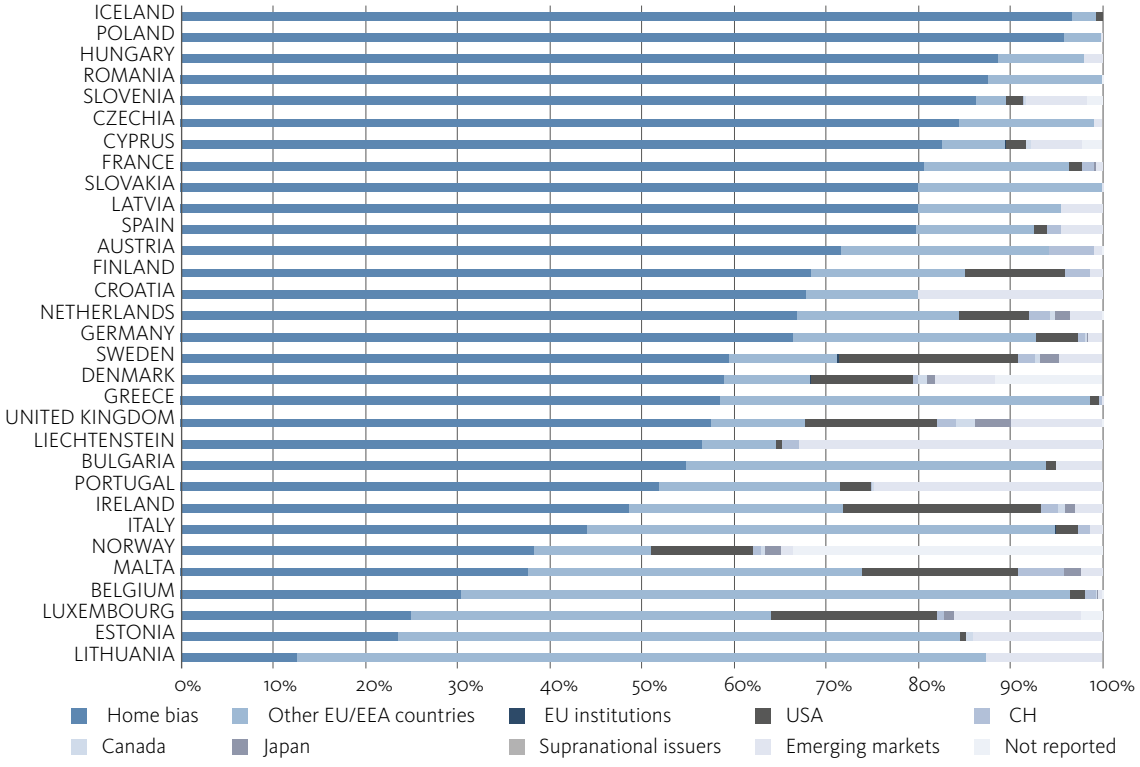
Figure 5.12: Overall corporate bonds exposures of the European insurers to different countries in Q4 2018



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018
Note: Look-through approach applied. Assets held for unit-linked business are included.

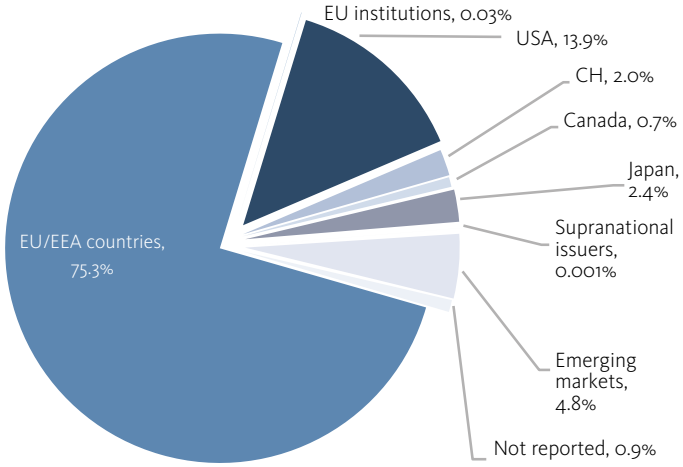
Despite limited exposures of European insurers towards equity emerging markets (4.8%), the insurance sector may still be vulnerable to a potential pronounced equity market distress. As equity markets have partially recovered after a correction in the US stock market in December, there are still concerns of a global economic slowdown following trade tensions between the US and China. This could serve as additional transmission channel of risks from emerging markets to the European insurance sector. Again, while direct exposures toward emerging markets are very limited for most countries as well as at a European level (Figure 5.13 and 5.14), uncertainty, political instability and interconnectedness could have negative effects on equity prices. This would have a noteworthy impact on insurance sectors in countries with substantial exposures to equities (Figure 5.6).

Figure 5.13: Home biased behaviour for insurers' equity investments in Q4 2018



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018
Note: Look-through approach applied. Assets held for unit-linked business are included.

Figure 5.14: Overall equity exposures of the European insurers to different countries in Q4 2018



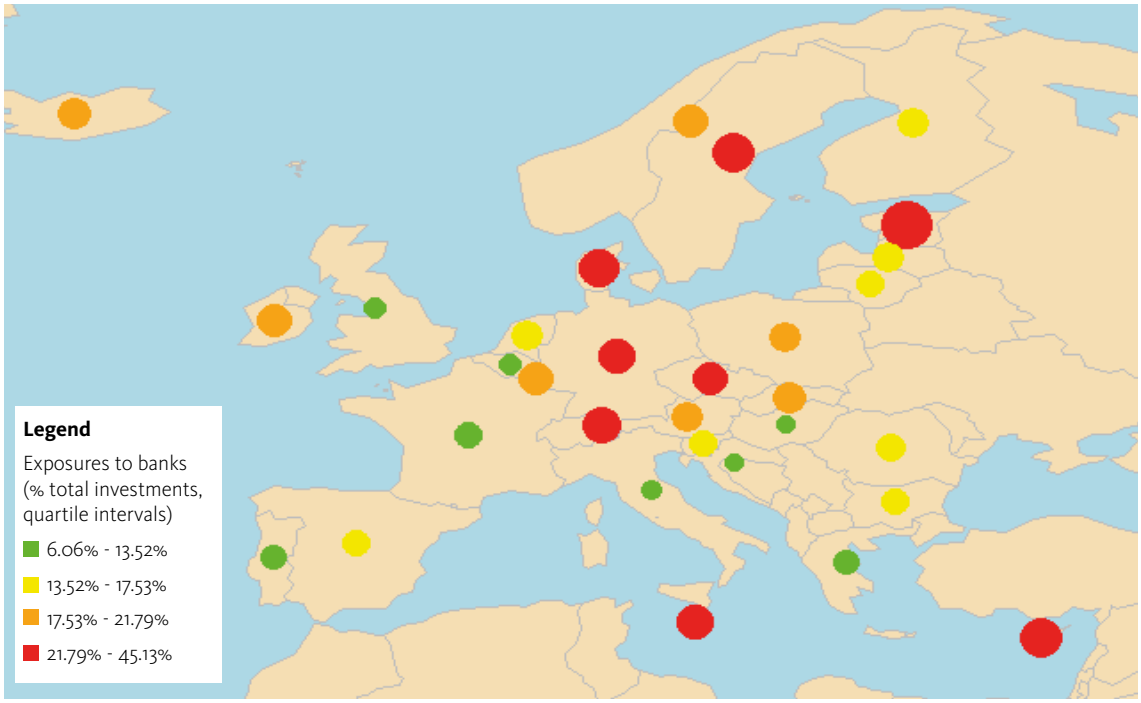
Source: EIOPA Quarterly Solo
Reference Date: Q4 2018
Note: Look-through approach applied. Assets held for unit-linked business are included.

INTERCONNECTEDNESS BETWEEN INSURERS AND BANKS

The overall exposures towards the banking sector remain significant for insurers in certain countries, which could be one potential transmission channel in case of a sudden reassessment of risk premia. The interconnectedness between insurers and banks could intensify contagion across the financial system through common risk exposures. A potential sudden reassessment of risk premia may not only affect insurers directly, but also indirectly through exposures to the banking sector. This is also a potential transmission channel of emerging markets distress, as banks have on average larger exposures to emerging markets when compared to insurers. Another channel of risk transmission could be through different types of bank instruments bundled together and credited by institutional investors such as insurers and pension funds.

The insurance sector, which are substantially exposed to banks, are relatively more vulnerable (Figure 5.15 and Table 5.1) where there are significant exposures to banks with high NPL ratios. In fact, insurers' exposures towards banks are heterogeneous across the EU/EEA countries, with different levels of home bias as well (Figure 5.16). Hence, countries with primary banks exposed to emerging markets or weak banking sectors could be impacted more in case of economic distress. On average, 16.32% of the EU/EEA insurers' assets are issued by the banking sector through different types of instruments, mostly bank bonds. Insurers from EE, CY, SE and DK have a larger exposure to banks with some of them with significant home biased behaviour.

Figure 5.15: European insurers' exposures towards banks as a percentage of total investments



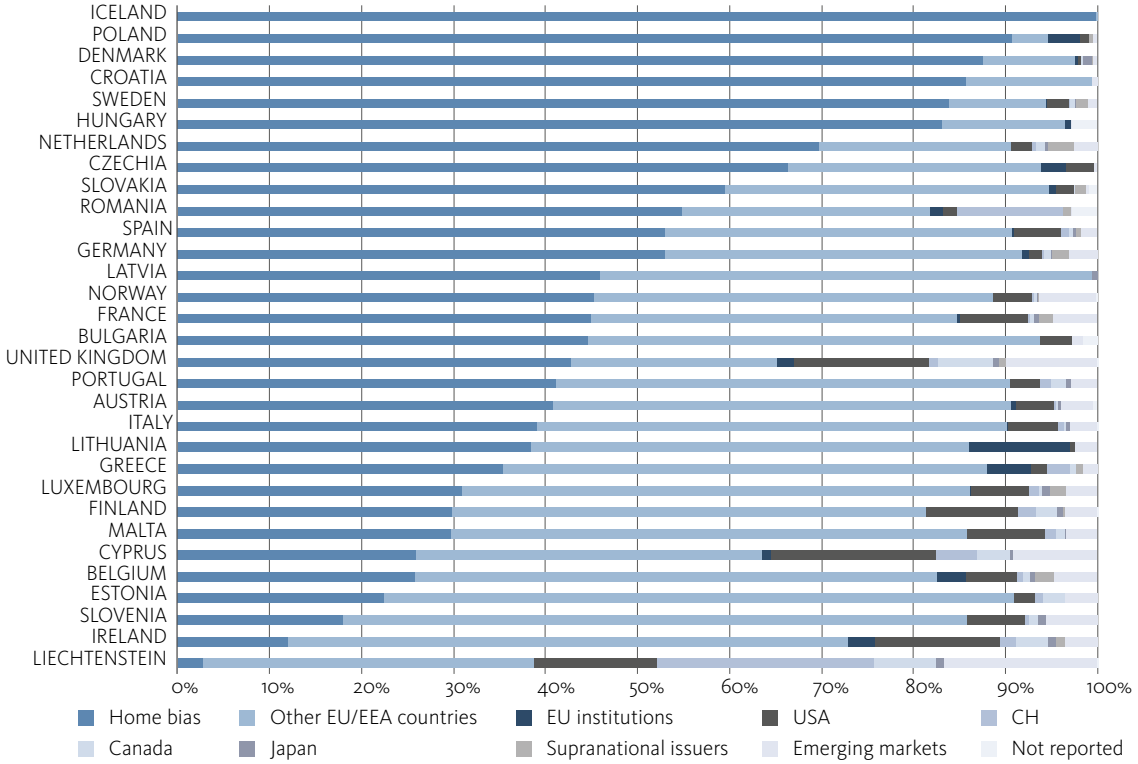
Source: EIOPA Quarterly Solo
Reference Date: Q2 2018

Table 5.1: EU/EEA insurers' exposures towards banks as a percentage of total investments at country level

Country	% Exposure to banks	Country	% Exposure to banks
EU/EEA average	16.33%	ITALY	7.97%
AUSTRIA	18.43%	LATVIA	17.27%
BELGIUM	8.61%	LIECHTENSTEIN	25.71%
BULGARIA	13.87%	LITHUANIA	14.16%
CROATIA	6.52%	LUXEMBOURG	21.57%
CYPRUS	31.04%	MALTA	24.63%
CZECHIA	22.01%	NETHERLANDS	17.52%
DENMARK	28.11%	NORWAY	21.49%
ESTONIA	45.13%	POLAND	17.59%
FINLAND	17.53%	PORTUGAL	12.53%
FRANCE	13.44%	ROMANIA	16.42%
GERMANY	23.61%	SLOVAKIA	20.38%
GREECE	12.34%	SLOVENIA	14.22%
HUNGARY	6.06%	SPAIN	13.60%
ICELAND	19.46%	SWEDEN	30.67%
IRELAND	21.47%	UNITED KINGDOM	9.81%

Source: EIOPA Quarterly Solo
Reference Date: Q4 2018
Note: the blue colour highlights the lowest exposures towards banks while the red colour highlights exposures towards banks

Figure 5.16: Insurance sector exposure towards the banking sector, domestic versus cross-border in %

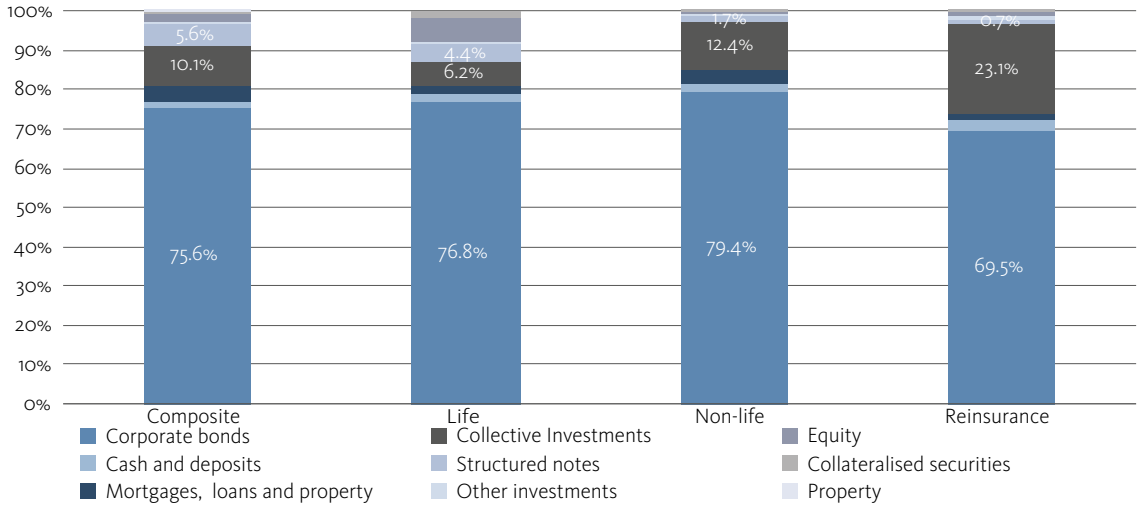


Source: EIOPA Quarterly Solo
Reference Date: Q4 2018

Intragroup exposures between insurers and banks could create vulnerabilities for the financial stability in case there is a high concentration of the assets within the same group if a market distress were to materialize. In addition, if some EU/EEA insurers or banks that are part of financial conglomerates were to face financial difficulties, these could seriously destabilise the financial system and affect individual depositors, insurance policyholders and investors. In this regards, insurers in EU/EEA were on average exposed to their intragroup banks by approx. 1% of their total banking assets (approx. 0.1% of total investment assets) at the end of 2018. This exposure comes mainly from equities and participations (61%), cash and deposits (23%) and bank bonds (16%). At country level, insurance sectors from PL, AT and IS tend to have higher intragroup transactions due to holdings of equities and participations in the banks belonging to the same group.

Risks from banking sectors could be transmitted to the insurance sector through specific financial instruments holdings (Figure 5.17). Insurers' exposures towards banks are mainly driven by holdings of bank bonds. Other significant exposures are through cash and deposits which are not effected by change in the market sentiment.

Figure 5.17: Exposures to banks by type of instruments and type of business



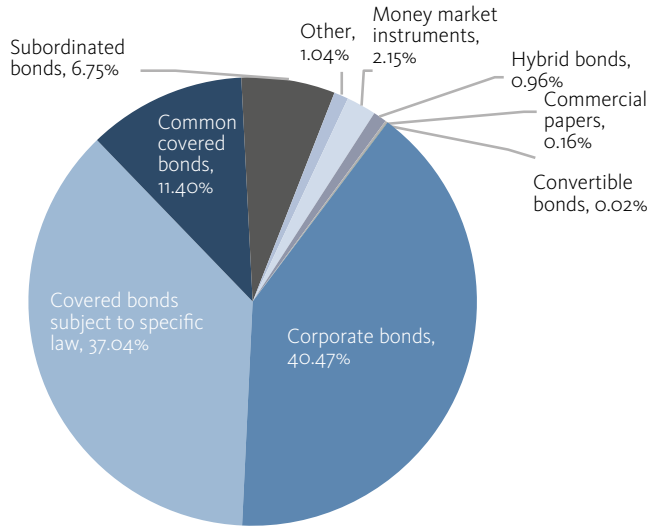
Source: EIOPA Quarterly Solo
Reference Date: Q4 2018

Recent changes in the banking supervision legislation might make debt issued by banks more risky for insurers. This refers to the new debt class, the so-called 'senior non-preferred' debt that has to be implemented in national legislations by January 2019. Market expectations are that banks will issue more non-preferred senior debt in the future to comply with tighter MREL/TLAC requirements. The idea behind the introduction of this new instrument is to facilitate the application of bail-in under BRRD and to allow banks to maintain enough subordinated ('bail-inable') capital. The role of bail-in bonds issued by banks is to absorb losses in a crisis before depositors lose money combining elements of equity and debt (hybrid instruments).

In light of the low-yield environment, non-preferred debt could attract insurers searching for better returns. In addition, given the importance of bank bonds in the investment portfolio of insurers, there are concerns regarding the availability of enough preferred senior debt on the market as banks might issue more 'bail-inable' bonds to meet the MREL requirements. In Q4 2018, approx. 77% of the exposure towards banks of the EU insurers was driven by holdings of senior bank corporate bonds (Figure 5.18).[31] Assuming that subordinated bonds, hybrid bonds and convertible bonds could be considered as bail-inable bonds, these categories account only for 7.7% of the total corporate bonds exposure. In the overall portfolios of insurers, this type of debt is less than 1% of the total investments. However, as around 25% of corporate bonds will mature within the 3 next years, the share of 'bail-inable' bonds might increase in the future in case these holdings are replaced with the new non-preferred senior debt instruments.

31 The breakdown of preferred and non-preffered senior debt is currently not available.

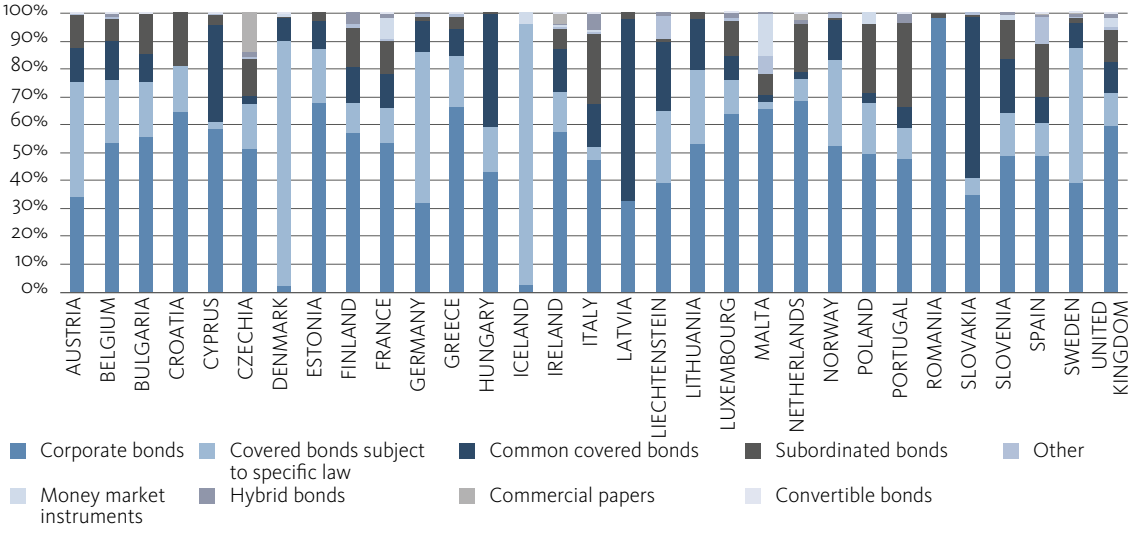
Figure 5.18: Breakdown of exposures to bank corporate bonds



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018

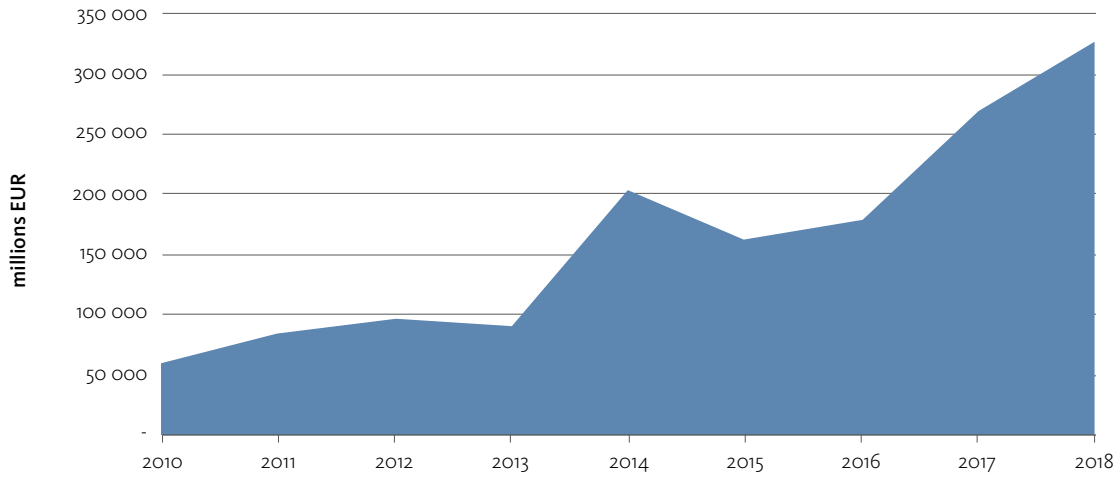
Furthermore, a breakdown by country (Figure 5.19) of the bank corporate bonds held by EU/EEA insurers reveals that insurers from several countries hold significant exposures to subordinated, hybrid and convertible bonds that could be bail-inable in case of a bank failure. Banks bail-in bonds could become attractive to insurers as they could offer a higher return without requiring additional capital charge as it depends on the group of credit quality steps where they are placed in when assigning a certain capital charge.

Figure 5.19: Breakdown of exposures to bank corporate bonds by country in Q4 2018



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018

Figure 5.20: Traded European CLOs



Source: Bloomberg data, EIOPA calculations

COLLATERALIZED LOANS OBLIGATIONS AND COLLATERALIZED MORTGAGES OBLIGATIONS

Over the last few years, the leveraged lending market and collateralised loans and mortgage market have increased significantly. [32] The volume of CLOs traded in the European market has substantially raised in the last years (Figure 5.20); this asset class is now about 5 times larger than in 2010. A potential risk of holding CLOs is that if market conditions worsen, CLOs could lose their trading liquidity.

Leveraged loans and CLOs could turn out to be risky for several reasons. First, insurers holding CLOs are exposed to credit risk as usually CLOs (and CMOs) are composed of loans issued to below-investment-grade companies that are sensitive to variations in the financial cycle (despite the CLOs having a high credit quality). For example, a decline in underwriting standards could position investors at increasing risk of losses. For CMOs, a decline in real estate prices could increase the risk of default of the borrowers as it similarly happened in the 2007-2008 financial crisis. Further, in case of a potential collateral deterioration, if a CLO's loans suffer losses, cash flows are allocated to tranches in order of seniority. Depending on the losses' severity, the value of the equity tranche could be lost and junior loan tranches could lose principal. There is no recourse and no guarantee for the investors in CLOs as these instruments have recourse only to the principal and interest payments of the loans in the portfolio and not to the borrower and its assets in case of a default.

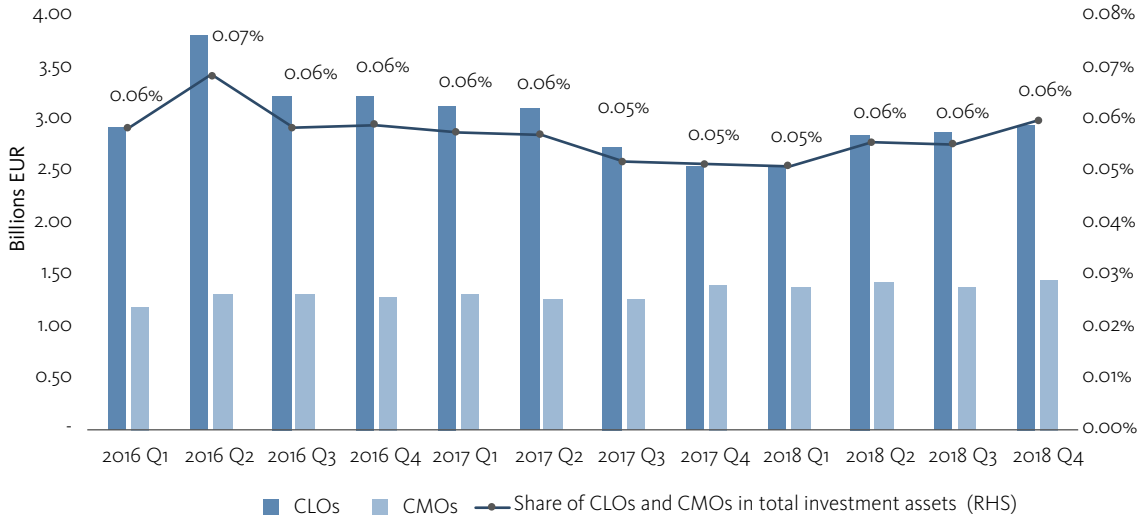
In addition, there is the risk given by holding the equity tranche of a CLO. The equity tranche is last in line to receive cash flows and first to realize losses so investors in this tranche take on the most risks. In addition, it has higher volatility and it is more difficult to hedge.

Overall, the exposure of insurers to CLOs and CMOs remains limited at the moment, representing about 0.06% of total investment assets of European insurers (Figure 5.21), while overall collateralized securities are slightly below 1% of the total investment assets. At the end of Q4 2018, only 55 solo undertakings from 12 countries were holding CLOs in their portfolios. In the case of CMOs, 15 solo undertakings from 7 countries were holding this type of investment in Q4 2018. Unit-linked and index-linked business are excluded as well as holdings of CLOs and CMOs through investments in funds.

Exposures to CLOs and CMOs have slightly increased every quarter during 2018 and amount to EUR 4.37 bn in Q4 2018. Insurers from MT invest the highest share of their portfolios to CLOs (they have no CMO exposure reported) compared to other countries at the end of 2018 (Figure 5.22).They are followed by insurers from IE, UK and DE who have exposures to both CLOs and CMOs.

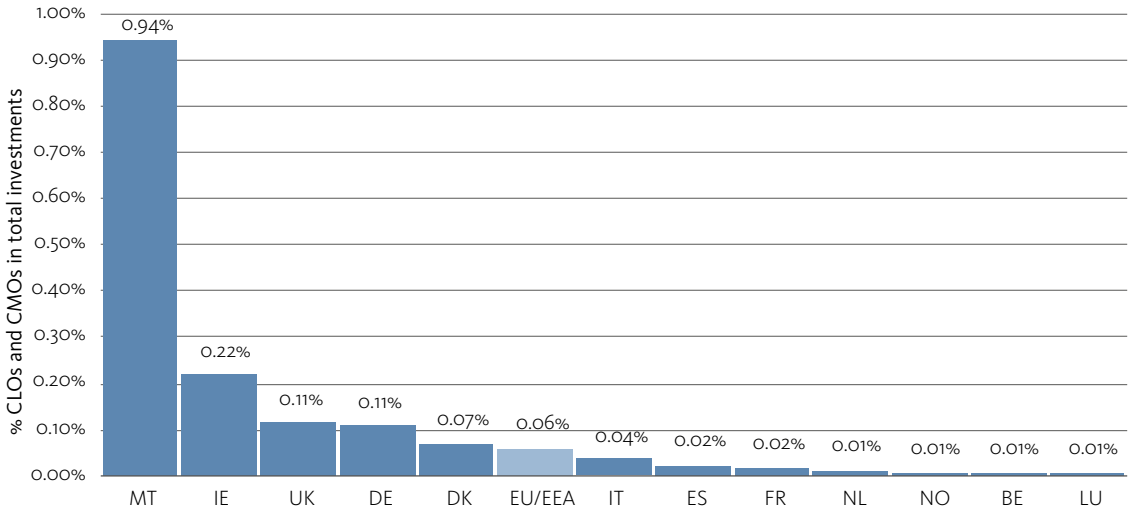
32 Collateralized loans obligations (CLOs) are structured finance securities collateralized predominantly by a pool of senior secured loans (typically bank loans). Collateralized mortgages obligations (CMOs) are a type of mortgage-backed securities containing a pool of mortgages collateralized together. Both types of instruments issued to investors consist of several tranches with different payment priorities and different credit quality and credit ratings. CLOs and CMOs offer an attractive yield alternative to traditional bond investments. The credit risk of a CLO is dependent on the underlying assets within the portfolio. For "traditional" CLOs, the collateral pool primarily consists of below investment grade loans that might be risky.

Figure 5.21: EU/EEA insurers' holdings of CLOs and CMOs



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018

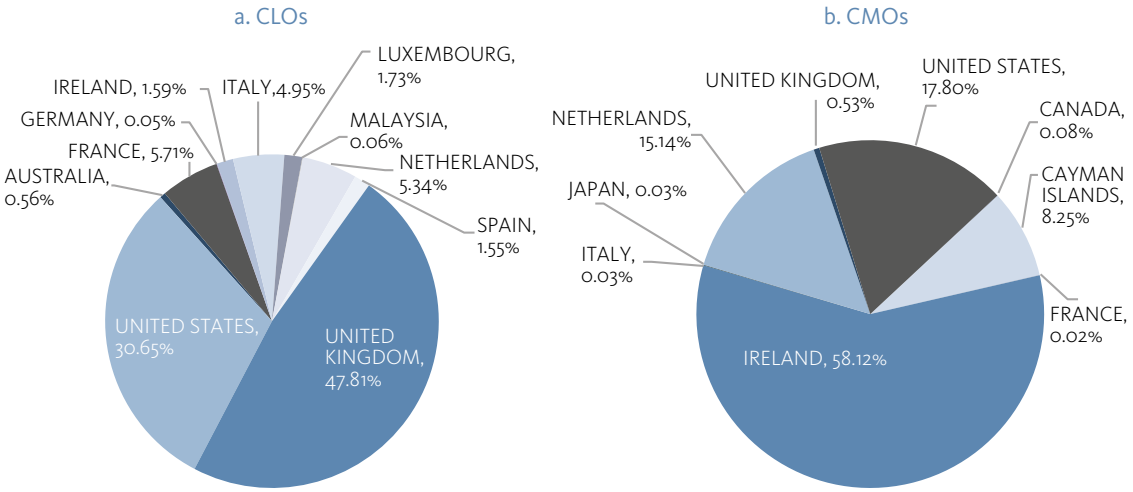
Figure 5.22 EU/EEA insurers' holdings of CLOs and CMOs as a share of total investment assets per country in Q4 2018



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018

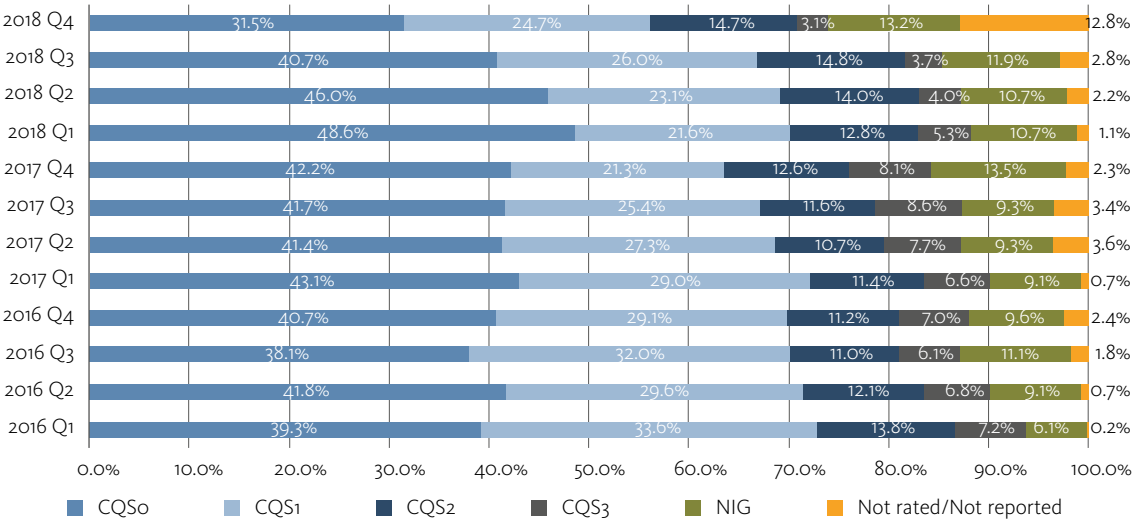
Most CLOs held by insurers are issued in IE, whereas most CMOs are issued in the UK. Almost two thirds of the CLOs are issued in IE (58.12%) followed by US (17.80%) and NL (15.14%) (Figure 5.23 a). In the case of CMOs, more than three quarters are issued in UK (47.81%) and US (30.65%) (Figure 5.23 b). Nonetheless, this does not entail that the underlying assets of CLOs or CMOs belong to the country of issuance. According to the credit quality of the CLOs and CMOs held by the European insurers in Q4 2018, almost a third are rated as credit quality 0, but decreasing compared to previous quarters (Figure 5.24). In the last 3 years, the non-investment grade rated CLOs and CMOs have doubled in value, which might turn out to be risky for insurers. At the end of 2018, the equity tranches of CLOs rated with CQS 7 amounted approx. 63.6 mil. EUR representing 0.2% of the total CLOs reported by insurers.

Figure 5.23 EU/EEA insurers' holdings of CLOs and CMOs by country of issuance



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018

Figure 5.24 Credit quality steps of EU/EEA insurers holdings of CLOs and CMOs



Source: EIOPA Quarterly Solo
Reference Date: Q4 2018

ANALYSIS BASED ON THE 2018 INSURANCE STRESS TEST EXERCISE

The main objective the 2018 Insurance Stress Test exercise was to assess the resilience of the European insurance sector to specific adverse scenarios with potential negative implications for the stability of the European financial markets and the real economy. In total, 42 (re)insurance groups, representing a market coverage of around 75% based on total consolidated assets, participated. The scenarios included in the stress test encompassed a combination of market and insurance specific risks, which are perceived by EIOPA as key risks to the European insurers and provide insight into potential vulnerabilities of the sector. Specifically, the following three scenarios were included in the ST exercise:

- A yield curve up (YCU) scenario encompassing market shocks combined with lapse and provisions deficiency stresses;
- A yield curve down (YCD) scenario encompassing market shocks combined with longevity stress;
- A natural catastrophe (NC) scenario encompassing a series of 4 windstorms, 2 floods and 2 earthquakes distributed throughout Europe.

The first two scenarios reflect, on the one hand, the risk of a sudden and abrupt reversal of risk premia (RP) leading to a tightening of financial conditions and, on the other hand, the risk of a continuation of the current low interest rate environment. Furthermore, the NC scenario reflects the risk of an increasing frequency of natural disasters, partly triggered by extreme weather events due to climate change, a key emerging risk for insurers.

Further analysis suggest that asset characteristics are the main determinants of the results in the YCU scenario, with the share of insurance with profit participation playing a mitigating role, while the share of life TP seems to be the main driver in the YCD scenario, with the share of corporate and government bonds mitigating the impact. The main stress test results have been published in a focused report in December 2018. In order to shed additional light on the key determinants of the stress test results for YCU and YCD scenarios, a regression analysis has been conducted (Box 5.1). The aim is to determine the main drivers of the impact of the shocks on excess of assets over liabilities (eAoL) and SCR ratio for both the YCU and YCD scenario, considering the assets and liabilities characteristics of the participating groups in the baseline.[33] In the analysis, the change in eAoL and the change in SCR ratio have been considered as dependent variables for both scenarios.The different groups' characteristics based on assets as well as liabilities indicators have been included as explanatory variables. On the assets side, the share of the different assets types as a percentage of total assets could be employed. On the liabilities side, variables such as the share of life and non-life technical provisions (TP) could be considered along with duration of the TP for life and non-life business, and the share held by different types of contracts (insurance with profit participation contracts, contracts with guarantees, reinsurance, etc.) in the total gross best estimate. In addition, other variables such as size of assets and liabilities could be included in the analysis together with other characteristics like the methods of SCR calculation (SF, PIM, FIM) and use of LTG and transitional measures (VA, MA, TMRFR, TMTP).

33 We employ two different data samples: one corresponding to the baseline information combined with the YCU data and the second one containing the same baseline information combined with the YCD data. The baseline dataset, that is common for both scenarios/datasets, contains the balance sheet information, assets and liabilities characteristics, as well as several features of the capital position of the 42 insurance groups that were part of the stress test exercise. The post stress results of excess of assets over liabilities (eAoL), solvency capital requirement (SCR) ratio, loss absorbing capacity of technical provisions (LAC TP) and loss absorbing capacity of deferred taxes (LAC DT) for both scenarios have been utilised for the analysis. Furthermore, the relative change in both eAoL and the SCR ratio are defined as the adverse compared to baseline situation. Hence, the changes would be negative for most cases.

BOX 5.1: REGRESSION ANALYSIS OF ADVERSE SCENARIOS IMPACT ON GROUP CHARACTERISTICS

The regression analysis focuses on the impact of the participating groups' characteristics on the stress test results in the YCU and YCD scenarios. The link between the asset and liability characteristics and how these affect both the relevant change in eAoL and the SCR ratio were explored by a pooled linear regression analysis.[34],[35] Please note that only magnitutes and signs of the estimates of variables that are statistically significant are relevant. The coefficients of insignificant variables should not be interpreted.[36]

DRIVERS OF CHANGES IN EAOL

In the case of the YCU scenario, the obtained results (see Table 5.1.1) suggest that the change in eAoL is driven on the assets side by the share of assets held for unit-linked and index-linked business, share of holdings in related undertakings, share of unlisted equities, share of government bonds, share of CIUs and share of loans and mortgages computed as a percentage of total assets. All these shares of asset types in the groups' portfolios are significant in the regression and have a negative sign that translates higher shares of these assets into the lower eAoL in the YCU scenario. This finding is in line with the stress test results presented in the published stress test report, confirming that the overall impact on eAoL in the YCU scenario is driven by significant losses on the asset side following the increase in risk premia, which prevails over the decrease in the value of TP. Unlisted equities seem to play an important role suggested by the highest estimated coeefficients. This is again in line with the stress test results corresponding to 38.5% drop in aggregated equities. On the liabilities side, the regression results indicate that the groups are less affected by the YCU scenario when they have a larger share of insurance with profit participation contracts. In this case, the investment risk is also borne by the policyholder and an absorbed investment reserve can be used during periods of market stress.

In the case of the YCD scenario, the stress test results revealed that the change in eAoL is mainly driven by the increase in technical provisions. This result is confirmed by the regression analysis shown in Table 5.1.1. On the assets side, the groups with a higher share of corporate bonds seem to be less affected by the shocks, as their market value increases due to the lower interest rates. In other words, the higher share of corporate bonds imply a lower change in eAoL for the groups in the sample. Nonetheless, the increase in assets is not enough to compensate for the increase in technical provisions in the prescribed low yield environment. The regression results suggest that life insurers are more affected in the YCD scenario. In addition, on the liabilities side, the contracts with guarantees as well as the contracts with no guarantees (but to a lesser extent then the former) have a negative impact on the change in eAoL. In other words, the empirical results reveal that the eAoL of the participating groups decreases more for life groups that need to meet the guaranteed obligations by contracts sold in times of higher yields.

34 The stress test dataset does not contain a time series, hence only pool regression analysis could be preformed.

35 The description of the employed variables and their source is provided in the chapter 6.

36 Additionally, please note that due to the limited data sample, the endogeneity of variables cannot be fully addressed, as the applied analytical framework does not allow the identification of causalities.

Table 5.1.1: Results of the regression analysis for changes in eAoL

VARIABLES	YCU	VARIABLES	YCD
% Assets held for IL and UL	-0.774*	% Assets held for IL and UL	0.173
	(0.377)		(0.413)
% Holdings in related undertakings	-1.133**	% Holdings in related undertakings	0.474
	(0.435)		(0.481)
% Equities listed	-0.441	%Equities listed	0.523
	(0.811)		(1.014)
% Equities unlisted	-3.719**	% Equities unlisted	-0.221
	(1.404)		(1.729)
% Government Bonds	-0.981**	% Government Bonds	0.581
	(0.385)		(0.478)
% Corporate Bonds	-0.659	% Corporate Bonds	0.685*
	(0.406)		(0.399)
% CIUs	-1.336***	% CIUs	0.118
	(0.430)		(0.475)
% Loans and mortgages	-3.040***	% TP life	-0.515**
	(0.528)		(0.218)
% Insurance with profit participation contracts	0.150*	Duration TP life	-0.00118
	(0.0874)		(0.00855)
% Contracts without options and guarantees	-0.0157	% Contracts without options and guarantees	-0.264*
	(0.0635)		(0.136)
% Annuities (life) contracts	-0.0427	% Contracts with options and guarantees	-0.315*
	(0.127)		(0.156)
% Accepted reinsurance (life) contracts	-0.453	% Annuities (life) contracts	-0.192
	(0.723)		(0.151)
VA	-0.0638	% Accepted reinsurance (life) contracts	0.375
	(0.0629)		(1.011)
MA	0.0480	VA	-0.00881
	(0.0453)		(0.0848)
Constant	0.540	MA	0.0970
	(0.337)		(0.0779)
		Constant	-0.212
			(0.361)
Observations	41	Observations	41
R-squared	0.659	R-squared	0.443
Robust standard errors in parentheses		Robust standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1		*** p<0.01, ** p<0.05, * p<0.1	

Drivers of changes in SCR ratio

The results of the regression analysis for the YCU scenario indicates that the SCR ratio decreases more for companies with a larger share of government bonds (Table 5.1.2). The overall stress test results already showed that when the prescribed shocks are applied in the YCU scenario, the value of government bonds decreases by 12.8%. On the other hand, the change in LAC DT seems to have a significant contribution in the change of the SCR ratio according to the regression results. More precisely, groups that reported a higher change of LAC DT in the adverse scenario compared to the baseline are less affected by the scenario. This variable was added in the regression model as within the Solvency II framework LAC DT may reduce the impact of the shock if the undertaking can provide credible evidence that they can utilise the fiscal losses stemming from the impact of the pre-tax shock loss.

In the YCD scenario, the regression results suggest that groups with a higher share of bonds (corporate and government bonds) are less impacted by the prescribed shocks leading to a lower impact on the SCR ratio. The value of corporate and government bonds increase by 2.3% and 3.1%, respectively, due to lower interest rates. Moreover, the obtained results indicate that a larger share of contracts with guarantees contribute to more substantial drops in the SCR ratio. Similar with the YCU scenario, the effect of the LAC DT improves the ST results and capital position of insurers. Hence, the impact on the change in SCR ratio is lower for groups that have a larger change in the use of LAC DT.

Table 5.1.2: Results of the regression analysis for changes in SCR ratio

VARIABLES	YCU	VARIABLES	YCD
% Assets held for IL and UL	-0.689	% Assets held for IL and UL	0.900**
	(0.622)		(0.345)
% Holdings in related undertakings	-1.084	% Equities listed	1.510
	(0.833)		(1.184)
% Government Bonds	-1.334*	% Equities unlisted	5.482
	(0.775)		(4.263)
% Corporate Bonds	-1.117	% Government Bonds	0.725*
	(0.847)		(0.411)
% CIUs	-0.966	% Corporate Bonds	0.913**
	(0.709)		(0.438)
% Loans and mortgages	-1.650	% Insurance with profit participation contracts	-1.915
	(1.004)		(1.297)
% Annuities (life) contracts	3.105	% Contracts without options and guarantees	-2.066
	(2.308)		(1.308)
% Accepted reinsurance (life) contracts	-0.650	% Contracts with options and guarantees	-2.484*
	(0.988)		(1.295)
VA	0.0311	% Accepted reinsurance (life) contracts	-0.818
	(0.0692)		(1.168)
MA	0.202	VA	-0.0518

VARIABLES	YCU	VARIABLES	YCD
	(0.122)		(0.0846)
ch_LAC_TP	0.152	MA	0.0951
	(0.151)		(0.0909)
ch_LAC_DT	0.176*	ch_LAC_TP	0.0584
	(0.101)		(0.106)
Size assets	-0.00638	ch_LAC_DT	0.305***
	(0.0327)		(0.0728)
Constant	0.805	Constant	1.217
	(0.616)		(1.216)
Observations	36	Observations	36
R-squared	0.617	R-squared	0.691
Robust standard errors in parentheses		Robust standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1		*** p<0.01, ** p<0.05, * p<0.1	

The results from the natural catastrophe scenario included in the EIOPA 2018 Insurance Stress Test Exercise highlighted a potential concentration risk in the ceded losses to reinsurers. The 2018 stress test exercise included a nat-cat scenario based on a set of 8 extreme natural events localised in Europe and distributed on 3 perils (4 windstorms, 2 floods, 2 earthquakes) happening on top of the events registered in 2017.[37] The aim of the scenario was to test the resilience of the European insurance industry against a sequence of natural catastrophes happening in a short period of time. In order to test the adequacy of their risk transfer practice, participating groups were instructed to stick to the reinsurance treaty in place for the year 2017 without any reinstatement of the reinsurance coverages (if not automatically included the in-force treaties) in between the prescribed events.

Participating groups reported EUR 33.2 bn gross losses and showed a proper resilience to the prescribed scenario (the AoL dropped by only -0.3 percentage points) mainly due to the adequate risk transfer techniques in place: 55% of the gross aggregated losses – EUR 15.1 bn – were ceded via proportional and non-proportional reinsurance treaties.[38]

While the overall results showed the resilience of the European insurance industry to the specific nat-cat scenario due to the adequacy of the reinsurance programs in place among the participating groups, the concentration of ceded losses towards a limited number of reinsurers and geographic areas might be a source of concern. Indeed, the EIOPA Stress Test report already showed that the top 5 reinsurers account for 52% of reinsurance recoverables reported in the list of top 10 reinsurance recoverables (70% of total reinsurance recoverables in the nat-cat scenario).

The ceded losses/reinsurance recoverables also show significant concentrations within certain jurisdictions, in particular for losses transferred to Switzerland. Concentrations within specific geographical areas could be an additional risk channel, as insurers with concentrated exposures might be more vulnerable to counterparty risk or to identified macro-financial turbulences within these jurisdictions. The concentration risk has been further analysed by looking at the jurisdictions where the losses were transferred to and at the level of concentration of the exposures within each jurisdiction (Figure 5.25).[39] Based on the 10 largest reported expected reinsur-

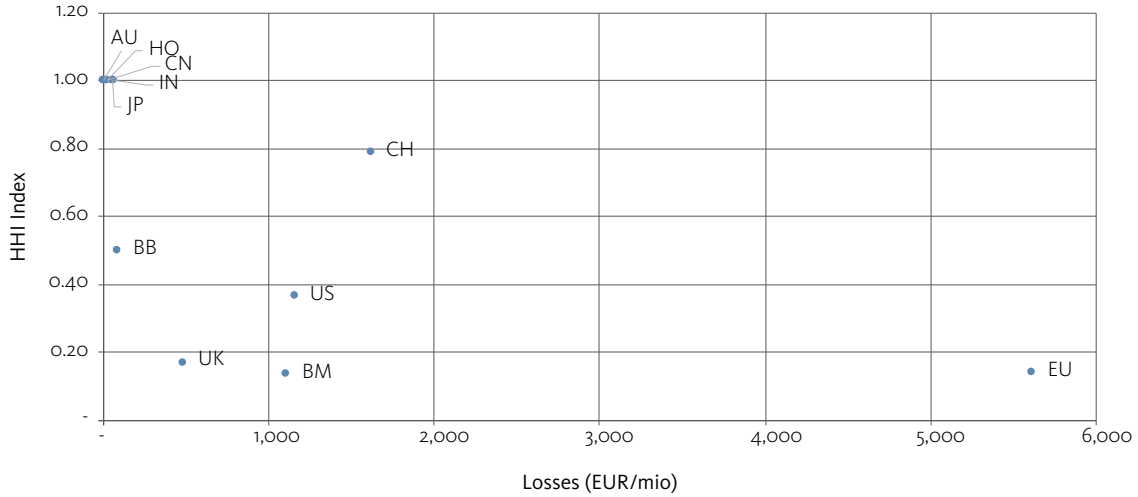
37 For a thorough description of the Nat-Cat scenario please refer to the 2018 technical documentation available here: https://eiopa.europa.eu/Pages/Financial-stability-and-crisis-prevention/Stress-test-2018.aspx

38 For more information on the results, please refer to the EIOPA Stress Test report here: https://eiopa.europa.eu/Pages/Financial-stability-and-crisis-prevention/Stress-test-2018.aspx

39 It should be noted that the analysis cannot distinguish between the transfer of risks within the reinsurance groups to which the losses are ceded. This might overestimate the concentration. However, the limited information available on the risk management strategy of these groups and the heterogeneity of the resolution processes among jurisdictions does not allow for a more accurate estimation.

ance recoveries in the reinsurance treaties, approximately one third (EUR 5.6 bn) of the ceded losses remain in the EU, whereas the remaining losses are transferred mainly to Switzerland, US, UK, Bermuda. Looking at within jurisdiction concentration, the distribution of the losses shows a heterogeneous picture. In some cases, e.g. Switzerland, the ceded losses are more heavily concentrated in one or a limited number of players,whereas in other countries such as Bermuda the losses are more evenly distributed across reinsurers. Countries located in the top left corner of the graph have limited exposures concentrated in only one reinsurance undertaking each (HHI = 1).

Figure 5.25 Ceded losses and concentration



Source: EIOPA
Reference Date: Q4 2017
Note: The scatter-plot displays on the x-axes the size of the expected reinsurance recoverables from reinsurers grouped by jurisdiction and in the y-axes the level of concentration of the expected recoverables for each jurisdiction. The analysis elaborates on the list of the reinsurance companies owing to the participating groups the top 10 reinsurance recoveries (reduced for any reinstatement premiums payable). The reinsurers therein are traced back to the jurisdiction where they are located or, if belonging to a group, to the jurisdiction where the group is registered. The approach is based on the assumption that the risk ultimately lies in the parent company. The level of concentration is measured via the Herfindhal-Hirshman index ().
Abbreviations in the figure: AU: Australia; BB: Barbados; BM: Bermuda; CH: Switzerland; CN: China; HO: Hong Kong; IN: India; JP: Japan.

6. BACKGROUND INFORMATION AND DATA DESCRIPTION

OVERVIEW AND DATA (RE) INSURANCE SECTOR

EIOPA publishes statistics based on quantitative Solvency II reporting from insurance undertakings and groups in the European Union and the European Economic Area (EEA). These statistics are published on a quarterly basis. Every publication is accompanied by a note describing the key aspects of the statistics published. The tables and charts are available in PDF and Excel format and are based on information from the statistics at the publication date.[40]

The new supervisory regime Solvency II came into full force on 1 January 2016 as a result of timely preparation and appropriate transitional periods.

The Solvency II Directive (Directive 2009/138/EC) introduces advanced solvency requirements for insurers based on a holistic risk assessment, and imposes new assessment rules for assets and liabilities, which must be assessed at market values.

Currently the following type of information is available:

Indicators based on Individual insurance undertakings (solo data)

- Quarterly and annual publication of statistics based on solo prudential reporting data and available on a country-by-country basis.

Indicators based on Insurance groups (group data)

- Annual publication of key indicators based on group reporting and available at EEA level from Autumn 2017.

40 https://eiopa.europa.eu/Pages/Financial-stability-and-crisis-prevention/Insurance-Statistics.aspx

INDICATORS BASED ON REPORTING FOR FINANCIAL STABILITY PURPOSES

Pursuant to Art. 51 Solvency II Directive 2009/138/EC insurance companies have to publish annual Solvency and Financial Condition Reports (SFCR) for groups as well as solo reports for its Solvency II regulated legal entities since May 2017. The structure of this Financial Stability Report covers Q4 2018 and focuses on European (re) insurance undertakings and groups that report regularly under Solvency II. EIOPA bases its analysis mainly on Quarterly Prudential Reporting Solo (QRS) for Q4 2018. But as not all templates and/or companies report under QRS, EIOPA also uses Annual Reporting Solo (ARS) and Quarterly Financial Stability Reporting Group (QFG) for some indicators.

Information is provided on different sample sizes as some (re)insurance companies are exempted from quarterly reporting in accordance with Art. 35 (6). Therefore, the sample of undertakings is not identical in the annual and quarterly publications. Each Figure EIOPA uses in this report is hence accompanied by a source mentioning the sample size and a note on data (if needed).

INSURANCE SECTOR

Solvency II has put in place long term guarantees (LTG) and transitional measures to ensure an appropriate treatment of insurance products that include long-term guarantees and facilitate a smooth transition of the new regulatory framework regime. The LTG measures are a permanent feature of Solvency II, whereas the transitional measures will be gradually phased out until 2032, by which time the balance sheet position of insurance companies will be fully estimated at market value. For a period of 16 years after the start of Solvency II (re)insurance undertakings may apply the transitional measure on the technical provisions and the risk-free interest rate.

The use of LTG and transitional measures is transparent and insurance companies publish their solvency ratios with and without the application of these measures. LTG and transitional measures form an integral part of Solvency II and are intended to limit the procyclicality of the regulatory changes and to facilitate the entry into the new regime by giving companies the time needed to adapt to the new solvency requirements.

The EIOPA Insurance Stress Test Report 2016 and the Report on Long-Term Guarantees (LTG) [41] have shown that, in the absence of the easing effect of the LTG and transitional measures, insurers might be induced to force sales and de-risk in order to lower their SCR and MCR, possibly pushing asset prices further down, adding to the market volatility and potentially affecting financial stability.

Pursuant to Art. 51 Solvency II Directive 2009/138/EC solo insurance companies were required to publish annual Solvency and Financial Condition Reporting (SFCR) for the first time in May 2017, followed by groups at the end of June. Hence, this report uses a huge amount of comprehensive information on Solvency II results for the first time.

The publication of SFCR reports gives access to Solvency II results. Capital requirements under Solvency II are twofold. The Solvency Capital Requirement (SCR) is the level above which there is no supervisory intervention for financial reasons. Supervisors will take measures once the SCR is breached and ultimate measures (loss of licence) once the MCR is breached.

While the quarterly templates do contain SCR and MCR information, the SCR is not necessarily recalculated for the quarterly templates which only require annual recalculation. Hence, the quarterly SCR ratios will represent a snapshot, but not necessarily the fully recalculated SCR ratios. Also, the MCR might be affected by this because the SCR is used to define a cap and a floor for the MCR value.

The SCR ratio is calculated either by using a prescribed formula, called the standard formula, or by employing an undertaking-specific partial or full internal model that has been approved by the supervisory authority. Being risk-sensitive the SCR ratio is subject to fluctuations and undertakings are required to monitor it continuously. A variety of degrees of freedom and options in the calculation of Solvency II results allows insurance companies to adjust the calculation of the SCR ratio to their risk profile.

According to Solvency II, insurers' own funds are divided into three "Tier" classes. Tier 1 capital, such as equity, is divided into restricted and unrestricted capital and has the highest ranking. Items that are included in Tier 1 under the transitional arrangement shall make up less than 20% of the total amount of Tier 1 items. Tier 2 capital is mostly composed of hybrid debt while Tier 3 is composed mostly of deferred tax assets. The eligible amount of own funds to cover the SCR has several restrictions: the eligible amount of Tier 3 capital shall be less than 15% of the SCR, while the sum of the eligible amount of Tier 2 and 3 capital shall not exceed 50% of the SCR. In order to ensure that the application of the limits does not create potential pro-cyclical effects, the limits on the eligible amounts of Tier 2 and Tier 3 items should apply in such a way that a loss in Tier 1 own funds does not result in a loss of total eligible own funds that is higher than that loss.

REINSURANCE SECTOR

The section is based on information from the Quarterly Reporting Templates (QRTs) where the reinsurance sample is calibrated with Q4 2018 data. A solo undertaking is listed as a reinsurer if it is listed as a reinsurance undertaking on the EIOPA register. The global and European market overview is also based on publicly available reports, forecasts and quarterly updates of rating agencies and other research and consulting studies.

PENSION FUND SECTOR

The section on pension funds outlines the main developments in the European occupational pension fund sector, based on information received from EIOPA's members. It covers all EEA Member States with active IORPs (i.e. occupational pension funds falling under the scope of the EU IORP Directive). There are a few Member States without such pension funds and/or where the main part of occupational retirement provisions is a line of insurance business, respectively underwritten by life insurers, and is therefore not covered. The country coverage is 81% (25 out of 31 countries).

41 Note EIOPA's third LTG (long term guarantee) report was published in late 2018

Data collected for 2018 was provided to EIOPA on a best effort basis to report the financial position of IORPs during the covered period. For Romania, the data refers to 1st Pillar bis and 3rd Pillar private pension schemes only.

Data availability and valuation approaches vary substantially among the Member States, which hampers a thorough analysis and comparison of the pension market developments between Member States. Due to differences in objective, scope, coverage and reporting period or timing of the data received by EIOPA, information reported in the different EIOPA reports may differ

RISK ASSESSMENT – ANALYSIS BASED ON THE 2018 INSURANCE STRESS TEST EXERCISE

The following table provides a description of the variables included in the analysis provided in the BOX 5.1.

Variable	Variable description	Source
ch_eAoL_YCU	Relative change in eAoL computed as eAoL(YCU)/eAoL(base)-1.	Balance sheet, S.02.01.01.01
ch_eAoL_YCD	Relative change in eAoL computed as eAoL(YCD)/eAoL(base)-1	Balance sheet, S.02.01.01.01
ch_SCR_YCU	Relative change in SCR ratio computed as SCR_ratio(YCU)/ SCR_ratio (base)-1	Own Funds, S.23.01.04.01
ch_SCR_YCD	Relative change in SCR ratio computed as SCR_ratio(YCD)/ SCR_ratio (base)-1	Own Funds, S.23.01.04.01
% Assets held for IL and UL	Share of Assets held for IL and UL as a percentage of total assets	Balance sheet S.02.01.01.01
% Accepted reinsurance (life) contracts	Share of Accepted reinsurance (life) contracts as a percentage of Total (Life other than health insurance, incl. Unit-Linked) gross best estimate	Life and Health SLT Technical Provisions (similar to S.12.01.01)
% Annuities (life) contracts	Share of Annuities (life) contracts as a percentage of Total (Life other than health insurance, incl. Unit-Linked) gross best estimate	Life and Health SLT Technical Provisions (similar to S.12.01.01)
% CIUs	Share of CIUs as a percentage of total assets	Balance sheet S.02.01.01.01
% Contracts with options and guarantees	Share of Contracts with options and guarantees (sum of UL, IL and other life) as a percentage of Total (Life other than health insurance, incl. Unit-Linked) gross best estimate	Life and Health SLT Technical Provisions (similar to S.12.01.01)
% Contracts without options and guarantees	Share of Contracts without options and guarantees (sum of UL, IL and other life) as a percentage of Total (Life other than health insurance, incl. Unit-Linked) gross best estimate	Life and Health SLT Technical Provisions (similar to S.12.01.01)
% Corporate Bonds	Share of Corporate Bonds as a percentage of total assets	Balance sheet S.02.01.01.01
% Equities listed	Share of Equities listed as a percentage of total assets	Balance sheet S.02.01.01.01

Variable	Variable description	Source
% Equities unlisted	Share of Equities unlisted as a percentage of total assets	Balance sheet S.02.01.01.01
% Government Bonds	Share of Government Bonds as a percentage of total assets	Balance sheet S.02.01.01.01
% Holdings in related undertakings	Share of Holdings in related undertakings as a percentage of total assets	Balance sheet S.02.01.01.01
% Insurance with profit participation contracts	Share of Insurance with profit participation contracts as a percentage of Total (Life other than health insurance, incl. Unit-Linked) gross best estimate	Life and Health SLT Technical Provisions (similar to S.12.01.01)
% Loans and mortgages	Share of Loans and mortgages as a percentage of total assets	Balance sheet S.02.01.01.01
ch_LAC_DT	Relative change in LAC_DT computed as LAC_DT (adverse)/ LAC_DT(base)-1.	SCR, S.25.01.04.
ch_LAC_TP	Relative change in LAC_DT computed as LAC_TP (adverse)/ LAC_TP(base)-1.	SCR, S.25.01.04.
MA	Matching adjustment (dummy variable)	Basic information, S.01.02.04
VA	Volatility adjustment (dummy variable)	Basic information, S.01.02.04

COUNTRY ABBREVIATIONS

AT	Austria	**IT**	Italy
BE	Belgium	**LI**	Liechtenstein
BG	Bulgaria	**LT**	Lithuania
CY	Cyprus	**LU**	Luxembourg
CZ	Czech Republic	**LV**	Latvia
DE	Germany	**MT**	Malta
DK	Denmark	**NL**	Netherlands
EE	Estonia	**NO**	Norway
ES	Spain	**PL**	Poland
FI	Finland	**PT**	Portugal
FR	France	**RO**	Romania
GR	Greece	**SE**	Sweden
HR	Croatia	**SI**	Slovenia
HU	Hungary	**SK**	Slovakia
IE	Ireland	**UK**	United Kingdom
IS	Iceland	**CH**	Switzerland

PART II
THEMATIC ARTICLE

IMPACT OF GREEN BOND POLICIES ON INSURERS: EVIDENCE FROM THE EUROPEAN EQUITY MARKET

Petr Jakubik and Sibel Uguz[42]

ABSTRACT

This article empirically investigates whether the introduction of green bond policies by insurance companies have a positive impact on their equity prices. To this aim, the sample of listed (re)insurers in Europe using monthly data for years 2012 – 2019 is employed. Announcements, press releases and semi-annual or annual reports are used to determine when the insurance companies committed to a green investment, issuance of green bonds or launching a green fund. Our results suggest that market investors positively price introducing such a policies for the issuance of green bonds or launching a green fund. However, the same results were not confirmed for initial investments in green bonds.

1. INTRODUCTION

Green Bonds are fixed-income instruments that finance green projects with an environmental objective. In the past decade, green bonds have gained increasing attention as a tool to accelerate the support for climate-related investments and the transition into an energy-efficient society by channelling capital flows towards more sustainable finance. The transition into a greener economy concerns - by definition – present and future generations and hence poses an intergenerational issue (Sachs, 2014). Historically, debt financing has been effective in realizing large scale and long-term projects (e.g. infrastructure). Green bonds serve as a suitable vehicle in spreading the costs of climate changes whereas benefits of a low carbon economy are generated in long-term.

The numerous international actions to reflect on climate change related impact have led to an increased demand for socially and environmentally responsible investment instruments. By issuing green bonds corporations and government institutions are able to support environmental projects that help the transition into a more energy-sustainable future. The green bond can be regarded as a promise between its issuer and the investor. Like a normal bond, the investor provides funds for a long-term with the issuer prom-

42 European Insurance and Occupational Pensions Authority (EIOPA).

ising to repay it with interest. However, green bonds are specifically tailored for green projects.

The first Green Bond was called into live in 2007 when the European Investment Bank (EIB) issued the first climate Awareness Bond. Labeling bonds as 'green' aims to flag that funds are exclusively used to finance climate and environmentally relevant projects. However, there is yet no official taxonomy outlining a framework for green bond labeling. Green Bonds are currently defined by a number of guidelines that have been established by numerous institutions in the course of the growing market, however the lack of a regulatory framework for those instruments has been questioned increasingly. Therefore this study aims to investigate whether investors respond positively to green bond policies implemented by the European insurers by paying positive premiums.

To address this research question, the study analyses the effect of green bond policies on equity prices of EU-based insurers. The following section 2 elaborates on the available research on green bond pricing as well as the economic significance of a harmonized framework. Section 3 provides a description of the sample used and the section 4 applied methodology. The results of empirical analysis conducted are presented in section 5, followed by the conclusion.

2. LITERATURE REVIEW

Climate change as a global issue has increased the awareness for the integration of sustainable principles in capital markets. With the rising pressure on environmental topics, investors are increasingly demanding the adaption of environmental, social or governance (ESG) criteria into financial services. Especially for critical sectors which contribute to a significant amount of the world-wide greenhouse gas emissions – i.e. energy and transport - channelling large amounts of funds effectively would be merely impossible via bank lending or private investors. Hence, the pivotal role of the green bond market in financing green projects with large up-front costs that only recover over the long-term becomes evident (Sartzetakis, 2019).

Sachs et al. (2019) pronounce the importance of green bonds as a tool to finance climate-relevant projects but also denote that – in order to meet internationally set of standards[43] for climate change – more measures have to be taken. As the demand for green investments has seen a tremendous rise from the investor's side, corporate environmental principles are now considered a significant driver for financial performance. Clark et al. (2015) find that 88% of their reviewed cases confirm a strong correlation between sound sustainable practices and enhanced operational performance which ultimately translates into cashflows. Furthermore, they show that in 80% of the sources, sustainable practices have a positive influence on investment performance.

Policy makers on the other hand have realized the need for a unified green taxonomy and recently there has been considerable effort to establish such a framework (PRI, 2018). Despite the prosperous outlook for the European- and international green bond market there are yet no harmonized, uniform standards for green bond labeling. This current situation triggers several obstacles and challenges for the green bond market to overcome. Introducing the green bond label would create a favourable environment for long-

43 United Nations' Sustainable Development Goals (SDGs) and the Paris Climate agreement (2015)

term investors as such a framework would ensure the compliance with general principles of sustainability when placing the funds. At the same time it imposes higher disclosure and transparency requirements and could possibly introduce another layer of regulatory reporting requirements on financial institutions engaging in Green Bond investments.

The lack of clearly defined Green Bond Principles creates reputational risks for both investors and issuers as it is difficult to control compliance. A number of academic papers question the effectiveness of the recent growth in green bond investments. More than a decade into the development of the green bond market, a standard of green bond certification is yet to be established in order to ensure that investments serve a beneficial environmental impact. The set-up of a sound certification program would moreover exclude reputational risks of merely labeling investments as green ("green-washed") whereby they do not serve any climate-relevant purpose. This would guarantee an appropriate use of proceeds and consecutively funds are channeled where they are effective (Bachelet et al, 2019).

A key factor in the success of green bonds is the measurability of the positive effect that green bonds aim to achieve from an environmental point of view. Asset managers increasingly rely on external certification to verify that the respective proceeds are used effectively. However, it seems that market players mainly focuses on the ex-ante review of a green instrument's credentials by agencies rather than taking the ex-post measurements as well as reporting and continuous verification standards into account (Shishlov et al, 2016).

A number of guidelines of green bond certification has emerged in the course of the growing market. These aim to ensure that the use of funds and proceeds is exclusively tied to green projects. However, measuring the environmental impact as well as ensuring an ongoing monitoring- and verification process is not guaranteed. So far the same bond metrics which are used for conventional bonds - such as yield to maturity, spread and duration - are employed for green bonds whereas those indicators solely assess the bond's financial performance. Clapp et al (2016) recognize that while reporting standards are yet to be addressed in a harmonized manner, best practises start to emerge. Issuers of renewable energy bonds are incorporating life-cycle analysis to reflect on the projects' environmental impact and the construction sector has established building certifications and energy-efficiency targets. In the meanwhile the World Bank has taken up a leading role in the international environment for reporting.

The International Capital Market Association (ICMA) has set up Green Bond Principles - "voluntary process guidelines" – which outline the general certification criteria that most schemes apply. Assembled by the leading private financial institutions in the sustainable sector in 2015, those principles guide prospective issuers. ICMA classifies a range of key components of green bond issuance which are: (i) the use of proceeds for environmentally sustainable activities; (ii) a process for determining project eligibility; (iii) management of the proceeds in a transparent fashion that can be tracked and verified; and (iv) annual reporting on the use of proceeds (ICAM, 2017).

Focusing purely on the acceleration for a low-carbon economy, the Climate Bond Initiative (CBI) has also contributed to the establishment of certification standards for green bonds (CBI, 2019). While the Green Bond Principles remain general, the organization has outlined sector-specific eligibility criteria to assess an asset's low carbon value and suitability at issuance. If assets meet the CBI standard, they are then eligible for Climate Bond Certification, following an external verification on the bond's environmental standards and continuous monitoring.

From an economic point of view, aligning the short-term target function of the average investor with the long-term investment horizon of social and environmental projects is another key issue addressed by a number of publications. According to Demary and Neligan (2018) most investors prefer optimizing their returns over a short-term horizon. This is a counter-productive feature when considering that most green projects (i.e. infrastructure and building sector) are designed to become profitable only long-term. Reflecting on this problem, the study emphasizes the key role that supranational institutions, government institutions and central banks have to take up. These institutions are not only under less pressure of short-term profitability but their creditability also enables them to benefit from long-term outlooks.

Discussing the counter productiveness of short-termism on sustainable finance, Schoenmaker (2018) argues that – by nature – environmental factors are not included in the decision-making process of an economic player. Externalities emerge in the medium-term whereas sustainable investments only pay out long-term. This makes the transition towards greener capital markets increasingly difficult as investors optimize based on a short-term horizon but climate-relevant activities reveal their impact only long-term. In this respect, the supervisory treatment of illiquid investments is proposed as one of possible solutions. While liquid (short-term) investments enjoy low supervisory surcharge, illiquid investments as they are placed in long-term environmental projects cannot be measures on a frequent basis (market-to-market) and hence are treated with greater regulatory rigorousness.

Carney (2015) emphasizes the importance putting incentives in favour of a long-term investment horizon rather than short-term projects. As the global community faces profound environmental challenges, the focus has to be put on overcoming this short-termism. Hence, the preference of investors and managers to play short-term depicts yet another obstacle for sustainable finance to be effective.

Besides the measurements that have been taken by the ICAM and CIB, the European Commission has called in a High-Level Expert Group on Sustainable Finance (HLEG) to support the establishment of clear guidelines and an official EU Green Bond Standard and to facilitate the development of sustainable finance. The HLEG advices the Commission concerning mandatory requirements for disclosure as well as the allocation of proceeds, reporting and external reviews. The Sustainable Finance Taxonomy would then lay out the criteria for identifying the eligibility of green projects and on accreditation criteria for providers of external review. An EU Green Bond label would hence allow an alignment of all green projects with the standard and increase clarity for investors and issuers. Moreover, the European Commission (EC) announced tax incentives for European Green Bonds in order to further support the growth of the market. As taxation remains in the competence of the Member States, the EC advices to assess the support for green bonds by implementing tax incentives as well as accelerated depreciation for assets financed by green bonds and green loans. On a regulatory basis it would provide a favourable stimulus for green investments towards a climate-efficient economy (EC, 2019).

Examining the price effect of a green label Ehlers and Packer (2017) query whether investors are willing to pay a premium for investments linked to environmental topics. In order to analyze this effect, they compare the credit spreads at issuance of 21 green bonds issued between 2014 and 2017 to the credit spreads at issuance of conventional bonds of the same issuers at the closest possible issue date.[44] As most green bonds issuers also emit conventional bonds, the data sample rules out issuer-specific idiosyncratic factors

44 Matched bond pairs are restricted to US dollar- and euro-denominated green bonds.

such as credit risk. Their study concludes that – at issuance - green bonds are priced at a premium compared to conventional bonds with similar characteristics, with a mean difference in spreads of around 18 basis points. Several recent studies suggest similar results, e.g. (Barclays, 2015). Likewise, Nanayakkara and Colombage (2019) find out that green bonds are traded at a premium of 63 basis points compared to corporate bond issue with analogous characteristics. The model, using panel data regression with data over the period from 2016 to 2017, concludes that a green label indeed offers a significant incentive for investors to raise funds through issuing green bonds. Moreover, it displays an opportunity to diversify a portfolio's investments returns. The study hence emphasizes the numerous incentives that Green Bonds offer for investors as well as supports of capital flows towards a more sustainable development of security markets. Overall, these findings validate the assumption that a significant share of investors have a preference to hold green bonds which has an impact on the price at issuance. In other words, there is currently a higher demand for green bonds relative to the current supply (OECD, 2016).

3. DATA SAMPLE

As data on insurers investing in green bonds are not available, insurers' engagement has been identified by using available market data only. The aim is to include as many listed companies as possible. There are 109 listed (re)insurers in Europe, but those investing in or issuing green bonds are yet limited. Therefore, the sample has to be narrowed to 17 EU insurers of which 15 are currently listed covering the years 2012 - 2019.[45] Furthermore, monthly time series are employed in our sample.

By examining EU-based insurers which engage in green finance activities, a first list of companies which hold green bond investments, issue green bonds or have launched a green bond fund has been set up. In order to measure the impact of green bond policy of EU insurers on their share prices, a green dummy variable is introduced. This indicates whether an announcement of observed insurance company on investment in green bonds, issuance of green bonds or launch of green bond funds was made at the specific month. The value '1' of green dummy variable corresponds to an announcement on introduction one of the mentioned green element into an insurance company's strategy. Since we employ publicly available market data, the specific month in which the insurer engages in green bonds were derived from official announcements on the company website, its annual- or semi-annual reports, sustainability reports or its press releases. In all other months the employed dummy variable is set to value '0'. To further break down the type of companies' introduced green policy, we use three further dummy variables. These indicate the actual type of engagement from the three categories we have listed earlier - green bond investment, green bond issuance and green bond fund. The sample was further complemented with data on companies' equity price developments and the benchmark market development represented by STOXX Europe 600 index extracted on a monthly basis from Bloomberg.

The description of all variables employed in this study is provided in the table below.

45 The sample was reduced to 2016 in a second stage, since some figures for 2017 of the sample countries were not available at the time of conducting this study.

Table 1: List of variables employed

Variable name	Abbreviation	Description
Return on a specific insurance company	ldprice	Logarithmic differences of the equity price of specific insurance company.
Market return	ldmarket	Logarithmic differences of the market index, which is based on the STOXX European 600 Market Index.
Green dummy	green	The green dummy variable indicates when an insurance company has engaged in any type of green bond strategy. The value '1' is assigned in the first occurrence of an announced green bond framework.
Green bond investments dummy	investment	The investment dummy variable indicates that the insurer's type of engagement in green bonds is a direct investment according to the announcement by the insurance company.
Green bond issuance dummy	issuance	The issuance dummy variable indicates that the insurer's type of engagement in green bonds consist of own green bond issuance according to the announcement.
Green bond fund launch dummy	fund	The fund dummy variable indicates that insurance company has launched an own green fund in a respective month according to the announcement.
Bond issuance dummy	debt	This dummy variable indicates the announcement on own bond issuance by the insurance company.
Volume of bond issuance	debt_volume	Natural logarithm of the announced volume of issued bonds by the insurance companies. The variables is assigned to 0 in case of no any issuance in the particular time t.

Note: All variables are employed with monthly frequency.

4. RESEARCH HYPOTHESES AND METHODOLOGY

This study empirically investigates whether the ongoing trend of insurance companies moving towards green policy is positively priced by market investors. This hypothesis is tested using equity prices of the listed European insurance companies that implemented green policy during the investigated period. To this aim, we specify the following model.

$$ldprice_{i,t} = \alpha + \theta\beta_i ldmarket_t + \gamma green_{i,t} + \varepsilon_{i,t} \quad (1)$$

The variable $ldprice_{i,t}$ represents a logarithmic market return of insurance company i at time t. The variable $ldmarket_t$ corresponds to a logarithmic market return at time t and the variable $green_{i,t}$ denotes dummy variable for green policy of insurance company i and time t. Effects of unobservable company-specific and cross section variables are represented by the variable $\varepsilon_{i,t}$. The equation (1) assumes that a logarithmic market return of each insurance company is given by its sensitivity to the overall market move corresponding to its beta (β_i). Furthermore, the equation (1) assumes that an insurer's return could increase at the period of announcement on implementing a green policy.

In the first step, we estimate beta for each insurance company *i* in the sample. In the second step, we create a new variable:

$$bldmarket_{t,i} = \widehat{ldmarket}_{i,t} = \beta_i ldmarket_t$$

The equation (1) could be then rewritten as follows:

$$ldprice_{i,t} = \alpha + \theta bldmarket_{i,t} + \gamma green_{i,t} + \varepsilon_{i,t} \quad (2)$$

We can further assume that market return could also contain some seasonality effects. Hence, we add the monthly dummies.[46]

$$ldprice_{i,t} = \alpha + \theta bldmarket_{i,t} + \gamma green_{i,t} + \sum_{j=2}^{12} \delta_j month_{j,t} + \varepsilon_{i,t} \quad (3)$$

$$month_{j,t} = \begin{cases} 1, & \text{for all time period } t \text{ that that corresponds to a month } j \\ 0, & otherwise. \end{cases}$$

$$j \in \{2, 3, \dots, 12)$$

Three different green bond policies announcements are considered, i.e. investment into green bonds, issuance of green bonds and raising green funds. We could assume that market investors are not reacting to those three types of announcements in the same way. Hence, we can introduce three separate dummy variables to capture the different market sensitivities to the three green bond policies considered.

$$ldprice_{i\,t} = \alpha + \theta bldmarket_{i\,t} + \gamma_1 investment_{i\,t} + \gamma_2 issuance_{i\,t} + \gamma_3 funds_{i\,t} + \sum_{j=2}^{12} \delta_j month_{j,t} + \varepsilon_{i,t} \quad (4)$$

Finally, $bldmarket_{i,t}$ as represents market return of insurance company *i* at time t multiplied by company's beta, therefore the coefficient θ should be theoretically equal to 1. Hence, we can impose this restriction to models (3) and (4).

Our models (3) and (4) are used to test impact of introducing green bond policies on companies' equity prices. The significant dummy variables with positive coefficients would suggest that market participants positively price the introduction of the particular green policy. In other words, the companies implementing those policies would be traded with premiums at the time of the specific announcement.

As our data sample contains 15 companies and 87 time periods, we start with the pooled estimate of the models with cluster-robust standard errors. Furthermore, we employ panel techniques and Breusch and Pagan Lagrange multiplier test for random effects. Finally, we employ Hausman test to find out whether the estimate for panel data model fixed effects should be used instead.

Additionally, the potential positive effect for the green bond issuance (a significant dummy variable for green bond issuance) could also be driven by increasing debt financing itself implying an advantage of using a tax shield. Hence, we need to further investigate the impact for both green and standard bonds issuance on equity prices of those companies that issue green bonds. Hence, we additionally test the following equation (5) for the companies that issued green bonds as a robustness check.

$$ldprice_{i,t} = \alpha + \theta bldmarket_{i,t} + \gamma_1 investment_{i,t} + \gamma_2 issuance_{i,t} + \gamma_3 funds_{i,t} + \gamma_4 debt_{i,t} * debt\_volume_{i,t}^{12} + \sum_{j=2} \delta_j month_{j,t} + \varepsilon_{i,t} \quad (4)$$

46 Please note that only 11 dummy variables need to be added to capture monthly seasonality.

5. EMPIRICAL RESULTS

In the first step, we verify whether both time series employed in our analysis – dependent variable corresponding to return on a specific insurance company as well as independent variable representing market return – are stationary. In both cases, Levin-Lin-Chu unit-root test strongly reject the null hypothesis that the panel contains unit roots. Hence, we employ the models (2), (3) and (4) using pooled estimate model with cluster-robust standard errors. The results are provided in Table 2 – see models pool1, pool2 and pool3 (columns 1,2,3). Using the equation 2, the green policy does not seems to significantly affect equity prices of insurance company (model pool1). We further control for seasonality as there might be some specific monthly effects regularly appearing every year. The results show that seasonality indeed plays a role as some of the introduced dummies are statistically significant. However, including monthly dummies does not change our result (model pool2). Hence, we test all three types of green bond policies considered in this study separately (model pool3). In this case, our empirical analysis suggests that while insurers' prices do not significantly react to announcement to investments in green bonds, they do react to the announcement on issuance of green bonds or launching a green bond fund. In this respect, the results might imply that introducing a certain type of green policy by insurers is positively priced by investors. In order to make a conclusion on the green bond issuance we further test whether the positive effect for the green bond issuance is not driven by increasing debt financing itself implying an advantage of using a tax shield by controlling for debt issuance - see equation (5). However, based on the model estimated for companies issued green bond, the significance of the dummy on green bond issuance has not been changed. Hence, we can imply that the conclusion on green bond issuance is relevant.

In the next step, we re-estimate equation (3) and (4) imposing restriction on the coefficient.The resulting models (restr_p1 and restr_p2) confirm the previously obtained results with both dummies for introducing issuance of green bonds and launching a green bond fund significant at 5% confidence level.

Table 2: Results of the pooled estimates

	pool1	pool2	pool3	restr_p1	restr_p2
			Dependent variable: ldprice		
bldmarket	0.9979***	1.0051***	1.0063***	1.0000	1.0000
	(0.0006)	(0.0145)	(0.0139)	(0.0000)	(0.0000)
Green	0.0008	0.0030		0.0030	
	(0.0084)	(0.0078)		(0.0077)	
investment			-0.0037		-0.0037
			(0.0099)		(0.0099)
issuance			0.0154**		0.0153**
			(0.0071)		(0.0071)
fund			0.0228*		0.0227**
			(0.0111)		(0.0110)
month, j = 2		-0.0018	-0.0018	-0.0017	-0.0017
		(0.0053)	(0.0054)	(0.0053)	(0.0053)
month, j = 3		-0.0097	-0.0097	-0.0098	-0.0098
		(0.0101)	(0.0101)	(0.0101)	(0.0101)
month, j = 4		-0.0030	-0.0029	-0.0030	-0.0030
		(0.0067)	(0.0067)	(0.0067)	(0.0067)
month, j = 5		-0.0244***	-0.0243***	-0.0245***	-0.0244***
		(0.0061)	(0.0061)	(0.0060)	(0.0059)
month, j = 6		0.0059	0.0057	0.0057	0.0054
		(0.0083)	(0.0085)	(0.0080)	(0.0082)
month, j = 7		0.0067	0.0067	0.0068	0.0068
		(0.0059)	(0.0059)	(0.0059)	(0.0060)
month, j = 8		0.0158**	0.0157**	0.0156**	0.0155**
		(0.0071)	(0.0071)	(0.0068)	(0.0068)
month, j = 9		0.0084	0.0082	0.0084	0.0082
		(0.0069)	(0.0069)	(0.0069)	(0.0069)
month, j = 10		0.0181*	0.0181*	0.0180*	0.0180*
		(0.0094)	(0.0094)	(0.0094)	(0.0094)
month, j = 11		0.0070	0.0068	0.0070	0.0068
		(0.0070)	(0.0070)	(0.0070)	(0.0070)
month, j = 12		0.0021	0.0019	0.0020	0.0018
		(0.0046)	(0.0046)	(0.0044)	(0.0044)
Observations	1,290	1,290	1,290	1,290	1,290
R-squared	0.3667	0.3929	0.3933		

Note: Robust standard errors are reported in parentheses. The significance is reported as following *** p<0.01, ** p<0.05, * p<0.10.
Source: Own calculations.

We further use Breusch-Pagan Lagrange multiplier (LM) test to verify whether a random effect model needs to be applied instead of a pool model. The both models with aggregate green dummy (equation 3) and with three separate green dummies (equation 4) were tested. In both cases, the null hypothesis of homoskedasticity cannot be rejected. Hence, random effects are not present in our models and pool regression is sufficient. We also test whether fixed effect would be preferable using Hausman test. However, the null hypothesis that there is no difference in coefficient of models with fixed and random effects was not rejected. Hence, it further confirms that the used pooled estimates are appropriate and robust.

6. CONCLUSION

This study contributes to the contemporaneous literature by investigating impact of green bond policies specifically for European insurers. It empirically test whether introduction of such policies is positively priced by market investors. To this aim, we employ publicly available data of listed European insurance companies to find out the specific month in which the insurer engaged in green bond policies. In this respect, we use official announcements on companies' websites, their annual or semi-annual reports, sustainability reports or their press releases. We further model equity prices of the companies that introduced green bond policies using market index and the estimated betas of the companies. To verify the impact of green bond policies, we introduce a dummy variable for the time when the specific green bond announcement was made. Furthermore, we split the introduced dummy into three categories - investment into green bonds, issuance of green bonds or launching green bond funds – to empirically test those three categories separately. Moreover, we included dummy variables for months to control for seasonality. Finally, the pool regression estimates with cluster-robust standard errors are employed to test a significance of the introduced dummies.

Our results suggest that announcements of European insurance companies on introducing green bond policies by issuance of green bonds or launching green bond funds are positively priced by market investors. However, the same effect of announcements on investments into green bonds could not be empirically confirmed. This conclusion shed a light on one of the instruments suitable to deal with the costs of climate changes and transition towards a low carbon economy. It reveals the way how insurers could transform climate related risks into a positive value for companies contributing to the overall financial stability of the European insurance sector.

As green bonds are one of the important tools that can help to support a transition into an energy-efficient society by channeling capital flows towards more sustainable finance, both theoretical and empirical research that help to understand their role in financial markets and broader economy could contribute to make the transition faster, more smooth and efficient. Since, insurers as long-term investors naturally play a crucial role in the green bond markets, further research in this area is needed.

REFERENCES

Bachelet, M. J., Becchetti L. and Manfredonia S., (2019). "The Green Bonds Premium Puzzle: The Role of Issuer Characteristics and Third-Party Verification," Sustainability, MDPI, Open Access Journal, vol. 11(4), pages 1-22, February 2019.

Barclays (2015): "The cost of being green", US Credit Focus, September 2015.

Carney, M. (2015). "Breaking the tragedy of the horizon – climate change and financial stability", speech given at Lloyd's of London, 29 September 2015.

CBI (2019). "Climate Bond Standard", Climate Bonds Initiative.

Clapp, C., Alfsen K., Francke Lund, H., Pillay K., (2016). "Green Bonds and Environmental Integrity: Insight from CICERO Second Opinions.", CICERO.

Clark, G. L., Feiner, A., & Viehs, M. (2015). From the Stockholder to the Stakeholder: How Sustainability Can Drive Financial Outperformance.

Demary, M. and Neligan, A., (2018). "Are green bonds a viable way to finance environmental goals? An analysis of chances and risks of green bonds," IW-Reports 28/2018, Institut der deutschen Wirtschaft (IW) / German Economic Institute.

EC (2019). Report of the Technical Expert Group (TEG) subgroup on Green Bond Standard, Proposal for an EU Green Bond Standard, Interim Report, 6 March 2019.

ICMA (2017). "The Green Bond Principles 2017", International Capital Market Association.

Nanayakkara, M. and Colombage, S. (2017). Do investors in Green Bond market pay a premium? Global evidence in Applied Economics, March 2019.

OECD (2016). Policy Perspectives, Green bonds Mobilising the debt capital markets for a low-carbon transition.

Sachs, J.D. (2014). "Climate change and intergenerational well-being." In Bernard, L. and Semmler, W. (Eds.), The Oxford Handbook of the Macroeconomics of Global Warming, pp. 248-259. Oxford: Oxford University Press.

Sachs, J.D., Woo, W.T., Yoshino, N., Taghizadeh-Hesary, F., (2019). "Why Is Green Finance Important?", ADBI Working Paper Series, Asian Development Bank Institute, January 2019.

Sartzetakis, E. (2019). "Green Bonds as an Instrument to Finance Low Carbon Transition", Bank of Greece Working Paper, March 2019.

Schoenmaker, D. (2017). "Investing for the common good: a sustainable finance framework," Essays and Lectures 21249, Bruegel.

Shishlov, I., Morel, R., Cochran I. (2016). "Beyond transparency: unlocking the full potential of green bonds", Institute for Climate Economics, June 2016.

PRI (2018). The European Commission Action Plan Financing Sustainable Growth, Version 2, July 2018.

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