FINANCIAL STABILITY REPORT

December 2020

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FOREWORD BY THE CHAIRMAN

The ongoing coronavirus crisis is still not over. Although financial markets have grad-ually stabilised after the initial sharp drop in asset prices, the recent new lockdowns in most European countries triggered by the second wave of pandemic cause uncertainty and medium-term risks for the economies. In addition, potential cliff-edge effects could materialise once the fiscal measures supporting economies will fade out. The depth of the recession, its duration and the pace of recovery hinge on how resilient firms and households are to this difficult situation, but most of all on the concrete expectation that effective vaccines are within reach.

Strains to demand that will reflect into insurers' underwriting and overall profitability will take some time to unfold in parallel with the deterioration of the macroeconomic environment in which a reduction of economic activity and disposable income is starting to become tangible. However, looking ahead, the news on vaccine developments and the potential alleviation of the geopolitical tensions somehow mitigate the risks and increase the prospects that 2021 might be a year when the economies will start to recover.

European insurers have been able to withstand the dramatic situation as, in particular, the Solvency II regime helped them to better align capital to risk, build-up resilience and enhance their risk management practices. While risks surrounding the economic growth outlook remain high, they appear to have become less pronounced and there are the first signs that the near term impacts on insurers' financial position could be captured within the Solvency II confidence levels. Nonetheless, uncertainty remains high and it is key that insurers act to preserve their capital positions in balance with the protection of policyholders and beneficiaries.

In this respect, EIOPA strongly recommends insurers to maintain extreme caution and prudence within their capital management. Any dividend distributions, share buy-backs or variable remunerations should not exceed thresholds of prudency and institutions should ensure that the resulting reduction in the quantity or quality of their own funds remains at levels appropriate to the current levels of risk. Supervisory authorities should ensure that insurers' assessment of the overall solvency needs is forward-looking, takes due account of the current level of uncertainty on the depth, magnitude and duration of the impacts of Covid-19 in financial markets and on the economy and the repercussions of that uncertainty in their business models and solvency, liquidity and financial position.

The prolonged low yield environment remains the fundamental concern for both insur-ance and pension sectors, but other risks have emerged due to the pandemic. The on-go-ing recession is challenging corporate sector profitability, resulting in rating downgrades, increased defaults and unemployment. In addition, due to more extensively work from home arrangements adopted by firms, commercial real estate prices are expected to drop. Moreover, the deterioration of the economic cycle will primarily reflect into in-creased banks' non-performing loans that could further spill-over to insurers and pension funds due to their high interconnectedness with the banking sector. As a consequence of this crisis, levels of government and public debts are increasing dramatically. It is note-worthy that Euro area spreads have narrowed sharply and volatility reduced as a result of the activation of the Public Sector Purchase Programme (PSPP) by the European Central

Bank. This contributed significantly to mitigate the negative feedback loop between government and banking sector risk in the periphery of euro area having the positive effect of containing the risk for insurers and pension funds. Finally, the increase in reinsurance momentum prices coupled with the potential reduction in reinsurance coverage could lead to a widening of the protection gap.

While still being in a crisis mode, the resilience of the sector to different recovery scenarios will be assessed in the next European Union-wide insurance stress test carried in 2021. Despite these turbulent times, EIOPA will also keep devoting its attention to long-term goals such as sustainable finance and digitalisation. EIOPA's objective is to ensure that insurers and pension funds will not only be able to manage and mitigate climate and cyber risks, but also that they reflect policyholder and pension scheme member preferences for investments and capture business opportunities to actively support the transition towards sustainable and digital economies. Failure to do that will create pressures on profitability of business models, which will increase risks of capital weaknesses.

In addition, in order to unleash the full potential of the internal market and create a Capital Markets Union, we need to deal with the problem of fragmentation, particularly in the area of long-term retirement savings. With the delivery of EIOPA's proposed implementing measures specifying the Pan-European Personal Pension Product (PEPP) Regulation, EIOPA has fulfilled its objective to design the PEPP as a simple, transparent and cost-effective retirement savings option for the European citizens and to provide a powerful tool to close the pension savings gap. PEPP is a unique opportunity to offer consumers the participation in sustainable investments and the European Capital Markets Union.

Finally, EIOPA is moving to the new phase of having available almost five years of Solvency II data as well as a more elaborated methodological toolkit in place allowing to follow analytical rather than descriptive approaches to assess financial stability risks. The methodological improvement is reflected in this new release of the streamlined report focusing in depth on the most relevant financial stability topics. While the former format will be kept for the mid-year reports, this new format will be regularly applied to the end-year reports. EIOPA will further work on enriching its methodologies also leveraging on the cooperation with the global research community to ensure that all relevant risks are properly captured by supervisory frameworks.

Gabriel Bernardino

EXECUTIVE SUMMARY

As a consequence of the general lockdowns implemented in most European countries triggered by the Covid-19 outbreak, an unprecedented collapse in economic output was observed in the first half of 2020. From May until October, the lockdown measures have been gradually relaxed, reverting the downside of the impact during the third quarter. Recently, however, the uncertainty has increased due to the second wave of infections and subsequent new lockdown measures as well as because of potential cliff edge effects that could materialise once the fiscal measures will fade out. This development is expected to negatively affect the observed recovery started in the third quarter of 2020.

After the initial drop in March and April, the equity market positively reacted to the policy measures moving the market performance to the pre-crisis levels. Given the prevailing uncertainties on economic outlooks, the recent market development indicates its decouplement from the real economy prospects. Furthermore, earnings remain below the two-year average, raising concerns over potential corrections, questioning the ability of corporates to recover their profitability and retain creditworthiness.

Financial markets volatility has negatively affected insurers' investments in the first half of the year. Looking ahead, the prolonged period of ultra-low yields intensifies negative prospects on the profitability of insurers' investment portfolios, due to reinvestment risk. In addition, the risk of deterioration of corporates' ratings could affect the market value of insurers' corporate bond holdings. Finally, the poor macroeconomic conditions could set the risk of weaker insurance demand and increase the risk of lapses. Nevertheless, capital buffers of insurers were solid in the end of 2019 (median SCR ratio 213%) and proved resilient at the time of the virus outbreak, deteriorating slightly in Q1 (203%) and reverting upwards again in Q2 2020 (210%). It stands out that life undertakings are affected the most.

To assess the risks and vulnerabilities of the European insurance and pension sectors, EIOPA conducted a survey, using a qualitative questionnaire, among national competent authorities (NCAs).[1] The obtained results suggest that both international and country-specific macroeconomic conditions pose significant concerns. Apart from the prolonged period of ultra-low rates, also credit risk, equity, and property risk are relevant for the sectors. In particular, corporate bond downgrades were identified as a key risk for the insurance sector. The low profitability of investments as well as insurers' underwriting profitability driven by low premium growth pose potential concerns. In the current situation, liquidity risk for the European insurance sector is not expected to significantly increase in the next 12 months. However, given the latest macroeconomic developments and ongoing uncertainties, an increase in liquidity risk cannot be ruled out looking ahead. Finally, with the ongoing pandemic and the current home office set up in many European countries, the number and complexity of cyber-attacks have risen.

This financial stability report consists of five chapters. The **first chapter** provides a broad overview of the main risks identified for the insurance sector taking into account the situation of the economy and of financial markets together with the EIOPA risk assessment confronted and confirmed by the results of the questionnaire to NCAs.

1 For the full results and further discussion of the questionnaire, please refer to the annex.

As highlighted in the EIOPA July 2020 Financial Stability Report and in the ESRB Technical note[2], credit rating downgrades are one of the key potential threats to financial stability. **The second chapter** contributes to the discussion by providing evidence of EEA insurers' trading activities on corporate bonds in response to rating downgrades before and after the Covid-19 outbreak. The trading activity on corporate bonds is analysed in relation to the following several dimensions: type of insurer, use of volatility adjustment, use of standard formula, capital levels and finally by differentiating trading on bank bonds with respect to others. The obtained results revealed net buying activity throughout the entire period, hence also after the outbreak of the virus and the financial market turbulence observed in the end of Q1 and in Q2 2020. Insurers tend to sell downgraded bonds and this pattern has further intensified during the pandemic. The sale of downgraded bonds may be triggered by capital requirements, reflecting a need of insurers' de-risking, but it may also be driven by other reasons such as investment mandates. In any case, the magnitude of the observed selling of downgraded corporate bonds remains largely contained without evidence suggesting significant pro-cyclical effects triggered by insurers' response to the crisis. However, the ongoing crisis with the second wave of pandemic and many new lockdowns of economies indicates that more downgrades could be expected in the upcoming quarters. Hence, the analytical framework described in this chapter needs to be used to continuously monitor the situation in order to take appropriate supervisory measures, if needed, on a timely basis.

The third chapter assesses the risk related to insurers' exposures to adverse developments in the commercial real estate market. As the Covid-19 crisis triggered extensive work from home, demand for office spaces has decreased. Consequently, a fall in the price of commercial real estate related assets might be expected, which in connection with mark-to-market valuation could negatively affect insurers' assets. So far, price declines have not materialized significantly in the balance sheets, but significant write-offs are very likely in the future. Results show that although insurers are substantial investors in this asset class, a price decline of 10% would only have a modest impact on insurers. In this case, 4% of excess of asset over liabilities on aggregate is at risk. This number is significantly higher in some countries and for insurers with large exposures to commercial real estate. Overall risks appear to be limited when commercial real estate related assets are considered in isolation. A fall in other financial market prices would increase the vulnerability. This is illustrated by an analysis of the effect of combined financial market shocks in chapter 5.

The uncertainty surrounding the pandemic and the current deteriorated macroeconomic environment have resurfaced the discussion on the liquidity risk faced by the insurance sector. **The fourth chapter** of the report presents an analysis of the potential effects of an increase in lapse rates within the limitation of the sample and of the model considered. A reverse perspective approach and a sensitivity analysis to three mass lapses scenarios are considered. Results of the reverse perspective exercise show that most individual insurers do not seem to have liquidity issues, but some insurers are found to be vulnerable, even at relatively low levels of lapses. Results of the sensitivity analysis to the three mass lapse scenarios show that insurers would need to liquidate a material amount of assets to cover potential redemptions; in case of an extremely severe mass lapses shock, cash and deposits could not be enough to cover liquidity needs and liquid assets as government bonds would need to be liquidated. The sensitivity analysis could not evaluate the impact that such sales of liquid assets would have on financial stability via the transmission channel of fire sale of assets.

2 ESRB Technical note "A system-wide scenario analysis of large-scale corporate bond downgrades, updated assessment 2020 Q3", September 2020.

The fifth chapter assesses the vulnerability of the insurance sector to isolated and combined shocks in the risk free-interest rate, credit spreads, and equity and real estate markets. The estimation of an empirical model forms the tool of the assessment, on the basis of which the relation between AoL ratio and the main market risks is analysed. Interest rate risk was the main concern for the insurance sector before the Covid-19 outbreak and it remains. Results confirm that the prevailing factor explaining the variability of the assets over liabilities ratio is the risk-free rate. In general, increases (decreases) in interest rates increases (decreases) assets over liabilities; consistent with intuitive thinking, this relation is stronger for insurers with larger negative duration gaps. However, further investigation shows there is a residual sensitivity to interest rates, which is not explained by the duration gap. The model also confirms that when spreads increase, the use of volatility adjustment has a positive effect. Credit spreads, equity and real estate prices dynamics are shown to be relevant for companies holding assets exposed to these risks. Finally, the analysis further reveals the effects of interactions of the key risk factors in explaining AoL ratio. This is a first attempt of applying empirical techniques for providing a comprehensive analysis to quantify the relationship between AoL, market risk factors and exposures. Future data will enhance its application and will provide more solid ground for interpretations.

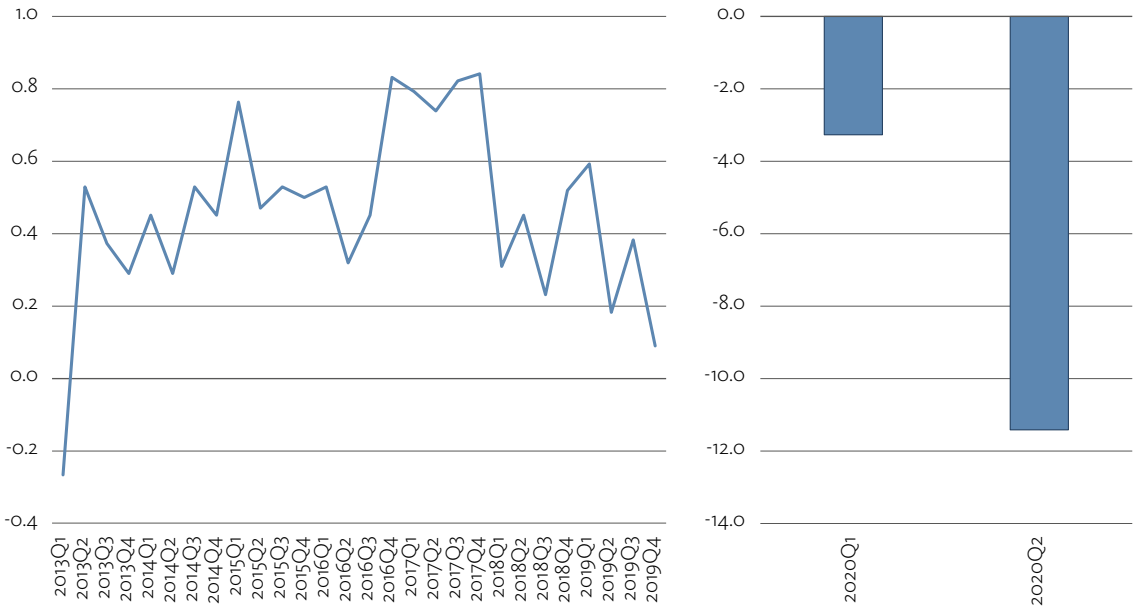
1. INTRODUCTION

The Covid-19 pandemic has extensively affected global and European economic activity. The unprecedented collapse in economic outputs reflects the impact of the general lockdowns implemented in most European countries within March (Figure 1.1). From May onwards, the lockdown measures gradually shifted, reverting the downside of the impact during the third quarter. Recently, however, the uncertainty remains high for at least two reasons. First, because the effect of the second wave of infections and the new lockdown measures are expected to stop the observed started recovery. Second, because potential cliff edge effects might materialise once policy measures, implemented to support the economy, will fade out in case these are not extended. Overall, the EU real GDP for 2020 is projected to fall by 7.4%, rebounding by 4.1% and 3.0% in 2021 and 2022, respectively, which effectively means that the projected rebound will not be sufficient to offset the decline.[3]

The rebound in financial markets has already been evident (Figure 1.2). The equity market reacted quickly to the policy response measures and its performance is almost at the level of 2019. However, the downside risk is increasing due to the resurgence in infections, forcing countries to start imposing (partial) lockdowns. At the same time, high asset market valuations suggest decoupling from developments in the real economy. This means that unless the economy swiftly recovers, market's optimism could fade out leading to significant market corrections. The earnings yield remains below the two-year average, no matter the good performance of equity markets, which further raises concerns over potential corrections and also puts in question the ability of corporates to recover their profitability and retain their creditworthiness.

Amid the ultra-low rate and the uncertainties regarding the future economic and financial market environment, insurers' stock prices underperformed the market during the last months (Figure 1.3); underperformance is captured by the dynamics of the ratio between the Euro stoxx Insurance index and the Euro stoxx 600. In general, the pattern of the relative movement could be associated

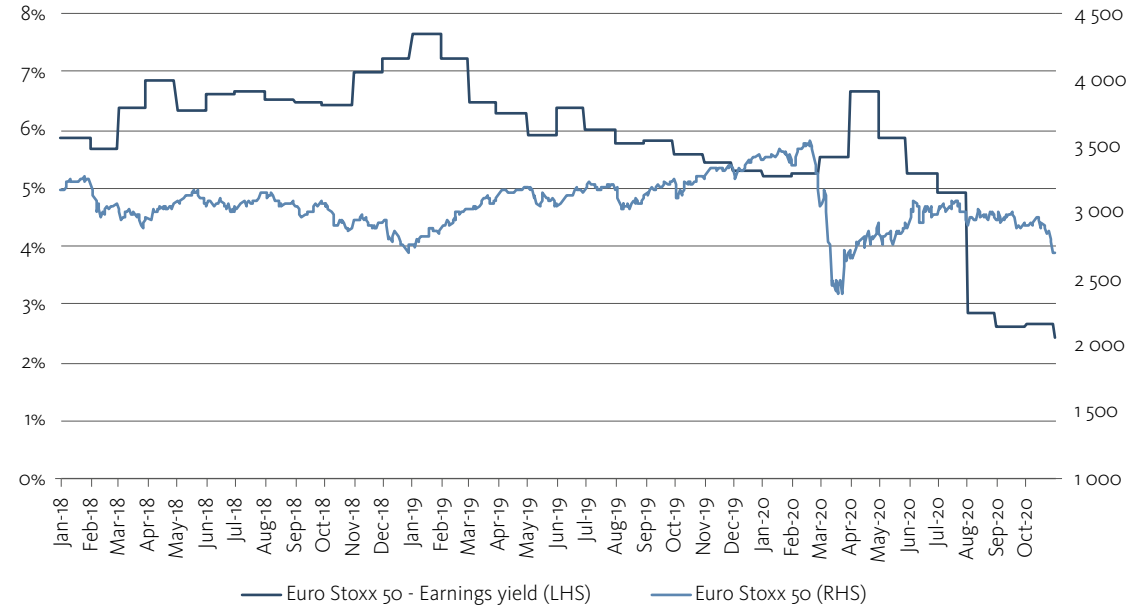
Figure 1.1: EU real GDP (in %)



Sources: ECB, Eurostat. Note: EU-27 fixed composition.
Latest observation: 2020 Q2.

3 European Economic Forecast, Fall 2020.

Figure 1.2: Equity market.

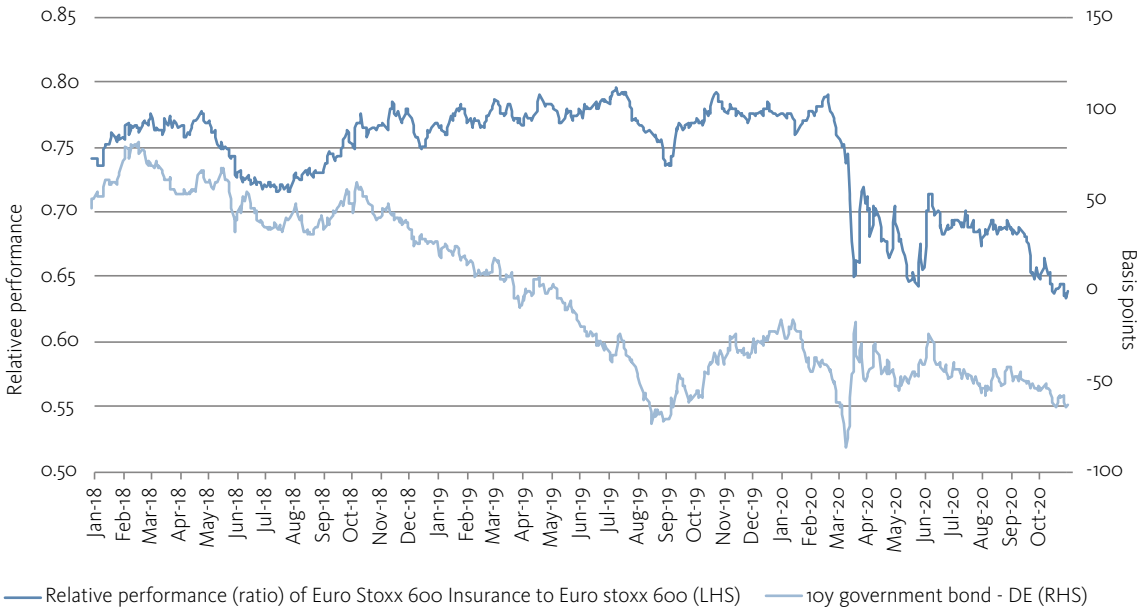


Sources: Refinitiv and EIOPA calculations.
Latest observation: 30/10/2020.

with the higher sensitivity of insurers towards risk-free interest rates movements. It is noteworthy that during the first months of 2019, even if interest rates were decreasing insurers' performance does not seem to be affected and remained in line with the market.

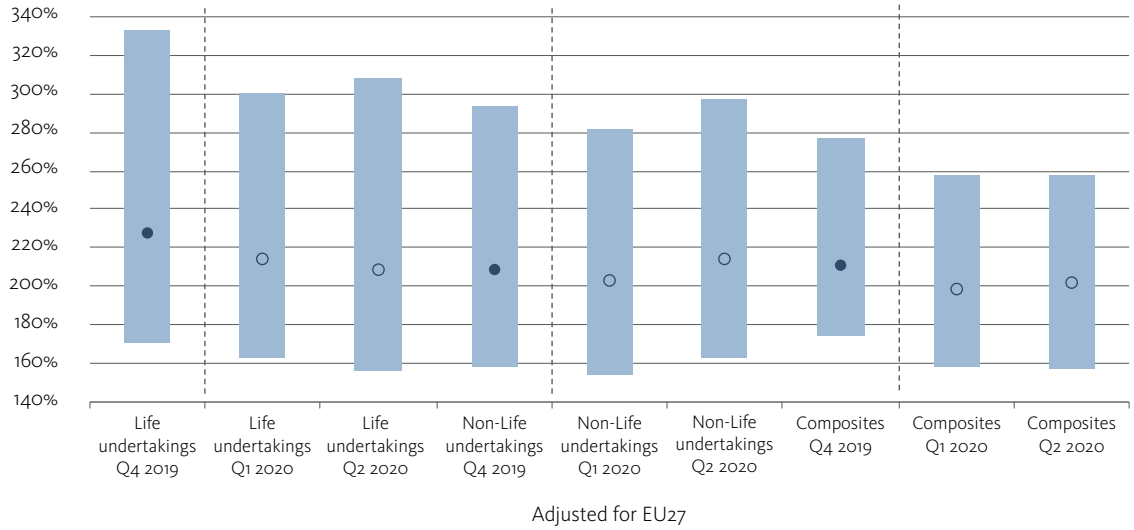
The outlook for the insurance and pension fund sectors depends critically on the future development of the pandemic and on the resilience of the economic recovery. Capital buffers of insurers were solid in the end of 2019 (median SCR ratio 213%) and proved resilient at the time

Figure 1.3: Price movements.



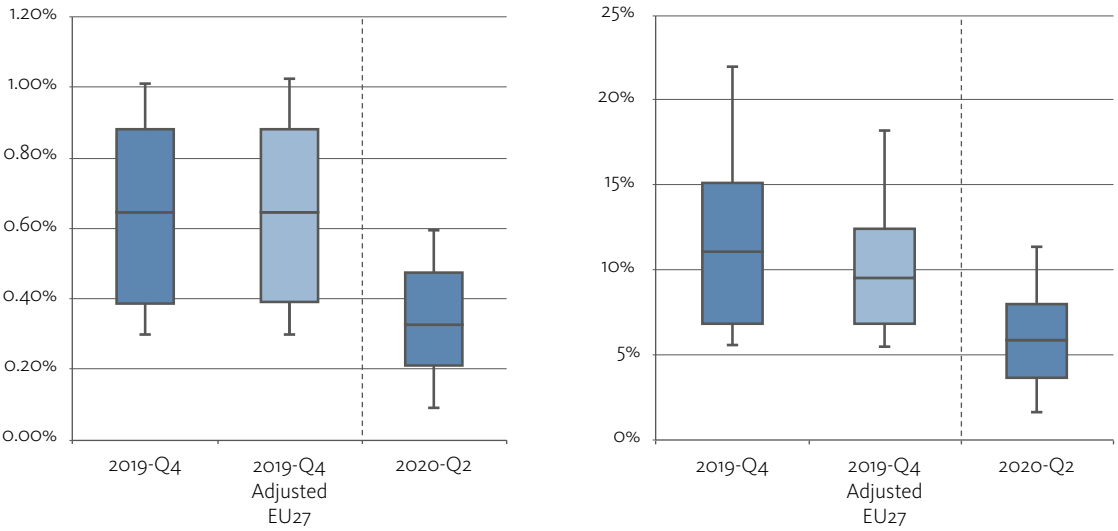
Sources: Refinitiv and EIOPA calculations.
Latest observation: 30/10/2020.

Figure 1.4: SCR ratio by type (in %; median, interquartile range)



Source: EIOPA Solvency II Data QRS.
Note: The dashed line indicates a break after UK exit and exclusion of UK undertakings from the distributions. Additionally, adjusted time series for EU27 before Q1 2020 are also disclosed to reflect potential variations driven by the structural break in the sample.

Figure 1.5: Return on assets and return on excess of asset over liabilities (in %; median, interquartile range and 10th and 90th percentile).



Source: EIOPA Solvency II Data QFG and ARG.
Note: Return on assets refers to profit and losses (QFG) as a share of total statutory accounts of assets (ARS). Profit and losses data for Q2 2020 has been annualized. The dashed line indicates a break after UK exit and exclusion of UK undertakings from the distributions. Additionally, adjusted time series for EU27 before Q1 2020 are also disclosed to reflect potential variations driven by the structural break in the sample.

of the virus outbreak, declining in Q1 (203%) and reverting upwards again in Q2 2020 (210%). It stands out that life undertakings are affected the most (Figure 1.4). The prolonged period of ultra-low yields is further negatively affecting the profitability prospects of insurers' investment portfolios, due to reinvestment risk. In addition, the risk of deterioration of corporates' ratings could affect the market value of insurers' corporate bond holdings. Financial markets volatility has also negatively affected insurers' investment profitability in the first half of the year (Figure 1.5).

Insurers are an important source of funding for banks as they hold bonds issued by banks for an amount of EUR 976.5 Bn (42% of all corporate bonds held are from banks). Moreover, banks are the main counterparties in

derivatives and security lending transactions. Looking ahead one vulnerability for the insurance sector could be the possible contagion through interconnectedness with banks.

Liquidity and funding risks did not materialise since the pandemic outbreak but are aspects that need continuous monitoring. Concerns remain in relation to potential increases in lapse rates and higher than expected virus and litigation related claims accompanied by the decreased inflows of premiums. Year-on-year premium growth for life has shown signs of deterioration for the second consecutive quarter, indicating already a negative impact from the Covid-19 outbreak. Premium growth for non-life slightly deteriorated as well.

Liquidity risk in the Institutions for Occupational Retirement Provision (IORP) sector has been a concern in the market turbulences observed in March and April 2020 as a result of the Covid-19 outbreak and remains a concern looking ahead. Sudden liquidity needs can be triggered by margin requirements of derivatives or in some instances through members and beneficiaries' (limited) rights to redeem savings.

The market turmoil has weighed on IORPs' portfolio performance. The significant investment losses suffered in the first half of the year, coupled with the lower profit distributions in equity markets, have negatively affected the sector's investment performance.

A significant decline of cover ratios (i.e. assets covering liabilities) in the DB IORPs sector is expected by the end of 2020. Moreover, the weak economic environment adds pressure on the sponsoring undertakings' and members' contributions to the occupational pension schemes.

The results of EIOPA's survey amongst NCAs[4] on the risks and key vulnerabilities of the insurance and IORP sectors suggest that both international and country specific macroeconomic conditions pose significant concerns. The prolonged period of ultra-low rates drives interest rate risk, but also credit risk, equity, and property risk are relevant to be considered. In particular, the exposure of the insurance and IORPs sectors to the corporate bond market was identified as a risk transmission channel in case of rating downgrades. Profitability risk remains highly ranked. The low profitability of investments is the dominant factor, however, also underwriting profitability poses potential concerns, mainly due to considerations on premium growth. The materiality of liquidity risks is perceived to increase in the next 12 months. Finally, with the ongoing pandemic and the current home office set up, in many European countries, the number and complexity of cyber-attacks have risen.

This financial stability report is articulated in five chapters. **The first chapter** provides a broad overview of the main identified risks and vulnerabilities for the insurance sector taking into consideration the macroeconomic and financial market situations and what emerged from the risk assessment confronted and confirmed by the results of the questionnaire to NCAs.

As highlighted in the EIOPA July 2020 Financial Stability Report and in the ESRB Technical note[5], credit rating downgrades is one of the key potential threats to financial stability of the European insurance sector. **The second chapter** of this report contributes to the discussion by providing evidence of EEA insurers' trading activities on corporate bonds in response to rating downgrades after the Covid-19 outbreak.

The pandemic triggered extensive work from home, decreasing demand for office spaces, increasing the risk of a fall in the price of commercial real estate related assets. **The third chapter** of the report includes an assessment of the vulnerability of the sector to developments in the commercial real estate market.

The uncertainty surrounding the pandemic and the current macroeconomic environment have resurfaced the discussion on the potential liquidity risk faced by the insurance sector. **The fourth chapter** of the report presents a sensitivity analysis of the potential effects stemming from increases in lapse rates.

Finally, interest rate risk was before the Covid-19 outbreak and remains the main concern for the insurance sector. **The fifth and final chapter** of this report discusses extensively this aspect based on the result of the estimation of a comprehensive empirical model that analyses the joint impact of the four main risk factors, namely, interest rate, credit spreads, equity and real estate risk on the dynamics of insurers' assets over liabilities.

4 For a detailed discussion please refer to the annex.

5 ESRB Technical note "A system-wide scenario analysis of large-scale corporate bond downgrades, updated assessment 2020 Q3", September 2020.

2. RATING DOWNGRADES AND EEA INSURERS' HOLDINGS OF CORPORATE BONDS

As highlighted in the EIOPA July 2020 Financial Stability Report and in the ESRB Technical note[6], credit rating downgrades is one of the key potential threats to financial stability. This chapter contributes to this discussion by providing evidence of EEA insurers' trading activities on corporate bonds in response to rating downgrades. After providing an introductory overview of the sectors' holdings of corporate bonds, it documents that the number of downgrades in insurers' portfolios has increased in Q1 and Q2 2020 with respect to what observed previously. Insurers tend to sell downgraded bonds. This pattern has further intensified after the Covid-19 outbreak. However, the conducted analysis revealed that the magnitude of the observed selling of corporate bonds remains largely contained. The trading activity on corporate bonds is also analysed in relation to several dimensions such as type of insurer, use of volatility adjustment, use of standard formula, capital levels and finally by differentiating trading on bank bonds versus others.

INTRODUCTION

The Covid-19 pandemic and the measures adopted by governments around the world to contain the spread of the virus have had a significant impact on the global economy, leading to a large decline in economic output. This abrupt drop in economic activities has dramatic consequences for firms' profitability and creditworthiness, potentially leading to a substantial increase of firms' rating downgrades and defaults.[7] (Re)insurers might be negatively affected by the materialisation of such a scenario, given the large share of corporate bonds in their investment portfolios.

Some initial data indicated a deterioration of the overall credit quality and increase of downgrades as well as in the number of defaults. According to S&P, the number of corporate defaults until 13th of May 2020 had hit the highest year-to-date levels since 2009 and already exceeded the total number observed in the year of 2016, although 70% of defaults so far were concentrated in the US.

Downgrades do raise Solvency Capital Requirements in SCR sub-modules that rely on credit ratings to establish risk-based capital charges, like the spread risk and market risk concentrations sub-modules.

Credit spread changes[8] will also interact with some of the Long Term Guarantees (LTG) mechanisms such as the Volatility Adjustment (VA) and the Matching adjustment (MA) that are designed to counter pro-cyclical effects.

The chart below shows that the spread risk charges increase with the Credit Quality Steps (CQS), i.e. bonds with a higher credit quality are subject to lower capital charges than bonds with lower credit quality. This means that a downgrade of a bond or loan from one step, e.g. CQS 3, to another step, e.g. CQS 4, results in higher capital requirements.[9]

By jointly analysing actual rating downgrades in the EEA insurers' portfolios and their trading activity, it can be assessed whether and to which extent insurers respond to downgrades by selling off corporate bonds.

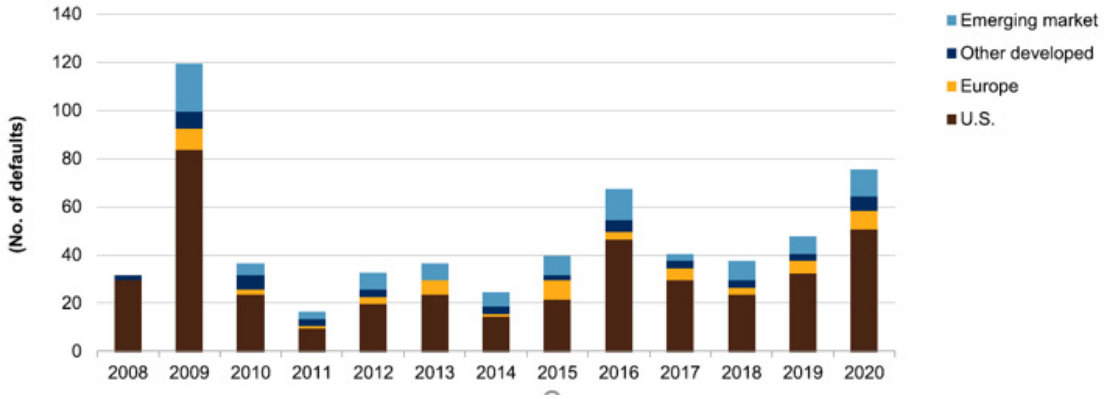
6 ESRB Technical note "A system-wide scenario analysis of large-scale corporate bond downgrades, updated assessment 2020 Q3", September 2020.

7 This situation corresponds to mass downgrade/default scenario.

8 Rating downgrades are associated with increases in credit spreads (fall of corporate bonds' prices). There is usually a very close relationship between the evolution of spreads levels and ratings, even if there may be a time differential between the materialization of the two.

9 The increase in the capital charges occurs in discrete steps because of the level of granularity assumed in the spread risk sub-module. The Solvency II Delegated Regulation distinguishes an objective scale of seven credit quality steps, i.e. CQS 0 to 6, and not the intermediate steps within credit quality steps that rating agencies tend to assign to corporates.

Figure 2.1. Corporate defaults by region: Year-To-Date Defaults



Source: S&P Global Market Intelligence LLC

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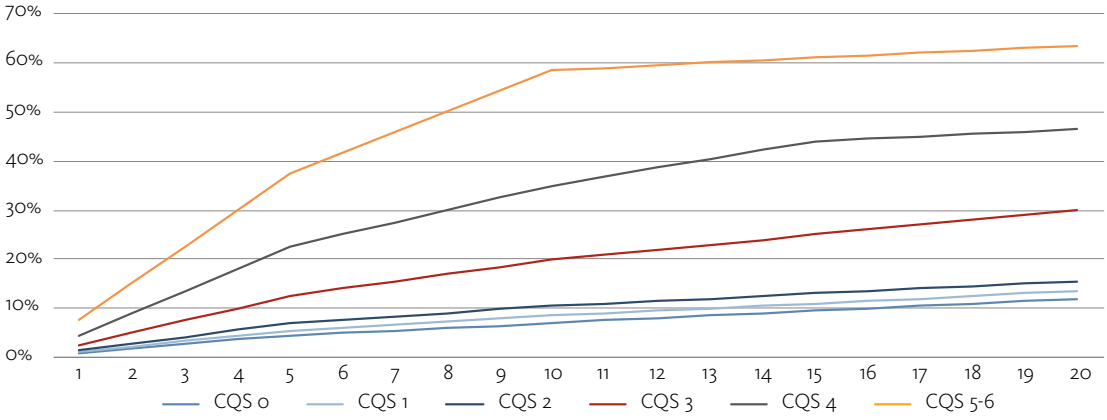
Figure 2.2. Spread risk charges on bonds & loans by CQS and duration in years



Source: EIOPA calculation with information from SII regulation.
Note: For Fitch Ratings, Moody's Investor Service and S&P Global Ratings the mapping between rating and CQS is the following: CQS 0 (AAA), CQS 1 (AA), CQS 2 (A), CQS 3 (BBB), CQS 4 (BB), CQS 5 (B) and CQS 6 (CCC).

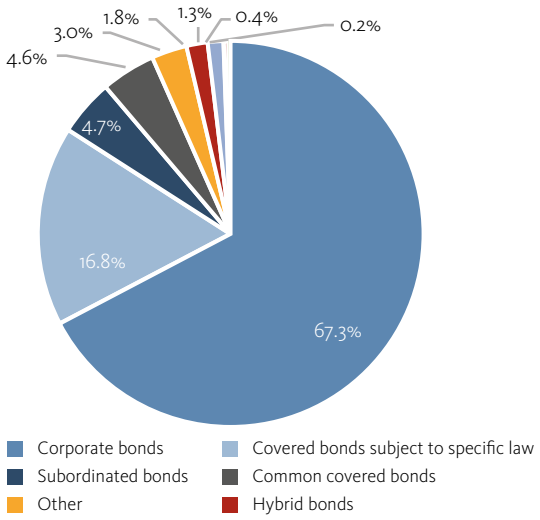
OVERVIEW OF CORPORATE BOND HOLDINGS AND ANALYSIS

Insurers are important investors in the corporate bond market. The EU insurance industry holds EUR 11,357 bn. of assets.[10] Corporate bonds represent a share of 32% of total investments.[11] In this analysis, only direct holdings are considered because only for these purchased and sold quantities can be calculated using item-by-item Solvency

10 Data: EIOPA Statistics, Solo prudential reporting Q4-2019.

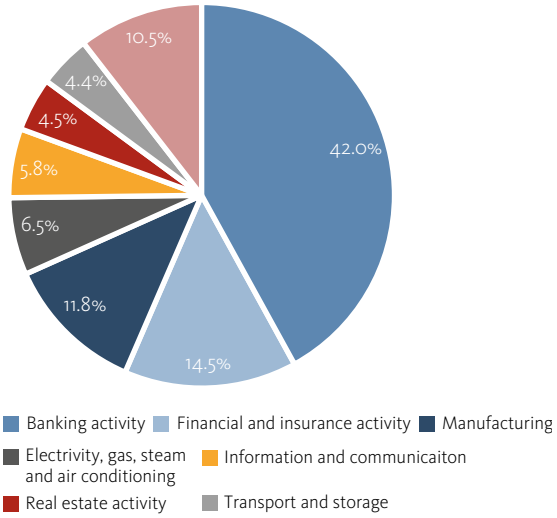
11 Investments is the largest component of insurers' assets. As at the end of 2018, EEA total assets were €11.3 trillion and EEA total investments €10.7 trillion. The difference between total assets and total investments is due to: goodwill; deferred acquisition costs; intangible assets; deferred tax assets; pension benefit surplus; property, plant & equipment held for own use; reinsurance recoverables and receivables; and own shares.

Figure 2.3. SII value of EU insurers' corporate bond holdings: by type of corporate bonds



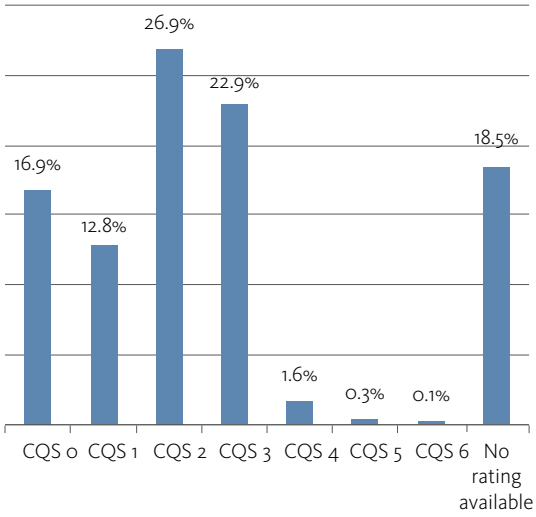
Source: EIOPA Central Repository, Solo Q4-2019

Figure 2.4. SII value of EU insurers' corporate bond holdings: by sector (NACE code)



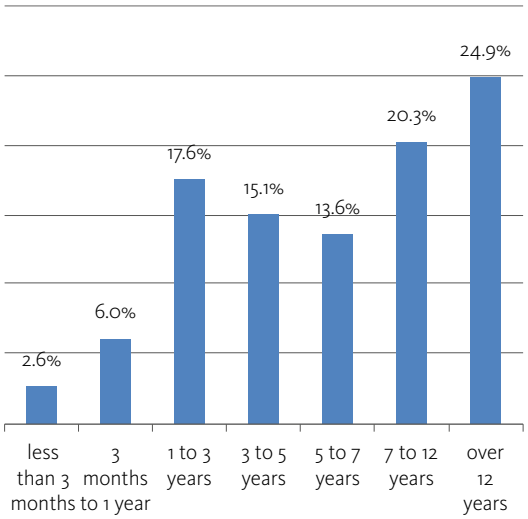
Source: EIOPA Central Repository, Solo Q4-2019

Figure 2.5. SII value of EU insurers' corporate bond holdings: % to total by Credit Quality Steps (CQS)



Source: EIOPA Central Repository, Solo Q4-2019

Figure 2.6. SII value of EU insurers' corporate bond holdings: % to total by remaining time to maturity



Source: EIOPA Central Repository, Solo Q4-2019

II reporting data[12]. Direct holdings amount to EUR 2,325 bn. and represent 20% of total investments.

Bank bonds represent the largest share corresponding to 42% of total holdings (Chart 2.4). Corporate bonds held are investment grade rated, mainly CQS2/A and CQS3/BBB and almost half of the bonds have a maturity longer than 7 years (Chart 2.5 and 2.6).

12 Investments in corporate bonds via CIUs are material, however the focus on CIUs is out of the scope of this study as no detailed information is available in the SII Quantitative Reporting Templates that allows to calculate buying and selling activity of corporate bonds. It is possible to observe whether the fund quantities change, but it is not possible to measure within the fund the rebalancing taking place; this work can be done only by matching the fund with statistics on investment funds.

TRADING OF CORPORATE BONDS BY EEA INSURERS

In the pre-crisis period, in each quarter, approximately 4% of the corporate bonds held are sold. This corresponds to 16% on an annual basis, meaning that EEA insurers' bond portfolio do turn over in approximately 6 years [1/sold] (Figure 2.7).

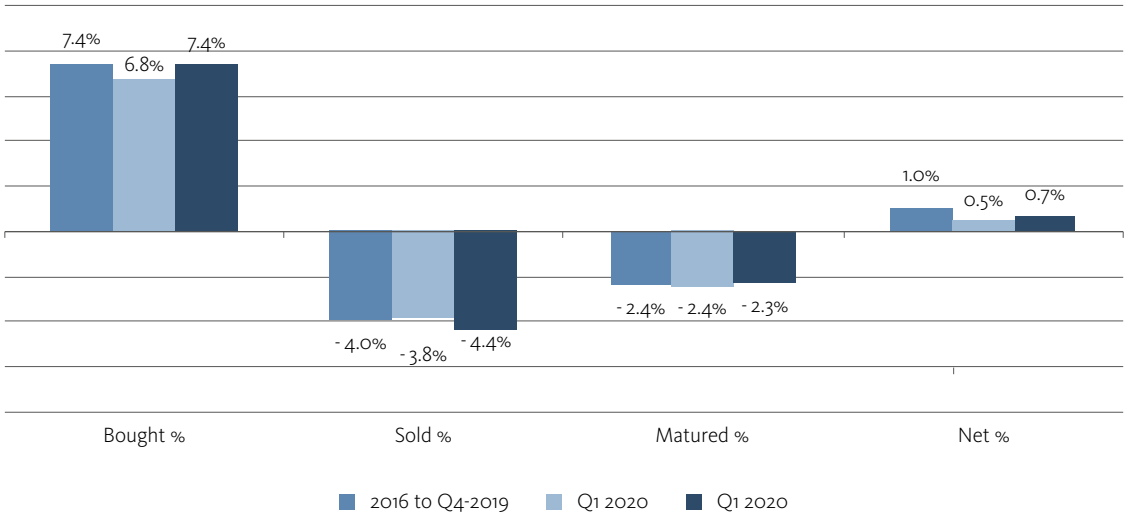
Insurers tend to be net buyers of corporate bonds (Table 2.1). Throughout the sample, up to Q4 2019, average quarterly corporate bond net purchases are overall positive,[14] i.e. EUR 20.9 bn. (+1% of initial quarter positions). In Q1 and Q2 2020, insurers remain net buyers for an amount of respectively EUR 11.7 bn. and EUR 14.4 bn. (+0.5% and +0.7%), despite the persistence of an above-average selling attitude.

In the pre-Covid-19 period, insurers tended to buy mostly A and BBB rated bonds (as shown in Table 2.1 respectively 28 and 23% of the total purchases), which is in line with the fact that CQS2/A and CQS3/BBB corporate bonds represent the largest shares corresponding to 29% and 26% (Figure 2.5) of the total corporate bonds holdings respectively.

In Q1 2020[15], insurers reacted to financial market developments, triggered by the virus outbreak, by net selling high rated (AAA) and (AA) bonds, for amounts of EUR -7 bn. and EUR -2.6 bn. respectively. Insurers net sold AAA bonds also in Q2 2020. Selling of low rated bonds is typically aimed at reducing credit risk in consideration of a potential increase of future downgrades. Instead, insurers have been selling highly rated bonds, which might have been motivated by an attempt to liquidate assets minimising losses.[16] Both in Q1 and Q2 2020, the largest amount of bonds net purchased corresponded to CQS2/AA (respectively EUR 15.5 and EUR 20.0 bn.). Instead, net purchases of BBB reduced from EUR 6.5 bn. before the Covid-19 outbreak to approximately EUR 2. Bn. in Q1 and Q2 2020, probably in consideration of the fact that the risk of rating downgrades was high.

Since the Covid-19 outbreak, downgrades increased. Before 2020, there were more upgrades than downgrades in EEA insurers' corporate bond portfolios (ratio of downgrades to upgrades on average 0.63 per quarter). This reverted in Q1 and Q2 2020, with the ratio becoming 2.16 and 3.67, respectively. The number of downgrades in insurers' portfolios increased from 1% (before the pandem-

Figure 2.7. Corporate bonds quarterly trading activity by EEA insurers



Source: EIOPA calculations with data from the EIOPA Central Repository, solo reporting.
Note: The sample period goes from Q1 2016 to Q2 2020 (15 quarters). To enable measuring selling activity the focus is on quarter-to-quarter changes of quantities (or par amounts) of bonds holdings at the asset level; results are then aggregated.[14]

13 Please refer to the annex for the methodology.

14 Net purchases have always been positive throughout the sample with the exception of Q2 and Q3 2017.

15 Trading activity could have also be triggered by other events in January and February.

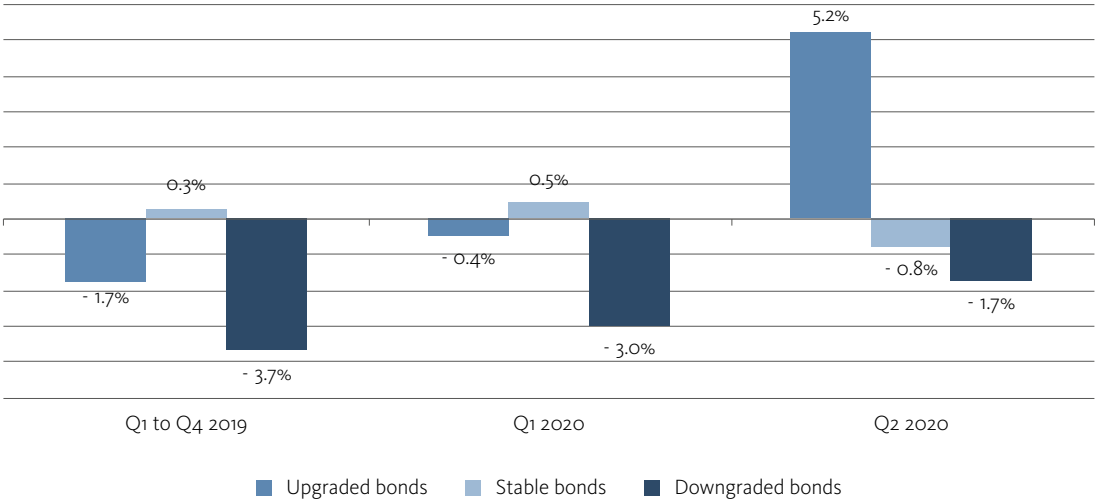
16 Cash positions increased in Q1-2020 by around EUR 33 bn and remained stable in Q2 2020. This suggests that insurers have sold some corporate bonds (but also equity and government bonds not discussed here) and have increased their cash holdings entering into a "wait and see" stance.

Table 2.1. Corporate bonds trading activity by EU insurers (Amounts are in EUR mil.)

	Bought (CQS end-of-Q)		Sold (CQS beginning-of-Q)		Matured	Net (Bought-Sold-Matured)
	EUR Amount in Mil	% of total buy	EUR Amount in Mil	% of total sell	EUR Amount in Mil	EUR Amount in Mil
CQS	**Quarterly average - Period from Q1 2016 to Q4 2019**					
0	27,013	18%	-19,894	25%	-5,376	1,743
1	15,441	10%	-7,862	10%	-6,340	1,239
2	41,550	28%	-16,058	20%	-16,692	8,800
3	34,663	23%	-18,177	23%	-9,895	6,591
4	3,112	2%	-2,509	3%	-889	-286
5	898	1%	-803	1%	-154	-60
6	137	0%	-214	0%	-43	-120
7	15,817	11%	-8,859	11%	-6,260	698
No rating	10,374	7%	-5,798	7%	-2,277	2,299
Total	**149,003**	**100%**	**-80,174**	**100%**	**-47,925**	**20,904**
CQS	**Q1 2020**					
0	25,646	18%	-26,849	33%	-5,850	-7,053
1	12,501	9%	-7,725	9%	-7,459	-2,684
2	47,366	32%	-15,814	19%	-17,007	14,545
3	34,406	23%	-18,501	23%	-13,819	2,086
4	4,375	3%	-1,764	2%	-734	1,877
5	1,000	1%	-794	1%	-157	49
6	72	0%	-74	0%	0	-2
7	11,832	8%	-3,776	5%	-6,166	1,891
No rating	9,257	6%	-6,728	8%	-1,518	1,011
Total	**146,454**	**100%**	**-82,026**	**100%**	**-52,709**	**11,720**
CQS	**Q2 2020**					
0	18,016	12%	-22,265	25%	-5,546	-9,795
1	16,818	11%	-7,892	9%	-8,694	232
2	54,662	36%	-20,086	22%	-14,560	20,017
3	37,476	25%	-25,801	28%	-8,988	2,687
4	2,083	1%	-2,244	2%	-500	-661
5	516	0%	-582	1%	-17	-83
6	99	0%	-161	0%	-5	-67
7	12,736	8%	-4,222	5%	-6,365	2,149
No rating	9,940	7%	-7,345	8%	-2,600	-5
Total	**152,346**	**100%**	**-90,598**	**100%**	**-47,275**	**14,474**

Source: EIOPA calculations with data from the EIOPA Central Repository, solo reporting.
Note: The sample period goes from Q1 2016 to Q2 2020 (15 quarters).

Figure 2.8. EU insurers' % net selling across quarters: Breakdown by bonds that have stable CQS, bonds that are upgraded and downgraded by one notch[19]



Source: EIOPA calculations with data from the EIOPA Central Repository, solo reporting.
The sample period goes from 2016 to Q2 2020.
Note: Trading activity on corporate bonds is calculated in relation to rating changes ignoring the starting rating category. Net is obtained as buy minus sell (ignoring bonds that mature) for the purpose of capturing activity.

ic) to almost 3% and 2.6% in Q1 and Q2 2020. On the other hand, the number of upgrades significantly reduced.

In general, insurers tend to net sell downgraded bonds (Figure 2.8).[17] Both in the pre-pandemic period and during the first two quarters of 2020, insurers tend to net-sell proportionally more downgraded bonds, compared to bonds without change in rating. On average approximately 3.7% (15%) of the downgraded bonds are net sold on a quarterly (annual) basis.

Fallen angels tend to be sold to a larger extent than other downgraded bonds.[19] Bonds which are downgraded from BBB to a non-investment grade rating are typically referred to as fallen angels and it is often presumed that institutional investors tend to sell those. As shown in Table 2.2, for BBB rated bonds, the selling and net selling is more pronounced. Approximately EUR 8.6 bn. and EUR 5.9 bn. of the CQS3/BBB rated bonds are downgraded in Q1 and Q2 2020 respectively and out of those -7.8% and -6.9% respectively were net sold[20].

Insurers were also net sellers for upgraded bonds in the pre-Covid-19 period and in Q1 2020 (Figure 2.8). In fact, they net sold -1.7% and -0.4%, of the holdings, respectively in these quarters, potentially with the intention of realising capital gains. In Q2 2020, instead, insurers net bought material quantities of upgraded bonds (+5.2%). The net selling is shown to be more pronounced for upgrades regarding bonds with higher credit quality. For example, in Q1 2020 out of the CQS1/AA rated bonds, an amount of EUR 1.4 bn. is upgraded[21] and of this amount -11.7% of the initial quarter position is net sold.

Both in Q1 and Q2 2020, life undertakings and internal model users have been relatively more active in net selling corporate bonds, with respect to non-life insurers, reinsurers and standard formula users.[22]

17 Note that in SII reporting data only end of the quarter positions can be observed and a precise temporal link between the down/upgrade and the buying or selling activity cannot be established. Therefore, this analysis capture situations in which the bonds could be traded both right before or right after the rating downgrade event.

18 Almost all bonds that are downgraded are observed to be downgraded by one notch in a quarter period.

19 In Q1 2020, the SII value of the EEA insurers' CQS3/BBB corporate bonds positions reduced by -7.8% from EUR 542 bn. to EUR 503 bn. This variation includes both selling and the price effect, in fact corporate bonds depreciated because of an increase in credit risk. The price effect is largely dominating, because as previously shown (in Table 1), in Q1 2020, insurers net sold (buy-sell-matured) CQS3/BBB rated bonds for approximately EUR 2.0 bn. corresponding to a 0.4% of the value of the initial quarter position (i.e. EUR 542 bn.).

20 In Q1 this holds similarly for CQS2/AA rated bonds.

21 Upgrades in Q1-2020 might have taken place pre Covid-19 shock, i.e. before March.

22 It needs to be taken into consideration that life undertakings hold the largest share of 51%; composites 31%, non-life 14% and reinsurance 3%. Standard formula user hold a share 60% of the total sectoral holdings and partial internal and full internal model both approximately 20%.

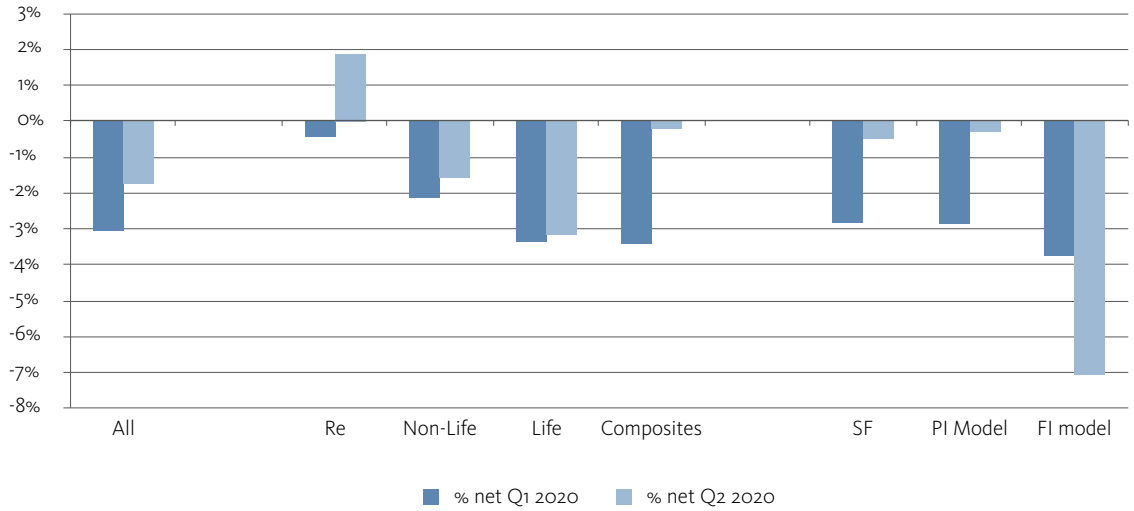
Table 2.2. EU insurers trading activity on downgraded and upgraded bonds by CQS in Q1 and Q2-2020

Period Q1-2020							
	CQS 0	CQS 1	CQS 2	CQS 3	CQS 4	CQS 5	
Downgrade by 1 notch	AAA	AA	A	BBB	BB	B	
buy	1.3%	2.2%	3.2%	6.4%	10.2%	7.8%	
sell	-5.2%	-2.0%	-4.5%	-14.1%	-7.8%	-9.7%	
net	-3.8%	0.2%	-1.3%	-7.8%	2.5%	-1.9%	
SII amount (EUR Mil)	**963**	**6,684**	**9,475**	**8,634**	**664**	**23**	**26,442**
Upgrade by 1 notch							
buy		1.5%	1.8%	6.6%	4.7%	5.2%	
sell		-13.2%	-1.6%	-4.5%	-2.5%	-35.0%	
net		**-11.7%**	0.1%	2.1%	2.2%	-29.8%	
SII amount (EUR Mil)		**1,460**	**17,258**	**3,133**	**1,339**	**174**	**23,363**

Period Q2-2020							
	CQS 0	CQS 1	CQS 2	CQS 3	CQS 4	CQS 5	
Downgrade 1 notch	AAA	AA	A	BBB	BB	B	
buy	1.1%	2.3%	4.3%	2.1%	3.0%	6.3%	
sell	-9.6%	-5.5%	-2.9%	-9.1%	-7.9%	-32.1%	
net	-8.6%	-3.2%	1.4%	-6.9%	-4.9%	-25.8%	
SII amount (EUR Mil)	**790**	**3,637**	**16,351**	**5,919**	**841**	**256**	**27,793**
Upgrade by 1 noth							
buy		110.5%	6.5%	4.8%	5.8%	2.9%	
sell		-26.0%	-1.8%	-2.9%	-2.2%	-13.3%	
net		84.2%	4.7%	1.9%	3.5%	-10.5%	
SII amount (EUR Mil)	**-**	**187**	**11,737**	**1,632**	**334**	**88**	**13,979**

Source: EIOPA calculations with data from the EIOPA Central Repository, solo reporting.
The sample period includes Q1 and Q2 2020.
Note: Measures in SII amounts are in EUR millions. Breakdown of % buy, % sell and % net for 1 notch downgrade and 1 notch upgrade with respect to the Credit Quality Step observed in the beginning of the quarter.

Figure 2.9. EU insurers' % net selling (buy minus sell) in Q1 and Q2 2020 (Breakdown: type of insurers and by methods of SCR calculation)



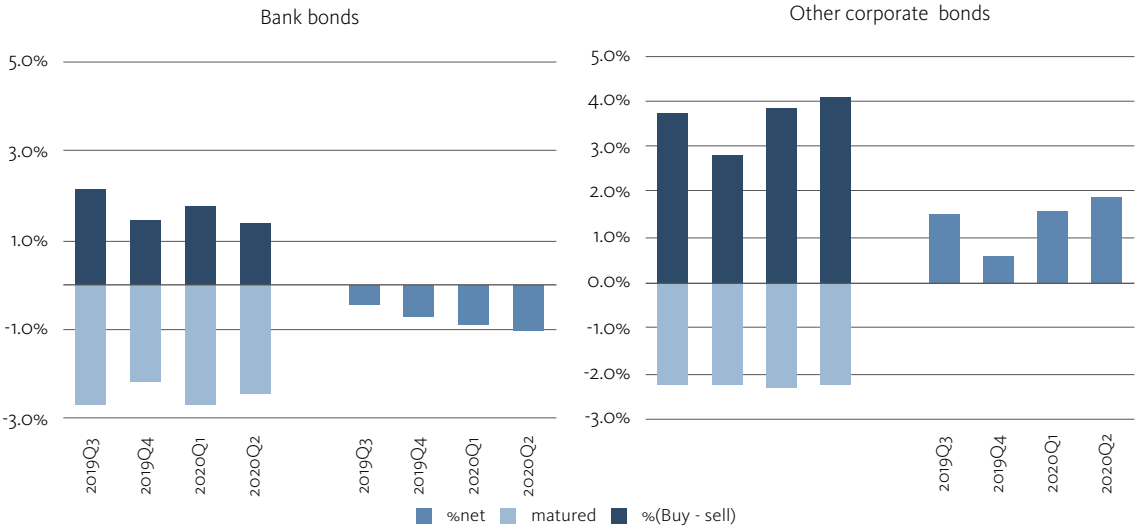
Source: EIOPA calculations with data from the EIOPA Central Repository, solo reporting.
The sample period includes Q1 and Q2 2020.

Trading activity on bank bonds shows a trend of reducing exposures from the third quarter of 2019 onwards. Although the difference between buy and sell amounts is positive, considering the matured bonds in each quarter implies that insurers are reducing their funding provision to banks, by not rolling-over.

When narrowing down the focus to bonds that have been downgraded, it is found that in Q1 insurers net sold predominantly non-bank bonds while in Q2 those insurers net sold relatively more bank bonds than bonds issued by other sectors.

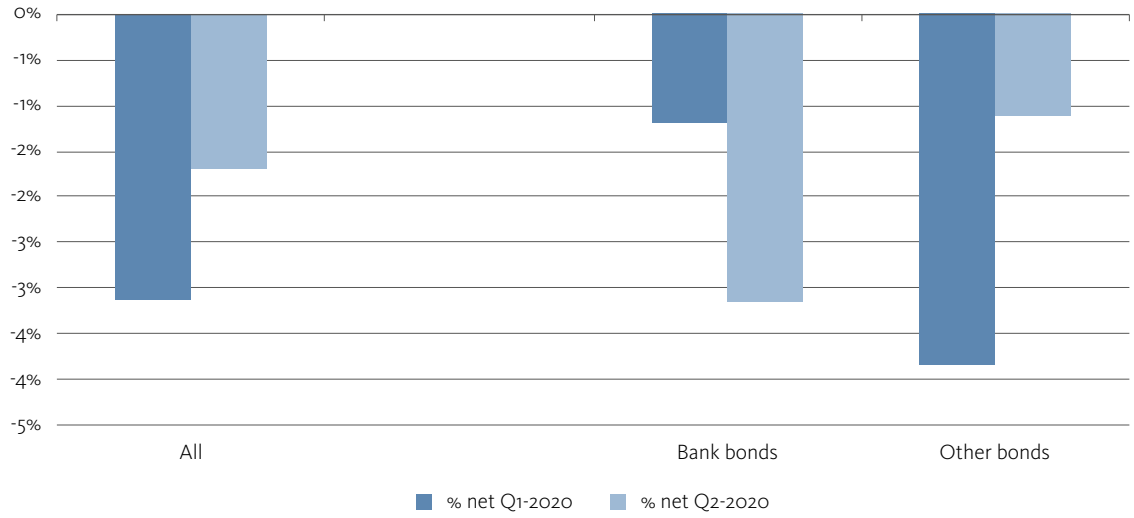
Solvency II contains a range of tools to limit pro-cyclicality, including the Volatility Adjustment (VA). This optional measure allows undertakings to reflect part of the credit spreads on government and corporate bonds as a mark-up on the risk-free interest rate curve. As such, the volatility adjustment

Figure 2.10. EU insurers trading activity: Banks versus other bonds



Source: EIOPA calculations with data from the EIOPA Central Repository, solo reporting.
The sample period includes Q1 and Q2 2020.

Figure 2.11. EU insurers % net selling (buy minus sell) of downgraded bonds

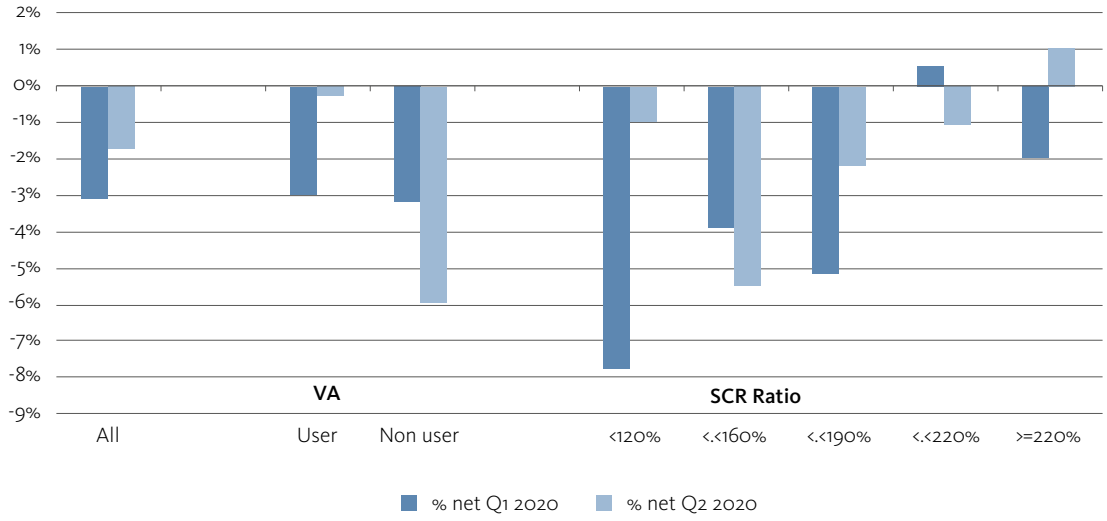


Source: EIOPA calculations with data from the EIOPA Central Repository, solo reporting.
The sample period includes Q1 and Q2 2020.

mitigates the adverse effect on capital positions stemming from an increase in spreads (and accompanying downgrades) because its impact will be reduced by a higher discount curve and, therefore, a lower value of technical provisions.

Results confirm that VA users, which hold 69% of the amount of corporate bonds, exhibited a different and relatively weaker net-selling attitude of downgraded bonds in Q1 2020, i.e. –3.0% vs. -3.2% and even more so in Q2 2020 with -0.3% vs. -6.0% (Figure 12). VA users tend to be less active in general; by looking at average selling activity before the outbreak of the pandemic, it is found that these turn-over their portfolios with an average time of 6.7 years as compared with non-user VA which do in approximately 4.5 years (as discussed the overall average is approximately 6 years). In the case of Matching Adjustment (MA), the countercyclical effect is higher because the assets in MA portfolios have to be held until maturity.

Figure 2.12. EU insurers % net selling (buy minus sell) of downgraded bonds in Q1 and Q2 2020. (Breakdown: VA and non-VA users and by buckets of SCR coverage ratios)



Source: EIOPA calculations with data from the EIOPA Central Repository, solo reporting.
The sample period includes Q1 and Q2 2020.

Also, it is found that undertakings disposing of thinner capital buffers have been more actively net selling corporate bonds. Insurers with smaller capital buffers have probably a lower ability or propensity to bear the increase in credit risk (Figure 2.12).[23]

FINAL REMARKS

The analysis of trading behaviour by EEA insurers reveals net buying activity with regard to corporate bonds throughout the entire period, hence also after the outbreak of the virus and the financial market turbulence observed in the end Q1 and in Q2 2020.

Insurers tend to sell downgraded bonds. This pattern has further intensified during the Covid-19 pandemic. The sale of downgraded bonds may be triggered by capital requirements, reflecting a de-risking behaviour by insurers, but it may also be driven by other reasons such as investment mandates. Among other things, results confirm that VA users exhibited a different and relatively weaker net-selling attitude of downgraded bonds and also that VA users tend to be less active in general.

In any case, the magnitude of the observed selling of downgraded corporate bonds remains largely contained without evidence suggesting significant pro-cyclical effects triggered by insurers' response to the crisis.

However, the ongoing crisis coupled with many new country lockdowns, in response to the second wave of the pandemic, indicate that more downgrades could be expected in the upcoming quarters when the fiscal and policy measures, introduced in support of the economy, might phased out. Hence, the analytical framework described in this chapter needs to be used to continuously monitor the situation in order to be able to take in a timely manner the appropriate supervisory measures if needed.

To get a full picture about downgrading risk and the trading activity in response to downgrades also indirect investments in corporate bonds via Collective Investment Undertakings (CIUs) should be taken into account. At the moment, to EIOPA no detailed information is available (in the SII Quantitative Reporting Templates) that allows calculating buying and selling activity of corporate bonds within CIUs. Measuring rebalancing within funds can be done only by matching the fund with detailed statistics on investment funds. This topic as well as analysing the buy and sell behaviour in response to rating downgrades across countries will be left for future investigation.

23 Only 0.1% of corporate bonds are held by insurers with ratios below 120%. Shares of 11.7, 19.5 % and 12.5% are held by insurers in the two bucket with SCR ratios 120-160%, 160-190% and 190-220. 56.2% are held by insurers with ratios in the bucket with ratios above 220%.

ANNEX

METHODOLOGY

Comparing the notional value of the bonds or the quantities at a point in time with the previous period will result in the net number of bonds bought or sold during that quarter. It is a net number since undertakings that have bought and sold an investment in a period just report the final exposure to that investment at the end of that period.

Define $MV_{i,j,t}$ as the market value of the holdings/investments of undertaking *i* in asset *j* at time *t* and $N_{i,j,t}$ as the number of holdings/investments in that asset *j* at time *t*, where N equals the par/notional amount (or the quantity) of bonds. The number of assets *j* bought, sold and kept by undertaking *i* in quarter *t* then becomes:

$$\Delta N_{i,j,t}^{bought} = \max\left[N_{i,j,t} - N_{i,j,t-1}, 0\right]$$
$$\Delta N_{i,j,t}^{sold} = \min\left[N_{i,j,t-1} - N_{i,j,t}, 0\right]$$
$$N_{i,j,t}^{kept} = \min\left[N_{i,j,t}, N_{i,j,t-1}\right]$$

And:

$\Delta N_{i,j,t}^{matured}$ = bonds with maturity < period (e.g. 1 quarter or 1 year) at time *t-1*. The number of bonds kept, matured and sold must, by definition, make up the initial bond holding. Since buying or selling 100,000 one Euro bond may be as relevant as buying or selling a single bond worth 100,000 Euro, the numbers above need to be translated into the market value of assets *j* bought, sold and kept by undertaking *i* in quarter *t*:

$$\Delta MV_{i,j,t}^{bought} = \Delta N_{i,j,t}^{bought} \times \frac{MV_{i,j,t-1}}{N_{i,j,t-1}}$$
$$\Delta MV_{i,j,t}^{sold} = \Delta N_{i,j,t}^{sold} \times \frac{MV_{i,j,t-1}}{N_{i,j,t-1}}$$
$$MV_{i,j,t}^{kept} = N_{i,j,t}^{kept} \times \frac{MV_{i,j,t-1}}{N_{i,j,t-1}}$$

and:

$$\Delta MV_{i,j,t}^{matured} = \Delta N_{i,j,t}^{matured} \times \frac{MV_{i,j,t-1}}{N_{i,j,t-1}}$$

Notice that this translation does not imply that price effects are included in the transactions; what is captured is the change in value clean from the price effect.

Whether or not an insurer holds onto its investments does not depend on whether or not they buy or sell 10 million euros of assets; if the total investments equal 20 million this is relatively a lot, but it is relatively little for an undertaking with 1 billion of assets. Therefore, the relative amounts of assets j bought, sold and kept by undertaking i during quarter t are defined as the changes in market value divided by the total investments of undertaking i in quarter t:

$$\Delta^{bought}_{i,j,t} = \Delta MV^{bought}_{i,j,t} \Big/ \sum_j MV_{i,j,t-1}$$

$$\Delta^{sold}_{i,j,t} = \Delta MV^{sold}_{i,j,t} \Big/ \sum_j MV_{i,j,t-1}$$

$$\Delta^{kept}_{i,j,t} = \Delta MV^{kept}_{i,j,t} \Big/ \sum_j MV_{i,j,t-1}$$

And

$$\Delta^{matured}_{i,j,t} = \Delta MV^{matured}_{i,j,t} \Big/ \sum_j MV_{i,j,t-1}$$

Analysing the total amounts of assets bought, sold and kept and matured ΔMVi,j,t may be also of interest. These amounts and percentages kept can be obtained per asset class (or any other asset attribute such as credit quality step, maturity etc.) or per type of undertaking (or any other undertaking attribute such as country, size etc.).

For that the assets j are categorized according to their belonging to categories c* (e.g. maturity, credit quality step, country etc.):

$$\Delta MV^{k}_{i,c*,t} = \sum_{j \in c*} \Delta MV^{k}_{i,j,t}$$

$$\Delta^{k}_{i,c*,t} = \Delta MV^{k}_{i,c*,t} \Big/ \sum_{j \in c*} MV_{i,j,t-1}$$

$$k \in \{bought, sold, matured, kept\}$$

When calculating changes in par amounts of bonds, these are converted from the undertaking reporting currency to the asset currency, so that the exchange rate effect is accounted for.

DATA

The sample goes from 2016 to the second quarter of 2020. For each undertaking, the list of assets at two different reporting dates is compared and trading activity is measured with the discussed methodology[24]. The sample creation procedure and data cleaning reduce the sample coverage to approximately 93% of the total.

To clean the data, where observations are deleted, when the following anomalies are observed in the list-of assets: a) SII values reported but quantity or par amount are not, b) large asset prices changes[25], c) par amounts that are significantly larger that SII value of the bond[26] d) an undertaking sells or purchases an asset for a value of more than 30% of the value of its total assets and e) SII values of bonds are reported negative.

24 Activity is measured on each individual bond and results are then aggregated at the EEA level and/or by undertaking and/or asset characteristics. The framework applied takes into account that some bonds are held from one reporting date to another and just increase or decrease in quantity. Instead some others bonds, are present in only one of the time periods meaning these are either newly bought, sold entirely, or matured. To calculate measures of trading activity undertakings must be reporting, i.e. present in EIOPA Central Repository (reported and not rejected) in all quarters analysed. Trading activity is measured in sub-samples of 5 quarters (intra-period activity for 4 quarters) and then results are combined; if the sample would cover all 16 quarters many undertakings would be dropped because they just miss in one quarter.

25 By extremely large we mean 100% price increase.

26 By significantly larger we mean double.

Because we do not dispose of external rating sources for the ratings, the CQS of a corporate bond can be obtained only if bonds are in EEA insurers' portfolios. If a bond leaves the sectors' corporate bond portfolio in SII data, the CQS information is not available anymore. When either in the beginning (i.e. end of previous quarter) or the end of a quarter a bond is classified as rating not available, the rating (CQS) variation cannot be observed.

For example, in Q1-2020, information on CQS is lost for approximately EUR 94 bn. of corporate bonds (4% of the EEA insurers' corporate bonds portfolio). Out of these: EUR 45 bn. (i.e. 48%) do reach maturity, EUR 34 bn. (i.e. 36%) remain in insurers' portfolios but the rating information is not available anymore and EUR 15 bn. (16%) leave the insurers' portfolios because they are sold. In summary, the amount of bonds sold in Q1-2020 is approximately EUR 117 bn. and for 12 % (EUR 15 bn.) of these it is not possible to analyse the selling behaviour in relation rating changes.

3. DEVELOPMENTS IN COMMERCIAL REAL ESTATE

This chapter assesses the potential vulnerability of insurers to developments in commercial real estate. The Covid-19 crisis triggered extensive work from home, decreasing demand for office spaces. As a consequence, risk of a fall in the price of commercial real estate related assets is expected. In connection with mark-to-market valuation this could negatively affect insurers' balance sheets. So far, price declines have not materialized significantly in the balance sheets, but in the future write-offs are likely. In case of a 10% price decline, 4% of excess of asset over liabilities on aggregate is at risk. This number is significantly higher in some countries and for insurers with high exposure to commercial real estate.

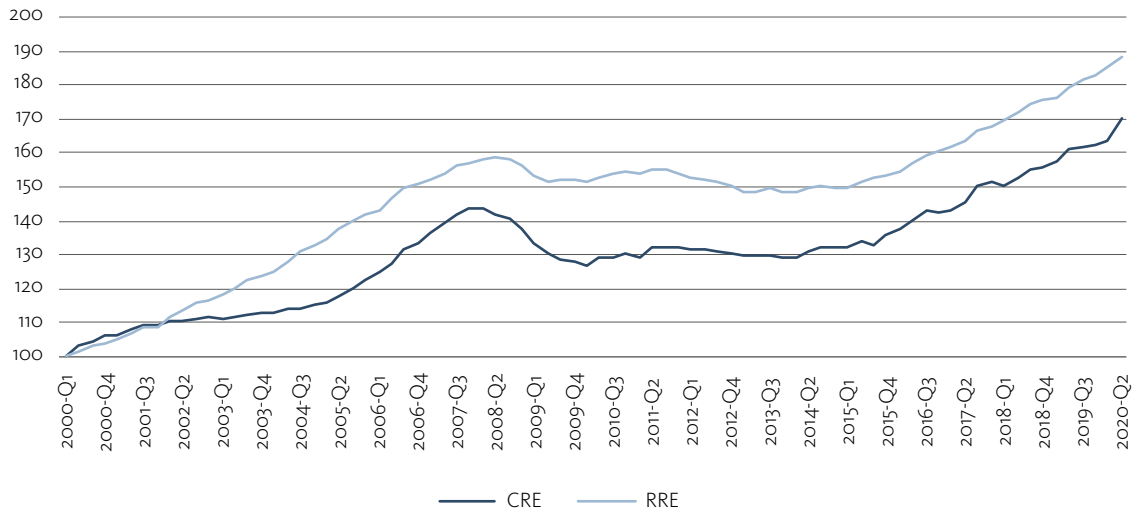
INTRODUCTION

Real estate related assets account for a significant share of European insurers' investments. Commercial real estate is particularly relevant, because recent developments during the Covid-19 pandemic have negatively influenced this sub-segment. First, commercial real estate is a cyclical market which will suffer more than most in the economic downturn. Moreover, several trends such as remote working and social distancing particularly reduce the attractiveness of commercial property. These trends could become so entrenched that demand for commercial property could fall. This motivates an analysis of insurers' exposure to commercial real estate and an assessment of their vulnerability to declining commercial real estate prices.

COMMERCIAL REAL ESTATE PRICES

Commercial real estate prices in Europe increased strongly over the last two decades. The compound annual growth rate was 2.7% which is, however, below the growth rate of residential real estate (Figure 1). The volatility of commercial real estate is higher, which is noticeable in the decline of prices during the financial crisis of 2007–2008.

Figure 1 - Commercial and residential real estate prices in the Euro area (Q1 2000-Q2 2020)



Source: ECB, Statistical Data Warehouse, RESC - Real Estate Statistics - Commercial property prices and Residential property prices. Index 2000 Q1 = 100. Euro area 19 (fixed composition) as of 1 January 2015. Downloaded 4 November 2020.

Yet, commercial real estate is a cyclical market, more so than residential real estate. A key factor responsible for the cyclicality is the inelasticity of supply, the number of properties can be reduced only with difficulty, even if in a recession demand falls quickly. This implies, that commercial real estate prices typically decline in times of crisis. [27]

There are several reasons for the higher cyclicality of commercial real estate than of residential real estate. Household incomes are more stable than business incomes. Residential real estate tends to be financed mostly by domestic banks, whereas commercial real estate is, to a larger degree, shorter-term financed and may be more dependent on international capital markets. Moreover, irrespective of the business cycle, people are reluctant to reduce their housing consumption, while businesses close and downsize during recessions.

The virus outbreak weighed on the commercial real estate sector. Office demand is affected by the economic downturn and the gloomy business outlook. Brick-and-mortar shops and leisure places such as bars and restaurants were shut-down. Even after re-openings and the end of stay-at-home orders, many people hesitate to go out, either because they feel uncomfortable and avoid crowds, or because of social distancing rules and mandatory face masks. The risk situation remains uncertain, second waves of the pandemic lead to regularly changing restrictions or even repeated lockdowns. An additional let-down is the stop of tourist flows and cancelled business trips. As a consequence, visits to city centres are becoming less frequent. Visits to central Paris, for instance, fell by 40 per cent in the week to October 9 (a week without a lockdown) compared with the pre-pandemic average in January.[28]

There is a risk that the shock to commercial property markets will be permanent, at least to some extent. Workplace pattern and lifestyles changes may be preserved. During the peak of the pandemic, many people worked from home with no or limited experience of working this way. This practice is broadly positive and many employees prefer to work more extensively from home in the future.[29] As a consequence, less office space might be needed. Furthermore, the large boom in e-commerce and other online services might remain such that customers will not return to the malls and city centres even after the pandemic ends. Regarding travel activities, virtual meetings may remain popular, so that business travel may not return to the pre-crisis level.

The outlook has further downside risks because of cliff effects. Governments and authorities have introduced a wide range of policy responses, which provide relief to businesses. These include public guarantees on loans and moratoria on payments of credit obligations. Importantly, these schemes are only temporary. This implies that the situation may get abruptly worse when schemes expire. There may be an increase in defaults, which reduces demand for commercial property.

Commercial property price indices for Europe suggest a stop in growth. Recent price developments of commercial real estate are condensed in price indices published by commercial providers (MSCI, CBRE, Real Capital Analytics and Green State Advisors).[30] There is a consensus that the upward trend of prices in previous years has slowed down significantly. However, there are mixed reports on the strength of the trend reversal and whether quarter-on-quarter prices in the first half of 2020 have actually decreased. Overall, the indices do not provide a clear picture. Country level price indices show a similar view.[31] On the basis of available data, prices appear to be stable in Germany and the Netherlands, whereas prices in Denmark and Iceland have fallen sharply. Among the sub-segments, data for Germany indicate a stable upward trend in office prices, while retail property prices have fallen both before and after the Covid-19 pandemic. All price indicators do not yet cover the full impact. The illiquidity of the market has increased due to lower activity[32] and deals in process take now longer to complete and deals under process are increasingly stalled. For these reasons, the transaction data used to calculate the price indices might be less representative in crisis times.

An alternative view on price developments is to look at Real Estate Investment Trusts (REITs). Prices of commercial real estate REITs declined strongly. Typically the value of REITs is as volatile as stocks but at the same time rep-

27 ESRB (2018) - Report on vulnerabilities in the EU commercial real estate sector.

28 Based on Google mobility data presented in the Financial Times: "From peak city to ghost town: the urban centres hit hardest by Covid-19", 15 October.

29 Eurofound (2020), Living, working and COVID-19, COVID-19 series, Publications Office of the European Union, Luxembourg.

30 RCA: Real Capital Analytics - Commercial Property Price Index. MSCI: MSCI Europe Quarterly Property Transaction-linked Indicator. CBRE: CBRE European Valuation Monitor – all property. GSA: Green Street Advisors - Pan-European Commercial Property Price Index.

31 Indicators from official sources collected by the Bank for International Settlements.

32 Quantifications: (1) Global Activity Tracker of Real Capital Analytics: After the first three quarters, deal number is down by 32% in the Europe, Middle East and Africa (EMEA) region. (2) CBRE: Commercial real estate investment in Europe in 2020 Q3 is down 36% year-on-year.

Figure 2: Daily prices of index Euronext IEIF REIT Europe (08/11/2019–11/11/ 2020)

Source: https://live.euronext.com/en/product/indices/QS0011070230-XPAR.

resents in the long-run the value of leveraged commercial property portfolios.[33] An index covering European commercial real estate decreased strongly in the first quarter of 2020 by 35% quarter-on-quarter and 26% year-on-year. This price decrease did not recover over the course of the year. Up to most recent time prices remained subdued, although there has been an uptick in prices in November with positive news on vaccine development. REIT prices also show the differences between the sub-segments of commercial real estate. While retail is suffering severely, office is affected only moderately and logistics has developed well.

The difference between price indices and REIT prices could indicate a time lag. REIT prices signal that even if property prices are currently stable, they will decrease in the coming quarters. It is only uncertain when this will be the case. However, also the extent is uncertain, the REIT price development may be exaggerated and property prices could become disconnected from economic fundamentals.

Declining commercial property price are associated with losses on corresponding debt instruments. Real estate investors commonly finance commercial property purchases with financial debt such as commercial mortgages and corporate bonds. Declining prices of commercial property are a source of losses for holder of related debt instruments.[34]

RATIONALE FOR INSURERS TO INVEST IN COMMERCIAL REAL ESTATE

Commercial real estate is attractive for insurers. It is an illiquid market, property is very infrequently sold, traded on private markets and transaction prices are often not disclosed to the public. Insurers seek illiquid assets because they match well with their illiquid liabilities and permit insurers to earn a potential illiquidity premium. In addition, ultra-low yields of bonds make alternative investments more attractive. At market level, there is a gradual shift from low/negative yielding assets towards alternative investments and asset classes with potentially higher yields.[35]

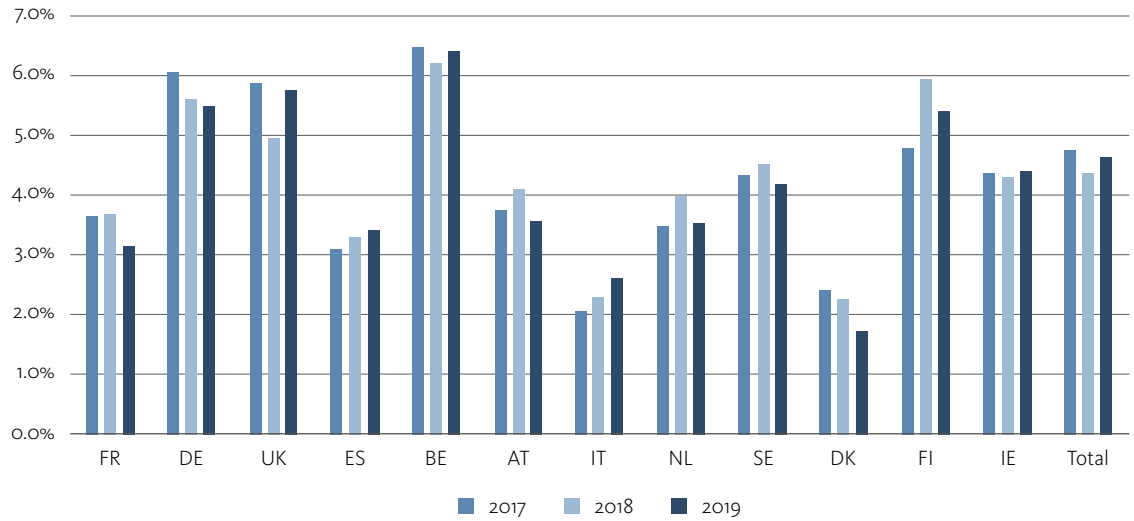
The cyclicality is less of an issue, as insurers are usually long-term investors, so that they can hold assets through economic cycles. Commercial real estate is usually held for the long term on balance sheets. Insurers are able to ignore short-term price swings, at least to some extent. This is due to their stable balance sheets and the fact that

33 REITs and direct real estate are good substitutes over the long-run, see Hoesli, Martin, and Elias Oikarinen. "Are REITs real estate? Evidence from international sector level data." Journal of International Money and Finance 31.7 (2012): 1823-1850.

34 See Oxford Economics: Commercial property slump risks chronic stress. 14 Oct 2020.

35 EIOPA - Impact of ultra low yields on the insurance sector, including first effects of COVID-19 crisis.

Figure 3: Rent income relative to property holdings by country



Source: SII QRTs data from EIOPA Central Repository. Nominator: annual solo reporting, template S.09.01, rent income (column C0090) filtered by property (CIC 9) excluding unit-linked. Denominator: EIOPA Insurance Statistics - Exposure data, filtered by property (CIC 9), subcategories office and commercial (1), residential (2), under construction for investment (4) and other (9) excluding unit-linked.

they do rarely use financial debt. From this standpoint, insurers' investment in commercial real estate contributes to financial stability, because insurers can act counter-cyclically in times of crisis and thereby stabilize markets. Regular income is generated through rent income. Solvency II data show that insurers have generated attractive rent returns over the last three years from direct ownership of property (Figure 3).

TREATMENT OF COMMERCIAL PROPERTY ON BALANCE SHEETS

An analysis is conducted to track Solvency II balance sheet valuations of commercial property over time. This analysis aims to assess whether potential price declines have already been materialized on insurers' financial statements. In principle, a decline in commercial real estate prices should lead to lower valuations in Solvency II balance sheets of insurers because of mark-to-market accounting.[36] The analysis tracks the valuation of direct holdings of commercial property from Q3 2019 to Q2 2020. The sample includes all commercial property objects with a valuation in excess of EUR 30 million which are neither held for unit-linked, nor for own use and held by insurers throughout the last year. This are 562 objects. The analysis is done on an asset level to ensure that observed changes of balance sheet valuations are due to adjustments at an asset level corresponding to write-downs of commercial property, rather than changes in the composition of the portfolio.

Price declines have not yet materialized on insurers balance sheets. The analysis indicates a wait and see approach. Although, an increase in write-downs could be observed, overall the crisis did not yet reduce valuations on insurers' balance sheets. In detail, the average value of the 562 tracked properties increases by 6% in Q4 2019. Then, the total value decreases by 0.4% in the first quarter of 2020 and increases by 0.4% in the second quarter of 2020.

EXPOSURES

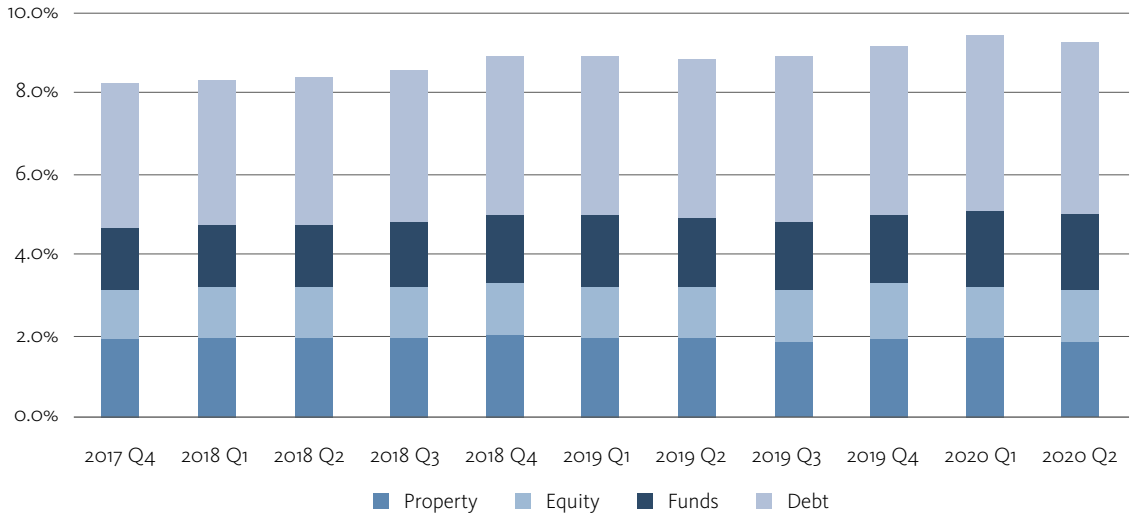
Solvency II data provide a rich source of information about the exposure of European insurers to commercial real estate. An analysis uses the list of asset, a detailed view into investment portfolios asset-by-asset. Insurers in the European Economic Area invest 9% of their total assets in real estate related assets (Figure 4).[37] Total valuations on balance sheets increased by 8% p.a to EUR 779

36 The lion share of property is assessed by Alternative Valuation Methods, which implies some leeway in adjusting valuations.

37 Based on the asset exposure statistic. For real estate exposure the definition in question 22 of the following document is used:

h¹tps://www.eiopa.europa.eu/sites/default/files/toolsanddata/insurance_statistics/faq_insurance_statistics.pdf.

Figure 4 - Real estate related assets as a share of total assets of insurers in the EEA (Q4 2017 – Q2 2020)



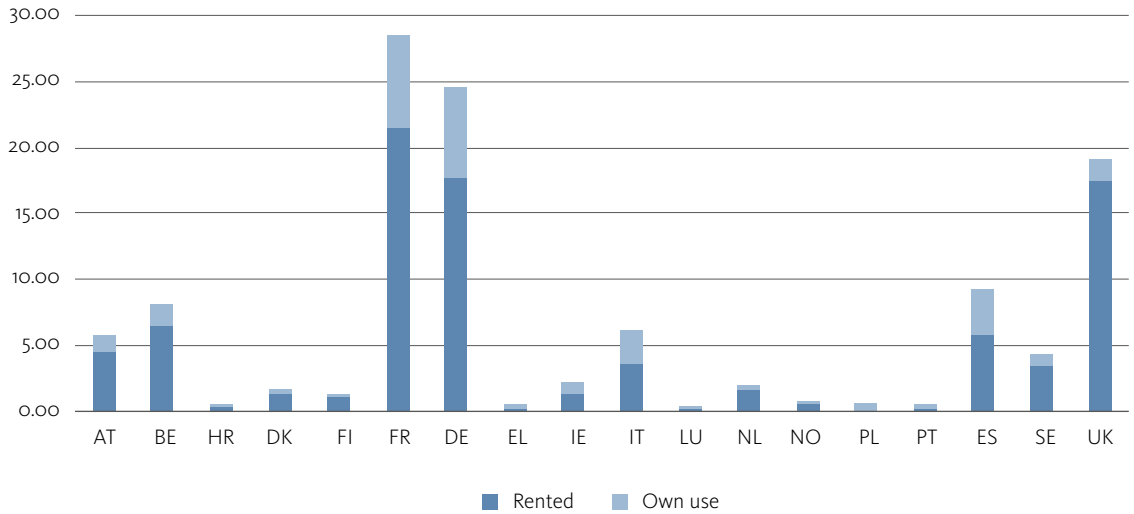
Source: EIOPA Insurance Statistics - Exposure data. Property: CIC 9, Equity related to real estate: CIC 32, Real estate funds: CIC 45, Debt: CIC: 84 (mortgages) + CIC 65 (collateralised securities – real estate risk) + CIC 55 (structured notes – real estate risk) + CIC 2, where NACE = F.41.2, F.41.2.0 or L (corporate bonds issued by firms active real estate firms). Definition of real estate assets follows the definition in question 22 of https://www.eiopa.europa.eu/sites/default/files/toolsanddata/insurance_statistics/faq_insurance_statistics.pdf. Assets that belong to unit and index-linked insurance are excluded.

bn. in the second quarter of 2020. The total real estate exposure can be distinguished between residential real estate and commercial real estate. Usually, commercial real estate is defined by the purpose of generating income. For some assets such a distinction is not clear-cut, e.g. if the type of owner of real estate to which an asset relates is not included in the data.

Among real estate investments, insurers invest approximately EUR 159 bn. (1.9% of total assets) directly in property. The focus is on commercial property such as office buildings or mixed-use office and retail buildings. Most properties are located in undertakings' home countries in major cities. For instance, for German insurers 28% of rented out commercial properties are located in Munich and 9% in Hamburg and Frankfurt, respectively.

On aggregate, around 75% of commercial property is rented out while 25% is for own use. There is large heterogeneity between the countries (Figure 5): In smaller jurisdictions such as Estonia and Iceland own use is 100%. Contrary, the share of own use is very low in the Nordic countries. Among the larger jurisdictions, the share is relatively high in Spain and Italy.

Figure 5 - Commercial property split between rented and held for own use by country (in EUR bn.)



Source: EIOPA Insurance Statistics - Exposure data. Q1 2020. Rented commercial property: Office and commercial (CIC 91). Own use commercial property: Property for own use (CIC 93) + Plant and equipment for own use (CIC 95) + under construction for own use (CIC 96). Assets that belong to unit-linked are excluded. Only countries displayed with commercial property values above EUR 500 m.

Insurers hold EUR 107 bn. (1.3% of total assets) equity of firms related to real estate investments and EUR 155 bn. (1.8% of total assets) in real estate funds. Equity includes mostly participations in real estate firms belonging to the same group. For these, it is unknown in what type of property assets insurers invest in. Other important equity assets are REITs and privately owned real estate companies. Of minor importance are investments in listed equity that is not in the form of REITs and shares in private or listed firms active in the construction or building materials sector.

Among debt instruments, mortgages and corporate bonds are the most important asset classes. In the case of debt instruments, a fall in property prices does not translate into a fall in the value of the debt instrument as long as defaults of the issuer are unlikely. The risk profile is therefore different from the risk profile of other assets related to commercial real estate. Insurers hold EUR 246 bn. (2.9% of total assets) mortgages. Mortgages are loans with collateral in the form of real estate. A mortgage is classified here as a commercial mortgage if it not granted to a natural person, i.e. to a firm investing in real estate. The split is then 37% commercial mortgages and EUR 63% residential mortgages[38]. Typical issuers of commercial mortgages are corporations established to represent specific property objects or subsidiaries of real estate firms. There are large country differences, in particular in Germany and the Netherlands, mortgages are an important asset class.

Further, insurers invest EUR 100 bn. (1.2% of total assets) in corporate bonds issued by firms engaging in real estate activities. For this asset class, issuer entries do not differentiate between commercial and residential real estate. Analysing corporate bonds asset-by-asset (here excluding UK insurers), the top 50 issuers account for 72% of the total value. These are mainly European REITs, other listed real estate firms and government-owned real estate firms. Privately-owned real estate firms are of less importance. Of the top 50 issuers, 77% have a commercial real estate focus, 19% invest in houses and apartments and 4% have other real-estate related activities. Hence, corporate bonds are mostly commercial real estate related. The portfolio is focused on Europe, 72% are issued in the Euro area and additional 16% by other countries in European Economic Area. 7% of bonds are issued in the United States. The predominant credit ratings are A to BBB.

38 The value of commercial mortgages reported here may differ from those in other publications including the EIOPA Insurance Statistics due to certain differences in the classification criteria.

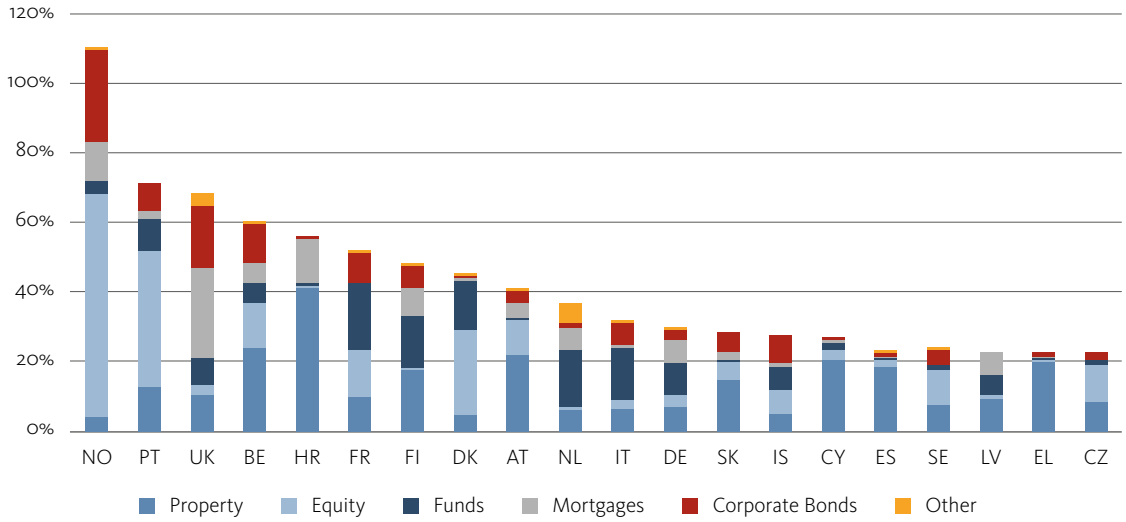
VULNERABILITY

Commercial real estate exposures are compared to excess of asset over liabilities. The following assets are counted as commercial property for the purposes of this analysis: commercial property, equity of real estate firms, real estate investment funds and as debt instruments commercial mortgages and corporate debt issued by real estate firms.[39] In Q1 2020, the average ratio of commercial real estate to excess assets over liabilities of the European Economic Area is 40%. If we take out debt instruments, the ratio is 27%. A decline of balance sheet valuations of real estate by, for instance, 10% would result in a decline of excess assets over liabilities by 4.0% or 2.7% if we take out debt instruments. This indicates that the total exposure to commercial real estate is too small to have a significant adverse effect on the balance sheets. The exposure differs widely between countries (Figure 6). If analysed at the scale of excess of assets over liabilities (which carries effects from the differences in baseline at this level between countries), it is particularly high in Norway (110%), Portugal (71%) and the UK (68%). But even in these countries, a decline in commercial property values would not have a negative impact.

Some insurers have significant exposure. Yet, a shock in commercial real estate alone, even if it were strong, would have only modest effects. The analysis is extended to an insurer-by-insurer level. 205 undertakings invest at least EUR 500 m. or more in commercial real estate (Q2 2020). Among them, the maximum ratio commercial real estate to excess of asset over liabilities is 282% and there are nine insurers with a ratio above 200%. The potential loss in excess of assets over liabilities for the ten insurers with the largest ratio if the valuation of commercial real estate were to decline by either 10% or 25% is displayed in Table 1. It illustrates that for some insurers, a large decline of commercial real estate prices would significantly erode their excess of assets over liabilities. However, even in case of a 25% price reduction, excess of assets over liabilities would remain above zero for all insurers. This suggests that a shock in commercial real estate alone, even if strong, would have only modest impact on insurers.

39 This corresponds to the sum of commercial real estate and unassigned real estate in EIOPA's asset exposure statistics. Unassigned are mainly investments in equity of real estate firms, real estate investment funds and corporate bonds issued by real estate firms. It is included here on the assumption that real estate funds and real estate companies hold a substantial part of their portfolios in commercial properties. In the case of corporate bonds, issuer information show that CRE REITs account for an important share.

Figure 6: Commercial real estate to excess assets over liabilities by country



Source: EIOPA Insurance Statistics - Exposure data. Q1 2020. Nominator includes property (CIC 91 + CIC 93 + CIC 94 + CIC 95 + CIC 96 + CIC 99), equity of real estate related corporations (CIC 32), real estate funds (CIC 45), mortgages (CIC 84) where issuer is not a natural person, corporate bonds (CIC 2), which are issued by real estate firms, other (CIC 65 and CIC 55). Definition of real estate assets follows the definition in question 22 of https://www.eiopa.europa.eu/sites/default/files/toolsanddata/insurance_statistics/faq_insurance_statistics.pdf with commercial here being the sum of commercial and unassigned in the document. Assets that belong to unit and index-linked insurance are excluded. Denominator is from balance sheet by item [S.02.01/Quarterly/Solo] row R1000. Only countries displayed with a ratio above 20%.

Table 1: Vulnerability of insurers in terms of potential excess assets over liabilities decrease (2020 Q2)

Ranking based on largest CRE / EAoL exposure:	CRE [EUR bn.]	EAoL [EUR bn.]	EAoI change with 10% CRE price decline [%]	EAoI change with 25% CRE price decline [%]
1st largest	2.6	0.9	-28%	-70%
2nd largest	1.3	0.5	-27%	-67%
3rd largest	0.9	0.3	-26%	-64%
4th largest	0.7	0.3	-23%	-57%
5th largest	12.5	5.6	-22%	-56%
6th largest	3.5	1.6	-22%	-55%
7th largest	1.3	0.6	-21%	-54%
8th largest	8.9	4.1	-21%	-53%
9th largest	27.3	13.1	-21%	-52%
10th largest	1.6	0.8	-20%	-50%
Total	**523.7**	**905.0**	**-6%**	**-14%**

Source: EIOPA Central Data Repository. QRT Solo Q2. CRE is from template S.06.02 and includes property (CIC 91 + C93 + CIC 94 + CIC 95 + CIC 96 + CIC 99), equity of real estate related corporations (CIC 32), real estate funds (CIC 45), mortgages (CIC 84) where issuer is not a natural person, corporate bonds (CIC 2), which are issued by real estate firms, other (CIC 65 and CIC 55). Excess asset over liabilities (EAoL) is from balance sheet template S.02.01 row R1000. Right columns show hypothetical change EAoL if prices of CRE decline by 10% or 25% with keeping everything else constant. Assets that belong to unit and index-linked insurance are excluded. Only firms displayed with a CRE assets above EUR 500 m.

FINAL REMARKS

The Covid-19 crisis triggered several developments that could reduce demand for commercial property. As a result, there is a risk of a fall in the price of assets related to commercial real estate. Although insurers are significant investors in this asset class, the overall risks to insurers' balance sheets appear to be limited. However, it should be recognised that a fall in the price of commercial property does not occur in isolation. The top-down analysis of this chapter could be extended to include a consideration of the exposure to other asset classes that could increase vulnerability. The chapter "Key market factors and the insurance sector" in this report examines the sensitivity to developments in financial markets, including changes real estate prices and joint changes in real estate prices and other market factors.

4. LIQUIDITY: A SENSITIVITY ANALYSIS TO LAPSE RISK

The uncertainty surrounding the Covid-19 pandemic and the current macroeconomic environment has resurfaced the discussion on the potential liquidity risk faced by the insurance sector. Focusing on liquidity risk stemming from a possible increase in lapses[40], this work analyses possible implications from two angles. First, the question of the critical lapse rate at which each individual insurer would no longer have sufficient liquid assets to meet potential redemptions is addressed. Second, the amount of insurers' assets that would need to be liquidated under different lapse scenarios is investigated. In both cases, results are derived at the individual and sector level.

INTRODUCTION AND MOTIVATION

In the context of the Covid-19 outbreak, the risk that insurers could face liquidity strains has resurfaced.[41] The negative macroeconomic development reduces firms' profits and households' income and increases unemployment. In such a situation, not only a contraction in underwriting might occur, but also policyholders could be more likely to surrender their in-force policies in order to cover their essential expenses. Surrenders might also be triggered by a loss of reputation of some insurers happening for unforeseen reasons. Additionally, claims could increase as insurers are highly exposed to underwriting risks related to the pandemic, such as business interruption or legal matters. In the worst case, lapses could couple with a decrease in inflows of premiums and with higher than expected claims potentially creating liquidity strains for the insurance sector.

This analysis considers liquidity risk as a potential vulnerability for both individual insurers and at the aggregate level within the limitation of the sample and of the model. From a financial stability perspective, the occurrence of liquidity risk in the insurance sector, stemming from an increase in lapses might impact the financial system through two main channels[42].[43] First, the inability to meet liquidity needs may drive insurance failures that could result in contagion to others market participants because of exposures and interconnectedness. Second, the market might be negatively affected by fire-sale of assets generated by insurers trying to sell quickly less liquid assets, in case these insurers do not have enough liquid assets to meet their liquidity needs. This second channel is less extreme and more likely to come into play. On the one side, the current ultra-low interest rate environment reduces to some extent the incentives to lapse life policies, particularly, those with high guarantees. On the other side, both an increase in lapses and strains from margin requirements would be more likely to take place if the interest rate would increase abruptly.[44] Other factors that could potentially lead to an increase in lapses are a sharp drop in economic activities and increased distress of firms and households due to the ongoing crisis.

The academic literature discusses two main motivations for lapses.[45] According to the emergency fund hypothesis, policyholders lapse when they need financial resources due to an income or asset shock. This is for instance, the

40 Lapse should be understood in a holistic way, comprehensive of all the situations described in the Delegated Regulation on the level 2 text. Under this approach, lapses include all legal or contractual policyholder rights to fully or partly terminate, surrender, decrease, restrict or suspend insurance cover or permit the insurance policy to lapse all legal or contractual policyholder rights to fully establish, renew, increase, extend or resume the insurance or reinsurance cover.

41 ESRB letter to EIOPA, "Liquidity risk in the insurance sector", 8th of June 2020

42 Another example could be the margin calls on derivative positions as illustrated in the EIOPA Financial Stability report December 2019.

43 Contagion channels are discussed in EIOPA report (2017) "Systemic risk and macroprudential policy in insurance".

44 Increasing interest rates might provide incentives to policyholders to lapse in search for contracts with higher guarantees or other financial products. Increasing interest rates would make insurers pay margin requirements because of how the insurance sector is exposed on interest rate swaps, i.e. predominantly paying floating-rate and getting the fixed-rate; this strategy extends the duration of the assets to match the duration of liabilities.

45 See for recent examples Kubitza, C., Berdin, E., & Gründl, H. (2019). Rising interest rates and liquidity risk in the life insurance sector. Working Paper. Barucci, E., Colozza, T., Marazzina, D., & Rroji, E. (2020). The determinants of lapse rates in the Italian life insurance market. European Actuarial Journal volume 10, p. 149–178. Förstemann, T. (2019). Lethal lapses–how a positive interest rate shock might stress life insurers. Working Paper.

loss of employment. Such cases are likely to increase in a prolonged economic crisis. Based on the interest rate hypothesis, policyholders lapse, when it is financially attractive. This is, for example, the case for some products used mainly for saving purposes when interest rates rise. In this situation, investing the redemption value elsewhere could be financially more beneficial than keeping the policy.

It is difficult to model and predict policyholders' behaviour.[46] For whatever reason lapses occur, liquidity risk is there, because insurers would have to promptly provide the amount of cash equivalent to the surrender value of the lapsed policies. In case insurers do not hold sufficiently high quality and liquid assets, they may need to sell other assets at distressed prices. The type of product, lapse penalties (contractual and fiscal), maturity dates, guarantees and customer type are some of the features that could influence the likelihood of a contract being lapsed by the policyholder.[47] The liquidity risk is higher for contracts where the surrender value can exceed the value of the assets covering the obligations when exercising the surrender option. In this case, it may be financially beneficial for policyholders to surrender contracts and to invest the surrender value elsewhere. Moreover, surrendered products that have negative technical provisions or, more general, positive surrender strains could constitute a potential vulnerability to the insurers' solvency and liquidity position. This might be the case for two reasons: insurers do not treat policies with negative technical provisions as liabilities, but rather as own funds and, secondly, these policies could have non-zero surrender values. Differentiating between types of businesses, liquidity risk stemming from lapses is more relevant for the life than for the non-life segment due to the savings component of life contracts that have longer durations and often surrender values attached.

DATA AND METHODOLOGY

Lapse rates for life contracts have already increased across the whole distribution prior to the pandemic, with the median value shifted upwards to 3% (+0.4 p.p.) in Q4 2019. The latest developments show that the median value for the lapse rates has also slightly increased in Q2 2020 when compared to Q2 2019 (+0.07 p.p.) reaching approximately 1.6%. This indicator is cumulative, so the level reported for Q2 2020 cannot be compared with the annual lapse rates.

A further deterioration could be expected as a consequence of the global impact of the outbreak of the pandemic as discussed above.

This work analyses potential liquidity implications stemming from lapse risk for traditional life contracts from two angles. First, the question of the critical lapse rate at which each individual insurer would no longer have sufficient liquid assets to cover its liquidity needs is addressed (reverse perspective). Second, the amount of insurers' assets that needs to be liquidated under three considered lapse scenarios (mild, severe and extremely severe) is calculated (sensitivity to lapses). The scenarios provide an improved understanding in terms of liquidity distress departing from an extreme break-even point of the reverse perspective. In both cases, results are derived at the individual and sector level for the considered sample.

This liquidity exercise focuses on life business and is based on data from the Quantitative Reporting Templates (QRTs) for solo prudential reporting Q1 2020. Some additional data is taken from a newly developed *Liquidity monitoring exercise* implemented by EIOPA for which a sample of solo undertakings submitted a set of information on: a) Liquidity sources and needs based on the stocks of assets and liabilities and b) Evolution of their liquidity sources and needs projected over 30 days and 90 days.[48]

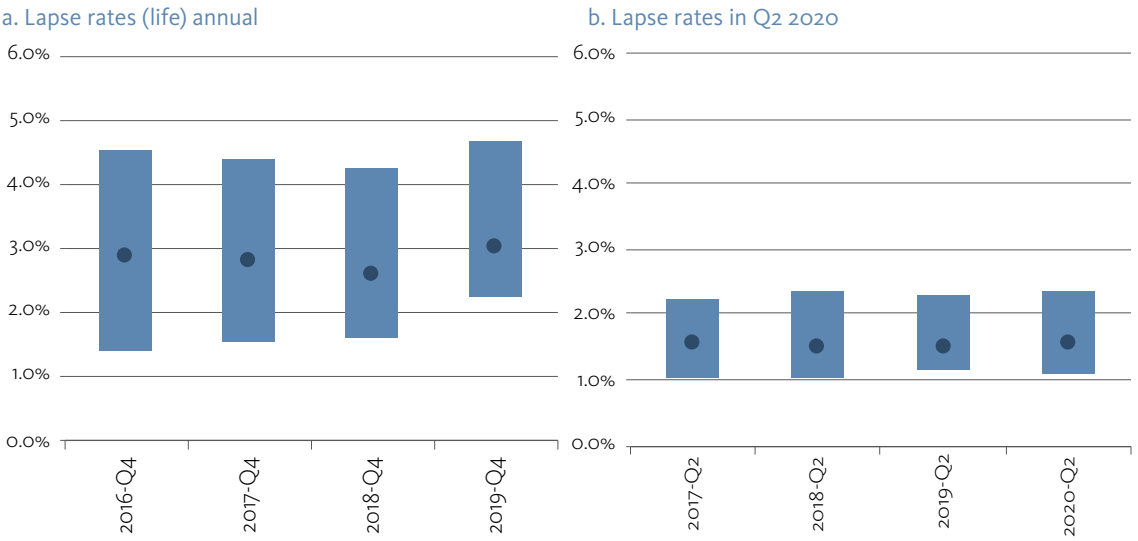
The assessment of the liquidity position takes a stock based approach focusing on the analysis of the asset holdings leveraging on the concept of Liquidity Coverage Ratio and of the life liability portfolios. Specifically, the approach borrows the classification of the assets and the calibration of the haircuts from the banking sector. The methodology applied builds on the assumption that policyholders behave rationally. This means, that lapse rates tend to increase as penalties or other financial cost decrease. It assumes that non-mandatory life products without any form of economic penalties are more likely to be lapsed than the products embedding some form of fiscal or contractual penalty. In this respect, the assumption made in the calibration is that the lapses of contracts

46 There is scarce empirical evidence on rational behaviour of policyholders.

47 Based on the Kubitza, C., Berdin, E., & Gründl, H. (2019). *Rising interest rates and liquidity risk in the life insurance sector. Working Paper*, surrenders are more sensitive towards interest rate changes when policies are relatively young and have low guaranteed rates. The mechanism is that older contracts receive returns that are independent of the asset side while younger contracts receive only the residual return when binding guarantees are paid.

48 The main information is taken from the EIOPA-BoS-20-285-Liquidity assessment Templates (STOCKs submissions reported for 31.03.2020) regards individual insurers' surrender volumes and the corresponding split between contracts with and without penalties.

Figure 4.1: Lapse rates (life)



Source: EIOPA QFG (N2018 Q4=88)
Note: *Distribution of indicator (interquartile range, median). This indicator is cumulative; hence, Figure 4.1 a shows the lapses rates occurred every year while Figure 4.1 b shows the latest available data in comparison with the same quarter of the previous years.
** This indicator is defined in the QRTs as the Volume (the amount of technical provisions according to the Solvency II balance sheet) of life (excl. health) contracts (direct business only) fully or partially lapsed or surrendered during the reporting period divided by the volume (the amount of technical provisions) of life contracts at the beginning of the period. Unit linked contracts should not be considered. The indicator should reflect all life business.

without surrender penalties are three times larger than the ones with surrender penalties[49].

Against this background, the common considerations regarding data and methodology of the two analysis are:

- The sample encompasses 98 insurers that have reported traditional life contracts with the split of contracts with/without surrender penalties within the newly developed monitoring exercise[50].
- The liquidity indicator used to assess the liquidity risk is the share of the surrender volumes (capturing the potential liquidity need) as a percentage of the total liquid assets (liquidity sources). The calculation of the surrender volumes considers the split between contracts with and without penalties for traditional life contracts[51].
- In order to estimate the baseline and post stress liquidity sources, we consider only the part of the investment portfolio where assets are held for life and general funds.[52] Only assets that are not pledged as collateral are considered in the analysis.
- The assessment of the liquidity sources under this stock approach relies on the bucketing of the assets according to their liquidity characteristics. Given the instantaneous nature of the liquidity shocks, the liquid assets are obtained by applying haircuts to the various asset classes following the same classification as in the EIOPA Liquidity monitoring exercise. i. Table 4.1 shows the weights applied to the assets in order to compute the liquidity sources.

49 Given the instantaneous nature of the liquidity shocks, this analysis does not consider time restraints and just the fact that contracts without surrender penalties are more liquid than contracts with surrender penalties. We consider that surrenders need to be paid out instantaneously by the insurers in the sample.

50 The sample of the EIOPA Liquidity monitoring exercise was defined considering the undertakings more vulnerable to the liquidity risk, according to the framework; hence, the results should be interpreted carefully having in mind the sample limitations and the methodological assumptions.

51 On the liabilities side, the only available classification of the surrenders is with or without penalties as requested in the EIOPA Liquidity monitoring exercise. Hence, no information on the significance of fiscal/economic penalties is considered in this analysis.

52 The quantitative reporting template "S.06.02 – List of assets" does not include specific information on this. It does include the item "Portfolio" (C0060) where a split between portfolios is required using a closed list: 1 – Life; 2 - Non-life; 3 - Ring fenced funds; 4 - Other internal funds; 5 - Shareholders' funds; and 6 - General

Table 4.1: Liquid assets classification based on weights

	Assets (excluding assets held for UL/IL)	Weights
S.1	**Cash & Bank Deposits & Bank Commercial Paper/Certificates of Deposits)**	1.00
S.2	**Government-Related Securities (Central governments & affiliates)**	
S.2.1	issued/guaranteed by EU member states (all CQSs) and issued by highly rated non-EU countries (CQS0/1)	1.00
S.2.2	Issued or guaranteed by highly rated non-EU countries (CQS2/3)	0.85
S.3	**Exposures to ECB, Central banks, multilateral development banks & international organisations**	
S.3.1	issued or guaranteed by ECB, EU central banks, supranational institutions (BIS, IMF, EC,..) or Multilateral Development Banks	1.00
S.3.2	issued or guaranteed by central banks of non-EU countries (CQS0/1)	0.85
S.4	**High Quality Covered bonds**	
S.4.1	Extremely high quality covered bonds - CQS0/1	0.93
S.4.2	High quality covered bonds - CQS2	0.85
S.5	**Corporate bonds**	
S.5.1	Corporate debt securities (CQS0/1)	0.85
S.5.2	Corporate debt securities (CQS2/3)	0.50
S.6	**Listed Equity**	0.50
S.7	**Collateralised securities (CQS0/1)**	0.65
S.8	**Collective Investment Undertakings**	0.80
S.9	**Off-balance sheet or contingent financial liabilities to third parties**	0.50

REVERSE PERSPECTIVE RESULTS

Considering all the assumptions and methodological aspects illustrated above, we calculate the critical lapse rate at which each individual insurer would no longer have sufficient liquid assets to cover potential redemptions. We assume that the surrender volumes without penalties are three times higher than the surrender volumes with penalties. Increasing lapses progressively to the maximum level and keeping liquid assets constant, we derive the break-even points at which insurers would no longer be able to withstand the shocks.

The reverse perspective approach reveals that if lapse rates were to increase dramatically, up to the maximum extent, 42[53] out of 98 insurers would not have sufficient liquid assets to be able to cover their liquidity needs.[54]

The lapse rates of 1% and 3% respectively for contracts with/without surrender penalties would cause 2 insurers in the sample to not withstand the lapse shocks (Table 4.2). Lapse rates of 3% and 9% would create liquidity strains for 4 insurers, within the sample considered. Although, even larger shocks might be realistic to be considered when applied to individual insurers, it is highly unlikely that the entire insurance sector could face lapse rates of 100%. However, it can be the case that one insurer could potentially, for example, suffer an extremely adverse event that would cause a loss in reputation (see Table 4.2).

53 Out of this, 7 insurers would become illiquid only in case all contracts are lapsed.

54 The same analysis performed considering only life assets and excluding general accounts shows that 57 insurers out of 98 insurers would no longer be able to cover their liquidity needs by selling assets.

Table 4.2: Combination of the lapse shocks under stressed situation by a reverse perspective for the insurers that would become illiquid in at least one scenario

Lapses for contracts with penalties	1%	2%	3%	4%	5%	10%	15%	25%	33%	50%	70%	100%
Lapses for contracts without penalties	3%	6%	9%	12%	15%	30%	45%	75%	99%	100%	100%	100%
No. of companies that become illiquid	**2**	**2**	**4**	**6**	**7**	**8**	**9**	**10**	**17**	**21**	**26**	**42**

SENSITIVITY ANALYSIS RESULTS

The sensitivity analysis focuses on three scenarios (mild, severe and extremely severe), each of them assuming different levels of lapse rates for contacts with/without surrender penalties (see Table 4.3). These scenarios assume that policyholders have a common behaviour to redeem their funds from their life insurance contracts. Historically, events such as mass lapses have already taken place for some insurers and in most cases their negative effects were mitigated by regulatory interventions. In this context, a summary of what could be considered excessive surrenders is given in the paper of Kubitza et al. (2019)[55].

As a first step, we compute the share of surrenders in the total liquid assets for each scenario. Then, the amount of assets for each asset class that insurers would need to liquidate to cover redemptions under three adverse scenarios is computed. The assumption is that insurers will first sell more liquid assets, i.e. those with lower haircuts. For example, an insurer will deplete first all cash, and then sell government bonds, etc. while listed equity or off-balance sheet or contingent financial liabilities to third parties will be sold at the end.

The shocks applied in each scenario are presented in the table below (Table 4.3)[56]. The analysis of the liquidity indicator is limited to the ability to cover the liquid liabilities (cash out-flows) with the liquid assets under the adverse scenarios.

On aggregate, across the three scenarios, the surrender volumes as a share of total liquid assets (liquidity indicator) would increase from 10.9% in the mild scenario, to 32.6% in the severe scenario, reaching 54.3% in the extreme scenario. Even though on aggregate the insurers in the sample would have enough liquid assets to withstand the shocks, at individual level there is a certain degree of heterogeneity.

The obtained results show that from the aggregate perspective, insurers within the sample would have to sell a substantial amount of assets to cover the liquidity needs in the considered scenarios (Table 4.4). In the mild scenario, 60 insurers would need to deplete all available cash

Table 4.3: Scenarios and corresponding shocks

	Mild scenario	Severe scenario	Extremely severe scenario
SHOCKS	Lapse rate for traditional life contracts with surrender penalties 5%	Lapse rate for traditional life contracts with surrender penalties 15%	Lapse rate for traditional life contracts with surrender penalties 25%
	Lapse rate for traditional life contracts without surrender penalties 15%	Lapse rate for traditional life contracts without surrender penalties 45%	Lapse rate for traditional life contracts without surrender penalties 75%

55 Kubitza, C., Berdin, E., & Gründl, H. (2019). *Rising interest rates and liquidity risk in the life insurance sector. Working Paper*

56 Kubitza, C., Berdin, E., & Gründl, H. (2019) estimated that the surrender rates for life insurance savings policies based on historical data typically range between 2% to 10% per year, and therefore surrender rates that exceed 10% are regarded as mass lapses. Furthermore, the ESRB report, "Enhancing the macroprudential dimension of Solvency II", February 2020 shows in *Box 12 - A scenario of high surrenders over a one-month period – Ethias* that surrender rates jumped from 0.3% to between 2.44% and 4.88% in the space of a month.

and deposits and 11 insures would have to additionally sell all high quality government bonds. Moreover, 7 insurers would not have enough liquid assets to face potential redemptions. About 43.4 bn. EUR (6.3% of total liquid assets) is the shortfall[57] left after the entire cash buffer is depleted. This amount therefore needs to be obtained by liquidating other assets to cover surrenders. This may result in asset fire-sales with potential spill-overs to broader financial markets.

In the severe scenario, 9 insurers will not be able to cover their obligations towards the policyholders. Approximately 192.3 bn. EUR (28.1% of total liquid assets) is the potential shortfall after all cash is consumed. In terms of asset sales, 78 insurers will need to use all cash and deposits to cover for the shocks. In the extremely severe scenario, 10 insurers would face liquidity strains and, on aggregate, the surrenders would amount more than half of the liquid assets held by the insurers in the sample. The shortfall in cash is high, amounting 341 bn. EUR (49.8% of total liquid assets). In the severe scenario, for the various asset categories except cash, the shortfall would be between 1.7% and 2.8%; while in the extremely severe scenario the range would be between 3.1% and 8.5%.

Table 4.4: Results of the three scenarios

		Scenarios		
		Mild scenario	**Severe scenario**	**Extreme severe scenario**
		Lapse rate for traditional life contracts with surrender penalties 5% Lapse rate for traditional life contracts without surrender penalties 15%	**Lapse rate for traditional life contracts with surrender penalties 15% Lapse rate for traditional life contracts without surrender penalties 45%**	**Lapse rate for traditional life contracts with surrender penalties 25% Lapse rate for traditional life contracts without surrender penalties 75%**
Liquid assets (excluding UL/IL) (mil. EUR)		684,775	684,775	684,775
Surrenders volume (mil. EUR)		74,399	223,196	371,994
Surrender volumes as a % of liquid assets (excluding UL/IL)		**10.9%**	**32.6%**	**54.3%**
No. of illiquid companies		7	9	10
Cash & Bank Deposits & Bank Commercial Paper/Certificates of Deposits) (1)	Available amount	30,948	30,948	30,948
	Shortfall	-43,450	-192,248	-341,046
	%	-6.3%	-28.1%	-49.8%
	No. of insurers that need to depleat all (1) to cover the lapses	**60**	**78**	**89**
Government bonds issued/ guaranteed by EU member states (all CQSs) and issued by highly rated non-EU countries (CQS0/1) (2)	Available amount	399,326	399,326	399,326
	Shortfall	-3,798	-19,112	-58,116
	%	-0.6%	-2.8%	-8.5%
	No. of insurers that need to depleat all (1)+(2) to cover the lapses	**11**	**19**	**33**

57 The shortfall is computed as the difference between cash and the surrender volumes at individual level for each insurer. Then, for the other classes, it is the difference between the remaining amounts still needed to be paid from the surrenders that were not covered by cash and the available amounts of the next asset class considered in the hierarchy.

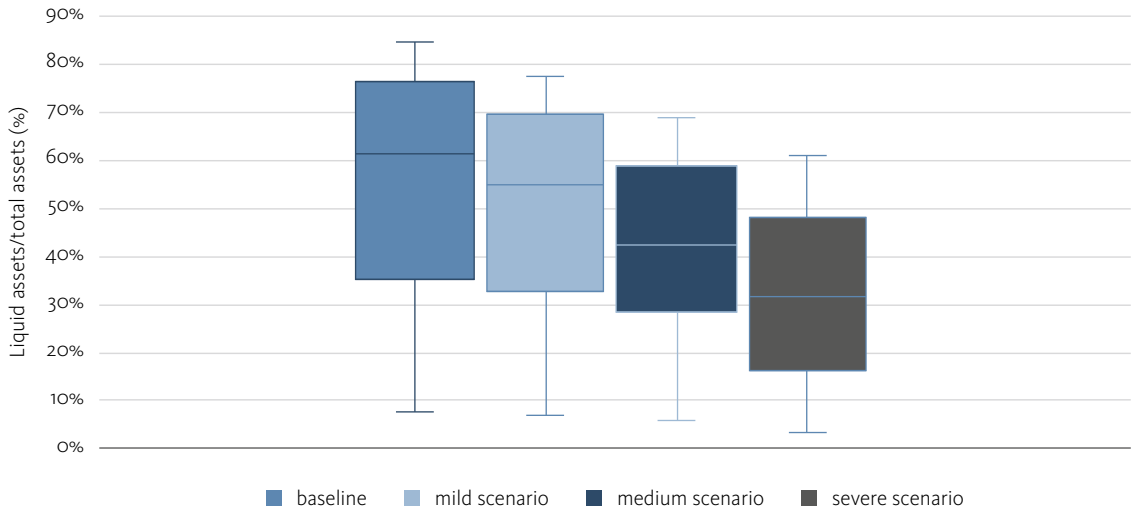
		Scenarios		
		Mild scenario	**Severe scenario**	**Extreme severe scenario**
		Lapse rate for traditional life contracts with surrender penalties 5% Lapse rate for traditional life contracts without surrender penalties 15%	**Lapse rate for traditional life contracts with surrender penalties 15% Lapse rate for traditional life contracts without surrender penalties 45%**	**Lapse rate for traditional life contracts with surrender penalties 25% Lapse rate for traditional life contracts without surrender penalties 75%**
Exposures to ECB, Central banks, multilateral development banks & international organisations issued or guaranteed by ECB, EU central banks, supranational institutions (BIS, IMF, EC,..) or Multilateral Development Banks (3)	Available amount	13,970	13,970	14,254
	Shortfall	-3,769	-15,187	-51,744
	%	-0.6%	-2.2%	-7.6%
	No. of insurers that need to depleat all (1)+(2)+(3) to cover the lapses	**11**	**19**	**31**
Extremely high quality covered bonds - CQS0/1 (4)	Available amount	30,839	30,839	30,839
	Shortfall	-3,660	-14,442	-43,537
	%	-0.5%	-2.1%	-6.4%
	No. of insurers that need to depleat all (1)+(2)+(3)+(4) to cover the lapses	**11**	**15**	**27**
Government-Related Securities (Central governments & affiliates) Issued or guaranteed by highly rated non-EU countries (CQS2/3) (5)	Available amount	3,750	3,750	3,750
	Shortfall	-3,656	-14,317	-42,564
	%	-0.5%	-2.1%	-6.2%
	No. of insurers that need to depleat all (1)+(2)+(3)+(4)+(5) to cover the lapses	**11**	**15**	**27**
Exposures to ECB, Central banks, multilateral development banks & international organisations issued or guaranteed by central banks of non-EU countries (CQS0/1) (6)	Available amount	15	15	15
	Shortfall	-3,656	-14,317	-42,564
	%	-0.5%	-2.1%	-6.2%
	No. of insurers that need to depleat all (1)+(2)+(3)+(4)+(5)+(6) to cover the lapses	**11**	**15**	**27**

		Scenarios		
		Mild scenario	**Severe scenario**	**Extreme severe scenario**
		Lapse rate for traditional life contracts with surrender penalties 5% Lapse rate for traditional life contracts without surrender penalties 15%	**Lapse rate for traditional life contracts with surrender penalties 15% Lapse rate for traditional life contracts without surrender penalties 45%**	**Lapse rate for traditional life contracts with surrender penalties 25% Lapse rate for traditional life contracts without surrender penalties 75%**
High quality covered bonds - CQS2 (7)	Available amount	1,529	1,529	1,529
	Shortfall	-3,655	-14,317	-42,475
	%	-0.5%	-2.1%	-6.2%
	No. of insurers that need to depleat all (1)+(2)+(3)+(4)+(5)+(6)+(7) to cover the lapses	**11**	**15**	**27**
Corporate debt securities (CQS0/1) (8)	Available amount	13,504	13,504	13,504
	Shortfall	-3,616	-14,249	-37,891
	%	-0.5%	-2.1%	-5.5%
	No. of insurers that need to depleat all (1)+(2)+(3)+(4)+(5)+(6)+(7)+(8) to cover the lapses	**11**	**14**	**26**
Collective Inverstment Undertakings (9)	Available amount	122,957	122,957	122,957
	Shortfall	-2,653	-12,305	-22,955
	%	-0.4%	-1.8%	-3.4%
	No. of insurers that need to depleat all (1)+(2)+(3)+(4)+(5)+(6)+(7)+(8)+(9) to cover the lapses	**8**	**9**	**14**
Collateralised securities (CQS0/1) (10)	Available amount	1,653	1,653	1,653
	Shortfall	-2,653	-12,305	-22,949
	%	-0.4%	-1.8%	-3.4%
	No. of insurers that need to depleat all (1)+(2)+(3)+(4)+(5)+(6)+(7)+(8)+(9)+(10) to cover the lapses	**8**	**9**	**14**
Listed Equity (11)	Available amount	7,613	7,613	7,613
	Shortfall	-2,577	-12,229	-22,831
	%	-0.4%	-1.8%	-3.3%
	No. of insurers that need to depleat all (1)+(2)+(3)+(4)+(5)+(6)+(7)+(8)+(9)+(10) +(11) to cover the lapses	**8**	**9**	**14**

		Scenarios		
		Mild scenario	**Severe scenario**	**Extreme severe scenario**
		Lapse rate for traditional life contracts with surrender penalties 5% Lapse rate for traditional life contracts without surrender penalties 15%	**Lapse rate for traditional life contracts with surrender penalties 15% Lapse rate for traditional life contracts without surrender penalties 45%**	**Lapse rate for traditional life contracts with surrender penalties 25% Lapse rate for traditional life contracts without surrender penalties 75%**
Corporate debt securities (CQS2/3) (12)	Available amount	58,670	58,670	58,670
	Shortfall	-2,199	-11,794	-21,479
	%	-0.3%	-1.7%	-3.1%
	No. of insurers that need to depleat all (1)+(2)+(3)+(4)+(5)+(6)+(7)+(8)+(9)+(10) +(11)+(12) to cover the lapses	**7**	**9**	**10**
Off-balance sheet or contingent financial liabilities to third parties (13)	Available amount	1.8	1.8	1.8
	Shortfall	-2,199	-11,794	-21,479
	%	-0.3%	-1.7%	-3.1%
	No. of insurers that need to depleat all (1)+(2)+(3)+(4)+(5)+(6)+(7)+(8)+(9)+(10) +(11)+(12)+ (13) to cover the lapses	**7**	**9**	**10**

The share of liquid assets as a percentage of total assets held by the insurers (Figure 4.2) gives an indication of the remaining liquid assets of the insurers in the sample. In the stress situation, if an insurer becomes illiquid, its available liquid assets are capped to zero. The median value of the liquid assets decreases from 61% in the baseline to 55%, 42%, and 31% for each of the three scenarios respectively. From a financial stability perspective, a massive asset liquidations upon sharp lapse increases might spill-over to financial markets by depressing further the asset prices. However, in the context of liquidity risk stemming from lapse events, results of Kubitza et. al (2019) suggest that fire sale costs and the price impact of fire sales are relatively small (less than 2% of insurers' equity capital and the impact on asset prices stays below 1.3%) in the baseline calibration for an average German life insurer, however, the heterogeneity of different policy generations' surrender rates dampens the annual fire sale costs.

Figure 4.2: Distribution of the share of liquid assets in total assets in the baseline and adverse scenarios



FINAL REMARKS

Given the high uncertainty surrounding the Covid-19 pandemic and the macroeconomic environment, lapse risk is a potential tail risk that could be relevant for the insurance market. Mass lapse events have occurred during past crises for some EU and non-EU insurers[58], and the intervention of authorities was required to address the negative effects.

The results obtained in this analysis need to be interpreted carefully having in mind the sample limitations and the methodological assumptions[59]. Moreover, the following two aspects need to be taken into account. First, there is a degree of complexity in the classification of the liability portfolios that is driven by the large variety of different types of surrender penalties across the European insurance sectors for which it seems difficult to consistently define a relationship between the level and the likelihood of the associated insurance contracts being surrendered. Second, the calibration of the shocks is based on expert judgement. Finally, as the analysis considers solo undertakings, it does not account for the impact of the liquidity risk management pursued by the group, (in case the liquidity is managed centrally).

The results of the reverse approach show that at individual level, most insurers broadly hold enough liquid assets to cover potential lapse rate increases. However, some insurers could face liquidity strains, even at relatively low levels of lapses. The results of the sensitivity to lapses, by applying three hypothetical scenarios, show that insurers would need to liquidate a material amount of assets potentially triggering fire-sales of assets and threatening financial stability. It is important to note that it is highly unlikely that the liquidity issues of few individual insurers would spread to the financial markets, instead contagion effects might occur when the insurance sector is affected as a whole via policyholder's herd behaviour.

58 See section 1. *A brief history of (excessive) policy surrenders* in Kubitza, C., Berdin, E., & Gründl, H. (2019). Rising interest rates and liquidity risk in the life insurance sector. Working Paper

59 See Footnote 50

5. KEY MARKET FACTORS AND THE INSURANCE SECTOR

This chapter assesses the vulnerability of the insurance sector to isolated and combined shocks to interest rates, credit spreads, equity and real estate prices. The estimation of an empirical model forms the tool of the assessment, on the basis of which the relation between the assets over liabilities ratio (AoL) and the main market risks is analysed. The prevailing factor explaining the variability of the AoL ratio is the risk-free interest rate. In general, increases (decreases) in interest rates increases (decreases) assets over liabilities; consistent with intuitive thinking, this relation is stronger for insurers with larger negative duration gaps. The model further confirms that when spreads increase, the use of volatility adjustment has a positive effect. Credit spreads, equity and real estate prices dynamics are relevant for companies holding assets exposed to these risks. Finally, the conducted analysis further reveals the effects of interactions of the key risk factors in explaining AoL ratio.

MOTIVATION

This chapter analyses the determinants of insurers' AoL dynamics, using market information as well as leveraging on Solvency II (SII) reporting data.[60] The comprehensive framework described combines market risk factors, taking into account their interdependence, together with information on insurers' holdings of assets exposed to these risks. The focus on each individual risk separately could provide insights related to the particular impact, but it ignores the interdependencies with the other risks. The analysis takes an ex-post view by estimating an econometric model and discussing the obtained empirical results drawing lessons from the observed relations.

In particular, the analysis assesses the impact of market risk factors on the AoL for the EEA insurance sector, as represented by large groups reporting SII data for financial stability purposes.[61] The risk factors considered are the risk-free interest rates, credit spreads, and equity and real estate prices (Figure 5.1). These relate to asset exposures as well as, some of them, to the valuation of technical provisions.

Throughout the sample, the risk free interest rate remains at notably low levels, and, in particular, during the period from 2018 Q4 until 2019 Q3 as well as after the Covid-19 outbreak it shows an unprecedented decrease. Credit spreads hover in relatively similar levels across quarters, with the exception of the Q4 2018 spike and most notably in Q1 and Q2 2020 when spreads sharply increased. Equity markets show opposite changes compared to real estate markets until Q4 2017, reverting to more aligned patterns thereafter. The fourth quarter of 2018 and the first of 2020 show two examples of simultaneous materialization of negative shocks. These two periods indicate that insurers need to be proof against combined market movements.

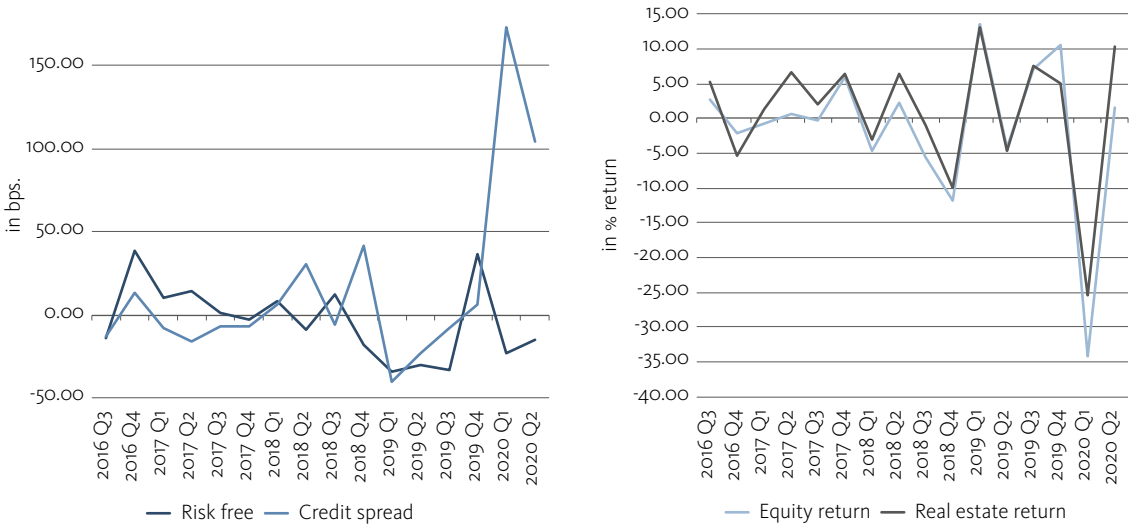
In Q2 and Q3 2020, financial markets recovered from the Covid-19 shock, but fundamentals and interest rates remain subdued. The significant rebound of financial markets after March raises the question whether the performance has decoupled from underlying macro-economic fundamentals, as GDP growth and inflation forecasts outlooks remain at the downside, leaving the risk of market correction and potential combined shocks on the upside.

The development of interest rates, further intensified by the Covid-19 crisis, remains the main concern for the insurance sector. This is because liabilities are valuated with a market consistent approach as well as insurers tend to have long-term liabilities and offer products with guaranteed rates. The duration gap, defined as the difference between the duration of assets and liabilities, is a measure of exposure towards interest rate risk. In the sample

60 The sample ranges from 2016 Q1 to 2020 Q1. Please refer to the annex, in section "Sample and exposures", for more detailed description and statistics of the sample.

61 In particular, the AoL ratio excludes the assets held for Unit-linked/Index-linked (UL/IL) and the technical provisions for UL/IL from the numerator and denominator, respectively. The analysis focuses on groups to account as much as possible for the within group risk diversification.

Figure 5.1: Time evolution of the risk factors, quarterly changes



Note: The indices used are the 10-year swap rate (as published by EIOPA), S&P Euro area BBB spread, EURO STOXX 50 and Euronext IEIF REIT Europe index. EIOPA calculations.

considered in the analysis, it is tilted to the negative side, with an average value of approximately -5 years.[62]

Insurance companies hold large amounts of corporate bonds[63] (sample average 31.6% of total assets excluding Unit-linked/Index-linked (UL/IL)). Although they tend to buy and hold bonds with long-term maturities[64], insurers remain exposed to volatile asset valuations, since corporate bonds are valued mark-to-market.

Equity and real estate represent also relevant shares of insurers' total assets (excluding UL/IL) with average exposures of 7.2% (5% listed and 2.2% non-listed, most of it are participations) and 4.1%, respectively.

The analysis of this chapter studies how AoL of the insurance sector changes in relation to the risk factors and the related exposures to these risks.[65] Such an analysis provides insights about averages and general trends. It does not allow interpreting results for specific groups, which is mainly due to the complexity and the particular characteristics of each group. The relatively short sample period could in some cases result in relationships that cannot be investigated further.

EMPIRICAL MODEL AND RESULTS

The analysis is based on the estimation of a panel regression (Table 5.1), using as a dependent variable the percentage changes in the AoL and as explanatory variables the market risk factors, namely the risk-free rate changes, credit spread changes, equity and real estate returns.[66] The insurers' exposures towards the risk factors are captured by the duration gap, the share of corporate bonds, equity and property respectively.

The analysis is performed in two stages. The first confirms the intuitive relationships regarding the insurance sector. Furthermore, it provides the ground to discuss some additional insights capturing the joint impact of key risk factors. The second stage is auxiliary and it aims to test and capture additional or residual sensitivities.

62 A negative duration gap means that assets are less sensitive to interest rate changes than liabilities, therefore when the interest rate declines technical provision increase relatively more than assets reducing the AoL.

63 When calculating insurers' exposures the look-through is applied (i.e. both direct exposures and exposures via holdings of collective investment funds is taken into account) and assets held for UL/IL are excluded.

64 20% of corporate bonds held by EEA insurers have maturities between 7 and 12 years and 25% maturities longer than 12 years.

65 Please refer to Annex for the technical details.

66 Please refer to the Annex in the subsection "Selection of risk factors" for more details.

Table 5.1. Panel Regression: results of the estimation

		Model of stage 1		Model of stage 2	
		Δ (AoL)/AoL		Residuals of stage 1	
		Coef.	P>|t|	Coef.	P>|t|
Interest rate	**Δ (10y swap)**			0.0055**	0.032
	Duration gap * Δ (10y swap)	-0.0031***	0.000		
Credit spread	**Δ (credit spreads) * Share corporate bonds**	-0.0531**	0.041		
	Δ (credit spreads) * Share corporate bonds * Share life TPs	0.0617**	0.023		
VA	**Δ (Volatility adjustment)*IndicatorVA user**	0.031***	0.004		
Equity	**% equity return**	-0.0001	0.421		
	% equity return * Share listed equity	0.0039***	0.001		
	% equity return * Share unlisted equity	0.0027*	0.086		
Real estate	**% Real estate return * Share property**	0.0025*	0.050		
Interactions	**Δ (10y swap) * % equity return * Share listed equity**			0.0143***	0.00
	% equity return * Share listed equity * % Real estate return * Share property			-0.0016***	0.00
Controls	**Crisis Indicator** $_{2020\ Q1}$	-0.0116***	0.006		
	Δ (Share of asset held for UL/IL)	0.1435	0.193		
	Std. Formula use	-0.0005	0.884		
	Constant	-0.0018	0.708	0.0002	0.968
	Adjusted R-squared		0.20		0.04

Note: Analysis period Q2 2016 to Q1 2020. The sample includes the 99 insurance groups reporting for Financial Stability in the period considered. The regression is estimated with insurance group fixed effects. For calculating the exposures the look-through is applied, also assets held for Unit-linked/Index-linked contracts are excluded from the calculation of AoL and the various explanatory variables. Each exposure is interacted with the corresponding market risk factor. The duration gap considered in the model refers to the one observed in beginning of each quarter. Controls are included in the specification; crisis dummy for Q1 2020, indicator of standard formula usage and the change in the share of assets held or UL/IL contracts. P-values are obtained from Newey-West HAC standard errors.

In line with the intuition, the model confirms that the key basic relationships are both economically and statistically significant with the expected signs. The sensitivity of the AoL to interest rate changes depends on the duration gap. For example, Table 5.2 illustrates that when the risk-free rate decreases by 40 bps, the excess of AoL declines by -3.72%, assuming the sample average duration gap, whereas it declines by -7.27% when considering the 10th percentile for duration gap. Credit spread changes[67], equity and real estate returns are shown to be relevant and, as expected, the sensitivity of the excess of AoL depends on the relative size of the exposures (Table 5.2). The model further confirms that insurers using the volatility adjustment tend to be less exposed to credit spreads changes.

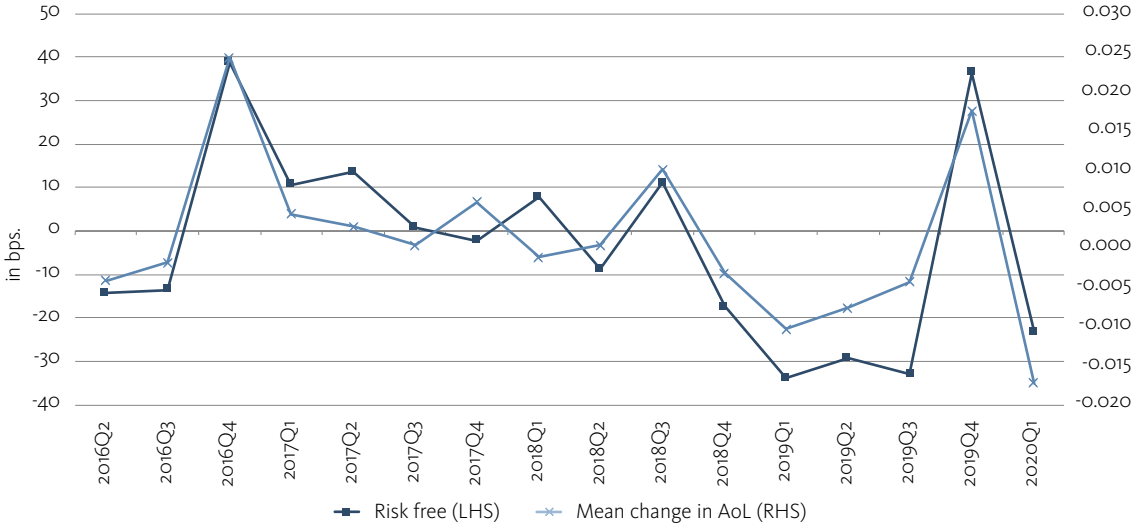
It is noteworthy that the variance of AoL captured by the model is predominantly related to the risk-free rate. In fact, more than 90% of the explained variance is determined by the dynamics of the risk-free rate. Figure 5.2 shows that the changes in AoL commove strongly with the risk-free rate. The empirical analysis confirms this, suggesting that out of the total explained variance in AoL dynamics the large majority is explained by the duration gap (model of stage 1) and by the residual sensitivity to the risk-free rate as captured in model of stage 2; these factors are both equally important. The residual sensitivity to interest rate could be related to the (positive or negative) valuation effect on assets, not captured by the

67 Insurers' holdings of corporate bonds portfolios characterized by higher creditworthiness (as measured by CQS) tend to be less sensitive to credit spreads changes. However, the significance of this result is weak and has been excluded from the regression.

Table 5.2. Quantification of key basic relations

Risk factor	Interaction	Shock in risk factor	Exposure	Marginal effect with respect to base	AoL (base AoL = 1.20)	eAoL	% change in eAoL (base AoL = 1.20)
Interest rate	**Duration gap * Δ (10y swap)**	**Decrease of 40 bps.**	**Duration gap of -5.02 (sample average)**	-0.006	1.193	0.193	-3.72%
		Decrease of 40 bps.	**Duration gap of -9.8 (10th percentile)**	-0.012	1.185	0.185	-7.27%
Credit spread	**Δ (credit spreads) * Share corporate bonds**	**Increase of 40 bps. in S&P EA BBB spread**	**31.6% exposure to corporate bonds (sample average)**	-0.007	1.192	0.192	-4.03%
Equity	**% equity return * Share listed equity**	**Decrease of 10% in Euro stoxx 50**	**5% exposure to listed equity (sample average)**	-0.002	1.198	0.198	-1.17%
Real estate	**% Real estate return * Share property**	**Decrease of 10% in Euronext IEIF REIT Europe Index**	**4.1% exposure to property (sample average)**	-0.001	1.199	0.199	-0.63%

Figure 5.2. AoL sectoral average and risk-free rate: quarterly changes



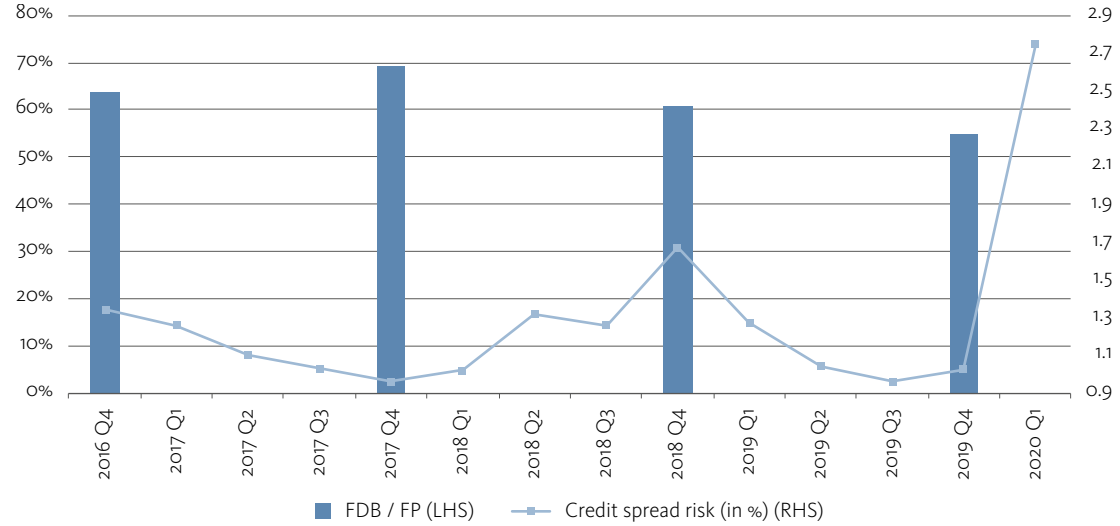
Note: The risk free rate used is the 10-year swap rate (as published by EIOPA).

duration gap, to the convexity of the liabilities and potentially to the effect of risk-free rate changes on the future discretionary benefits. The model suggests that the direction of this residual effect is positive, meaning that when interest rates increase the AoL increases.

Regarding the effect of the credit spread risk factor, the model outputs a positive coefficient for the interaction between changes in the credit spread and the share of life technical provisions. The positive effect partially offsets the decrease in AoL when spreads increase. One potential explanation that partially can explain this coefficient would relate to the evolution of future discretionary benefits (FDB); when spreads increase, the FDB decrease and this reduces technical provisions. Figure 5.3 illustrates the historical association between FDB and credit spreads. [68] In the year 2017, the level of FDB over premiums is elevated compared to the previous and following year. At

68 The amount of FDB is normalized by dividing it by the amount of future premium (FP), to account for the new business from year to year.

Figure 5.3: FDB over premiums (life with profit participation)



Note: AQS S.12. The solos which belong within the structure of the groups used in the analysis have been included. EIOPA calculations.

the same time, spreads decrease for 2017 and increase for 2018.[69] It should be highlighted, however, that longer time series would provide more solid ground for interpretation. Finally, the respective coefficient for equity returns was tested, and the results were consistent with the case of credit spreads, but the significance was weak and that is why it has not been included in the final model. Nevertheless, the weaker significance in the case of equity returns may be justified due to the lower exposure towards equity.

The second stage of the model reveals that two interactions, the risk-free rate with equity and the equity with real estate, are significant to explain the residuals of the first stage. Regarding the first interaction, this relationship implies that when interest rate and equity shocks happen simultaneously, there are some diversification effects compared with the stand alone impact of the two shocks. The diversification refers to the existence of the positive interaction coefficient. The effect of the interaction is illustrated in Figure 5.4, where the Q4 2018 observed changes were applied to risk-free and equity. When the shocks occur independently, the impact is additive, whereas in combination there would be material diversification benefits.

The second interaction is conceptually equivalent, but instead of diversification, there is an amplification effect, as the coefficient of the interaction is negative in this case (Figure 5.4).

FINAL REMARKS

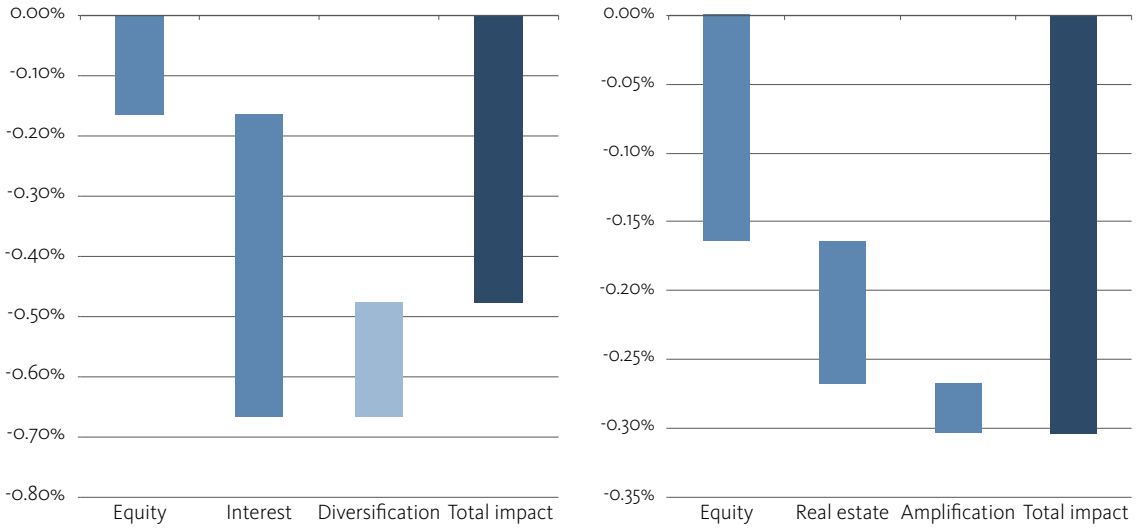
This chapter discusses an empirical approach to quantify the relationship between AoL, market risk factors and exposures.

The model confirms various key basic relationships, typically known to hold for insurers. Furthermore, it provides more involved insights and interpretations, which enhance the understanding and intuition on the impact of joint risk exposures on insurers' balance sheets. The sensitivity to interest rates is key to explain the development of AoL and the model suggests that there is not only the duration gap channel, but also a residual part. This residual sensitivity is significant and can be related to the (positive or negative) valuation effect of assets, to the convexity of the liabilities and potentially to the effects of risk-free rate change on the future discretionary benefits.

The chapter discusses a first attempt of applying empirical techniques for providing a comprehensive analysis and should be noted that future data will enhance its application and will provide more solid ground for interpretations.

69 The case of 2019 Q4 is more spurious because of the uncertainty on the extent it has been affected by the Covid-19 market developments during the first months of 2020.

Figure 5.4: Stylised impact of the two interactions (% changes of AoL)



ANNEX

SAMPLE AND EXPOSURES

The sample ranges from Q1 2016 to Q1 2020, since at the time of the analysis the Q2 2020 was not possible to be included. This is because the look-through template S06.03 was reported to EIOPA for prudential groups on the 14th of October.

Table 5.3: Asset over liabilities (AoL) ratio: summary statistics

	mean	std	min	p5	p10	p25	p50	p75	p90	p95	max
AoL Ratio	1.20	0.17	0.95	1.04	1.06	1.09	1.14	1.25	1.40	1.59	1.98
Δ (AoL Ratio)	0.04%	2.60%	-16.65%	-3.12%	-2.01%	-0.68%	0.03%	0.71%	2.14%	3.68%	18.52%
% Change (AoL Ratio)	0.05%	1.94%	-12.02%	-2.46%	-1.58%	-0.60%	0.03%	0.62%	1.70%	2.77%	16.49%

Table 5.4: Exposures towards risk factors: summary statistics

	mean	min	p5	p10	p25	p50	p75	p90	p95	max
Duration Gap	-5.02	-20.60	-13.04	-9.80	-7.04	-4.35	-1.85	-1.05	-0.34	1.68
Exposure to corporate bonds	31.6%	3.9%	9.7%	16.1%	20.1%	32.4%	40.5%	46.5%	51.7%	70.5%
Exposure to listed equity	5.0%	0.0%	0.0%	0.0%	1.5%	3.9%	6.6%	11.8%	16.1%	27.5%
Exposure to unlisted equity	2.2%	0.0%	0.0%	0.1%	0.6%	1.3%	2.9%	5.9%	7.6%	12.4%
Exposure to real estate	4.1%	0.0%	0.0%	0.2%	1.4%	3.3%	5.8%	8.6%	11.2%	25.9%
Weighted av. CQS Corporate portfolio	1.79	0.06	0.36	0.72	1.28	2.00	2.23	2.65	3.05	3.44

The duration gap is the mismatch between the modified duration of assets and the modified duration of liabilities proxied by their Macaulay duration as calculated by the formula below:

$$\text{Duration Gap} = Dur_{Assets} - \frac{TPs}{Assets} * Dur_{TPs}\ .$$

To calculate the duration of assets the modified duration is taken from the list of assets (S.06.02), filtered for CIC where C0290 = 1, 2, 4 (when available), 5 and 6; the modified duration is not available for loans and mortgages (CIC 8) which are also fixed income securities, i.e. exposed to interest rate risk. The duration is capped at 50 Years.

Modified duration assets: Dur_{Assets} *= (Sum_i ModDur * SII value) / (Sum_i SII value)*

where the sum goes over all assets (i) with and without reported modified durations and excluding assets held for Unit and Index Linked contracts as reported in S0602; the duration of the assets with no reported duration were assigned a duration of zero.

Modified duration TP: Dur_{TPs} *= (TP_L*MacD_TP_L + TP_NL*MacD_TP_NL)/(TP_L + TP_NL)*

The exposures to the asset categories are obtained by with the look-through approach.

SELECTION OF RISK FACTORS

To approximate the risk-free interest rate there are two possibilities. One is to use the EIOPA risk-free rate term structure. In particular, in the analysis quarterly changes of the 10-year swap rate are used. Another possibility is to use yields of government bonds with low default risk (AAA rated) such as the yield of the German bund with 10-year maturity. Similar results are found when the EIOPA swap rate and the bund yield are used.

The credit spread is the additional yield that is paid on a risky bond on top of the yield of a risk-free bond with the same maturity. One can distinguish credit spreads for different ratings and different types of bonds, such as government bonds and corporate bonds. In general, the credit spreads for different rating buckets (except, potentially, the AAA bucket which is often subject to "flight-to-quality") are correlated to a large extent and, in particular, the high exposures of insurers is mainly towards BBB and A rated bonds (22.9% and 26.9%, respectively, for solos).[70] The analysis uses the quarterly change of the option-adjusted spread of the Standard & Poor's Eurozone BBB Investment Grade Corporate Bond Index. This index consists of bonds with a credit rating that falls on or between BBB+/Baa1/BBB+ and BBB-/Baa3/BBB- according to S&P Global Ratings, Moody's or Fitch.

The equity return is the calculated quarterly return on investments in equities. Usually one use returns of stock indexes that measure the performance of a broad basket of stocks. The gross return includes changes of stocks prices as well as dividends. The analysis uses the gross return of the Euro Stoxx 50, a stock index that consist of the 50 largest and most liquid stocks listed in the Euro area.

The real estate return is the calculated quarterly return of investing in real estate. Real estate is an illiquid asset class, real estate objects are traded infrequently. Instead of property, on can use returns of stocks indexes focused on real estate firms. We use the quarterly return of the Euronext IEIF REIT Europe Index. This index covers European REITs with investments mostly in offices, retail and other commercial real estate.

Table 5.5: Risk factors quarterly changes summary statistics

	mean	std	min	p5	p10	p25	p50	p75	p90	p95	max
EIOPA Risk-free rate 10 y (Bps.)	-4.3	21.4	-34.8	-33.5	-31.3	-18.1	-9.5	10.6	23.1	37.0	38.4
S&P EA BBB spread (Bps.)	9.1	47.8	-40.0	-40.0	-23.0	-10.5	-6.5	9.5	41.0	173.0	173.0
EURO STOXX 50 index (% ret)	0.9	9.0	-25.3	-25.3	-11.4	-2.1	3.4	5.7	10.0	12.3	12.3
Euronext IEIF REIT Europe Index (% ret)	-1.8	10.9	-34.1	-34.1	-11.7	-5.1	-0.5	4.4	10.6	13.6	13.6

70 Please refer to the analysis on Rating downgrades and EEA insurance corporate bond holdings.

6. APPENDIX

6.1. QUESTIONNAIRE TO NCAs

In order to assess the risks and key vulnerabilities for the insurance sector, EIOPA conducted a survey, using a qualitative questionnaire, among national competent authorities (NCAs).

Macro, market and credit risks remain key risks for both the insurance sector and IORPs sector (Figure 1). After the initial high levels of volatility, financial markets have stabilized at the end of the second quarter of 2020. However, in the end of the third quarter, most European countries started to experience the second wave of the pandemic with (partial) lockdowns that brought back the concerns about economic growth. The persistence of low interest rates remains the main driver for macro risks (Figure 3), having an adverse impact on the liability side of insurers' balance sheets and challenging insurers' and IORPs' investments returns. Given the high insurers' exposure towards fixed-income assets and interest rate guarantees in some member states, interest rate risk is indicated as the main driver for market risks, followed by equity risk (Figure 4). On credit risk, the turnaround of the currently observed decoupling between financial markets performance and the general economic outlook could directly impact insurers' and IORPs' balance sheets through depreciation of asset prices such as bonds issued by banks, non-financial corporations and sovereigns (Figure 5), in particular to insurers and IORPs highly exposed to these assets categories.

Corporate bonds downgrades remains a concern, triggered by the continuing uncertainties surrounding the economic situation. This could have a severe impact on insurers' and IORPs' balance sheets highly exposed to risky bonds. The exposure to commercial real estate investments and the potential repricing on CRE is also a potential vulnerability.

Figure 1.1: Top 6 risks in terms of materiality for the insurance sector

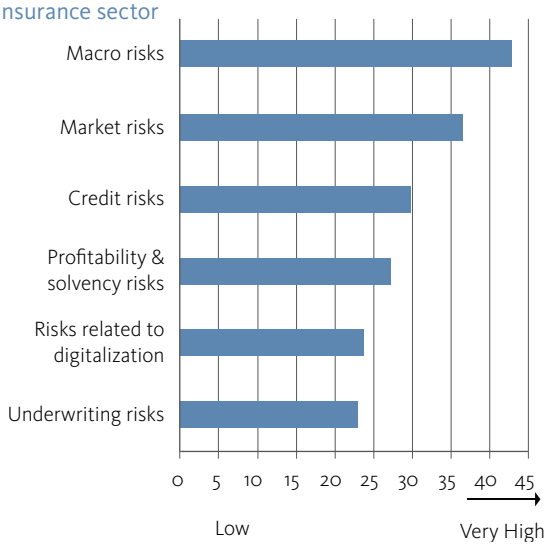
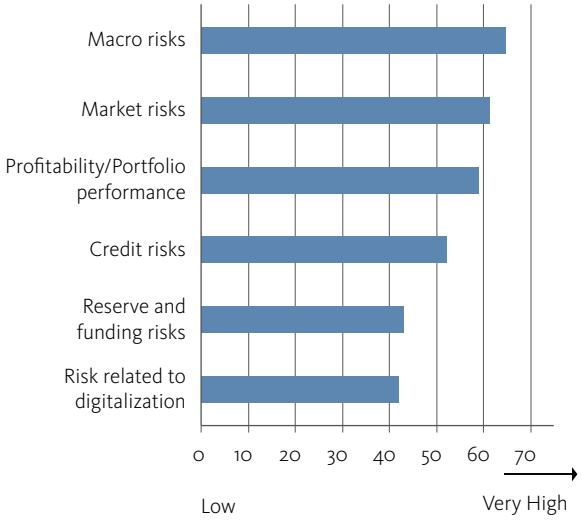


Figure 1.2: Top 6 risks in terms of materiality for the IORPs sector



Source: EIOPA Insurance and pension Bottom Up Surveys Autumn 2020
Note: Based on the responses received. (Left chart) 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.

Figure 1.3: Main drivers for macro risks[71]

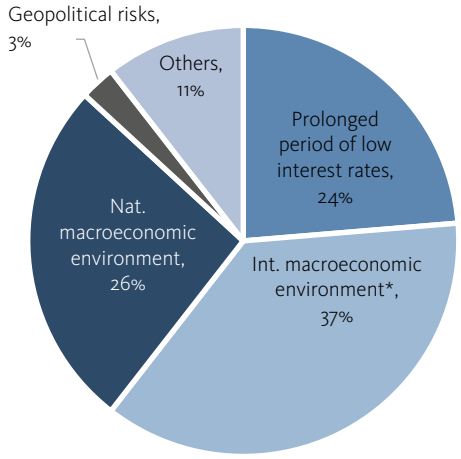


Figure 1.4: Main drivers for market risks

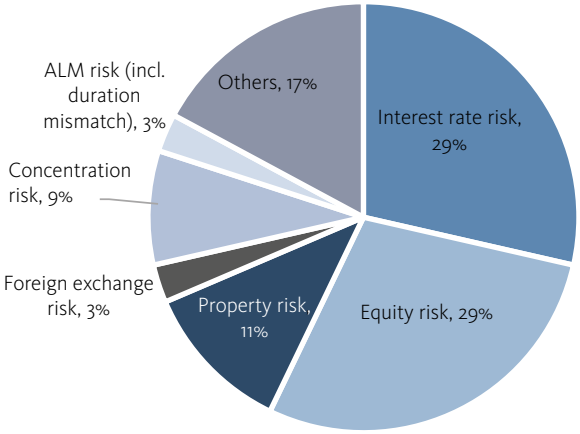
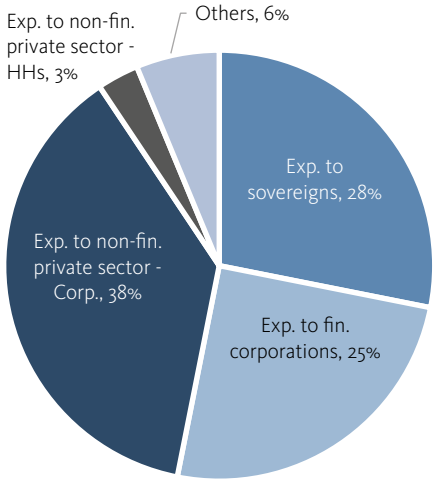


Figure 1.5: Main drivers for credit risks



Source: EIOPA Insurance Bottom Up Survey Autumn 2020
Note: Based on the responses received.

Both investment and underwriting profitability (Figure 6) and solvency risks remain a challenge for the insurance sector, standing in the 4th position of top risks (Figure 1). The worsen economic outlook as a result of the Covid-19 outbreak, negatively impacted insurers' profitability positions in the second quarter of the year via deterioration of both insurers' investment portfolio and underwriting profitability.

Risks related to digitalization are ranked in the 5th place (Figure 1), mainly triggered by cyber security risks. With the Covid-19 crisis and the current home office set up in many undertakings of European countries, the number and complexity of cyber-attacks have risen, although the impact is still unknown. Going forward a reputational risk for insurers may arise.

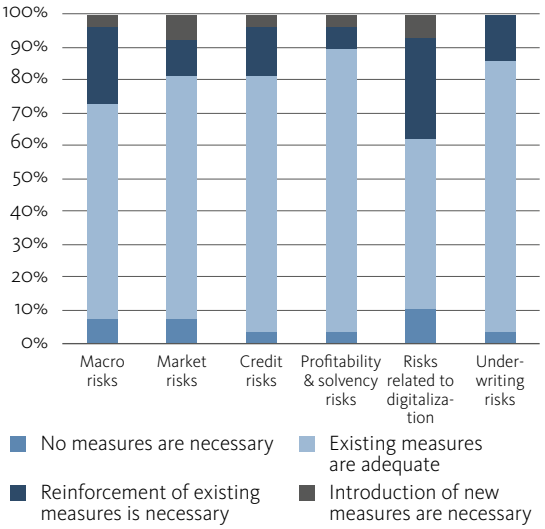
Macro risks also affect the IORP sector (Figure 2). IORPs' investments had suffered significant losses in the first and second quarters of 2020 due to the market turmoil in the wake of the COVID-19 pandemic. Further, the experienced higher spreads, with sharper sectoral differentiation, in corporate bonds, together with lower profit distributions in equity markets have strained the sector's investments returns and consequently lowered the investment performance. Yet, generally, IORPs are - due to their long-term obligations - capable of investing for the long-term and usually have some flexibility in terms of timing to re-balance to their strategic investment allocation. The negative global macroeconomic environment, coupled with the prolonged period of low interest rates, continue to severely affect IORPs' investment performance, which also impacts on the funding situation of Defined Benefit (DB) IORPs due to lower asset values and potentially higher liability values.

71 International and national macroeconomic environment drivers in macro risk category exclude prolonged low interest rates.

Maintaining appropriate funding levels in the IORPs sector, standing in the 5th position of top risks, remains critical (Figure 2). Cover ratios (i.e. assets covering liabilities) in the DB IORPs sector are expected to have decreased significantly by the end of 2020, compared to end-2019 values, potentially triggering national recovery plans or leading to the need for additional sponsor support or benefit reductions. Due to the unprecedented effects of the COVID-19 pandemic on the real economy, whilst mitigated by governmental measures and subsidies, both IORP's sponsors and members of IORPs are potentially facing severe financial difficulties to maintain contributions and so to ensure the sustainability of the pension promise.

There is a need for insurers and IORPs to introduce and reinforce measures to mitigate risk aggravated by the Covid-19 pandemic (Figure 6-7). In spite of the measures already taken by insurers and IORPs to mitigate Covid-19-related risks, NCAs still consider it necessary to reinforce existing measures, in particular for macro risks and risks related to digitalization.

Figure 1.6: The need of risk mitigation measures for the top 6 risks for the insurance sector



Source: EIOPA Insurance and pension Bottom Up Survey Autumn 2020
Note: Based on the responses received.

Figure 1.7: The need of risk mitigation measures for the top 6 risks for the IORPs sector

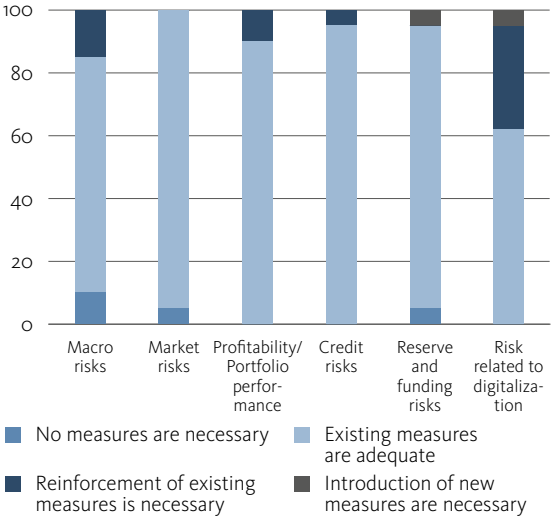


Figure 1.8: Risks with the highest expected increase in materiality over the next 12 months in the insurance sector

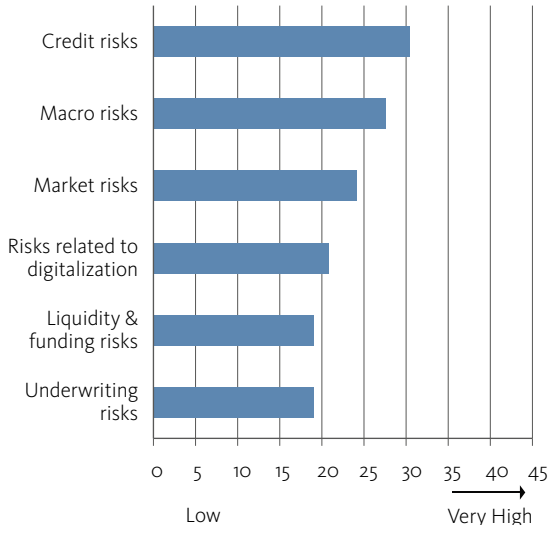


Figure 1.9: Risks with the highest expected increase in materiality over the next 12 months in the IORPs sector

Source: EIOPA Insurance and pension Bottom Up Survey Autumn 2020
Note: Based on the responses received. Risks are ranked according to the expectation for the future movements of each exposure (from -2 indicating strongly decrease to +2 indicating strongly increase). The figure shows the aggregation of the average scores assigned to each risk. The results were subsequently normalised on a scale from -100 to 100.

Going forward, macro, credit and market risks remain the top 3 risks of highest expected increase in materiality over the next 12 months (Figure 8-9). These results are driven by the uncertainty about the length of the pandemic and the economic recovery also as a consequence of the end of the supporting fiscal packages by governments and ample monetary package activated in response to Covid-19 shock. Additionally, the potential worsening of the economic environment and a sudden reflection of the crisis' consequences in the labour market could lead to negative effects on net inflows for both insurance and IORPs sectors.

Concerns on the liquidity position of insurance undertakings are high during the Covid-19 crisis (Figure 14). The Covid-19 crisis and its potential impact on investments redemptions, counterparties' default risk and surrenders on policies increase the concerns about liquidity. Although European insurers do not show liquidity strains as of Q2 2020, going forward this is a potential concern because of the unknown future development of the pandemic and its impact on the economy.

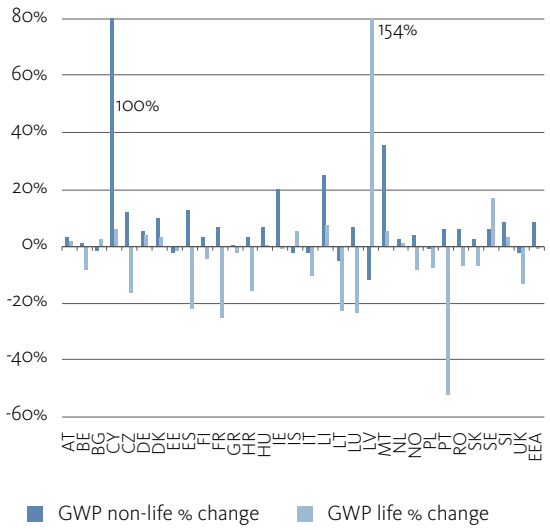
Risks related to digitalization remain a challenge for insurers and IORPs going forward, while cybersecurity insurance products gain in importance. Undertakings promote Insurtech solutions including the addition of distribution channels and more automated claims processes and improved handling web/smartphone interfaces. Extensive use of digitalisation and of teleworking arrangements in the pandemic may increase insurers' and IORPs' vulnerability to cyber-attacks. At the same time, the number of product offered by insurers for cyber security have increased, together with the number of claims covering these type of risks, mitigating the negative effects of cyber-attacks to financial stability. EIOPA is closely monitoring the developments related to digitalization and in October EIOPA published guidelines on information and communication technology security and governance.[72]

72 See EIOPA guidelines on information and communication technology security and governance https://www.eiopa.europa.eu/content/guidelines-information-and-communication-technology-security-and-governance, October 2020.

6.2. STATISTICAL ANNEX

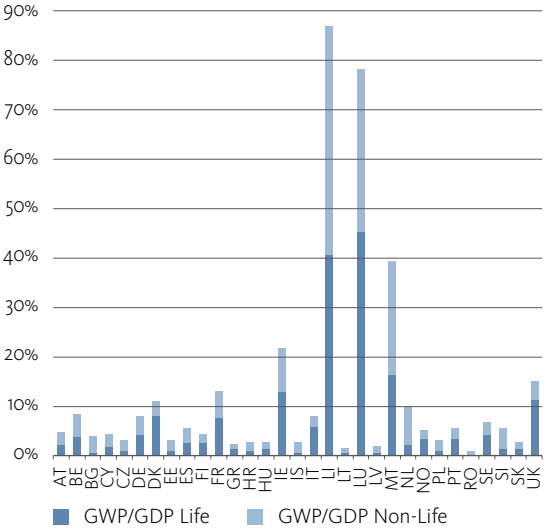
INSURANCE SECTOR

Figure 2.1: GWP growth (in %, year-on-year)



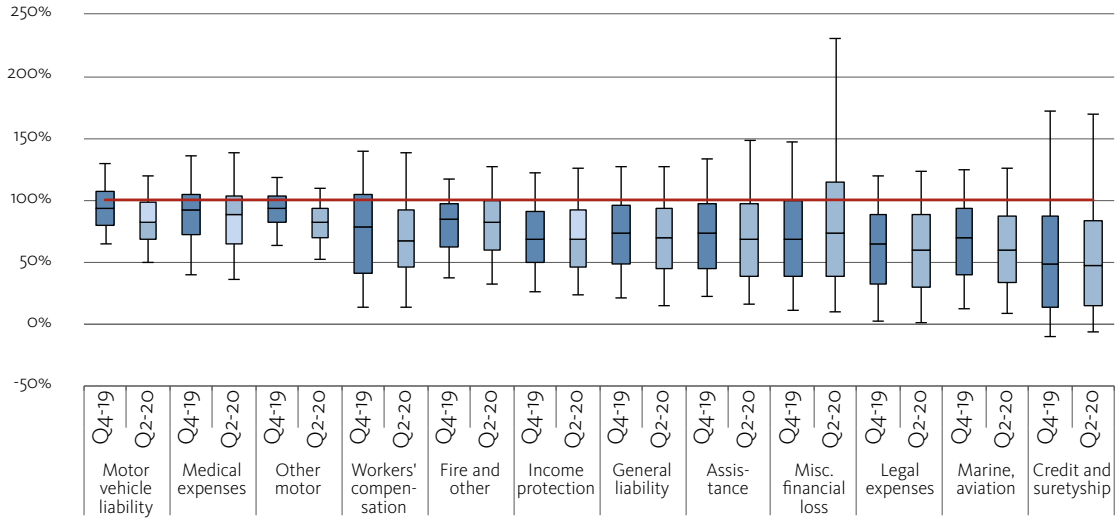
Source: EIOPA Quarterly solo
Reference date: Q2 2020 and Q2 2019

Figure 2.2: GWP as a Share of GDP in % by country



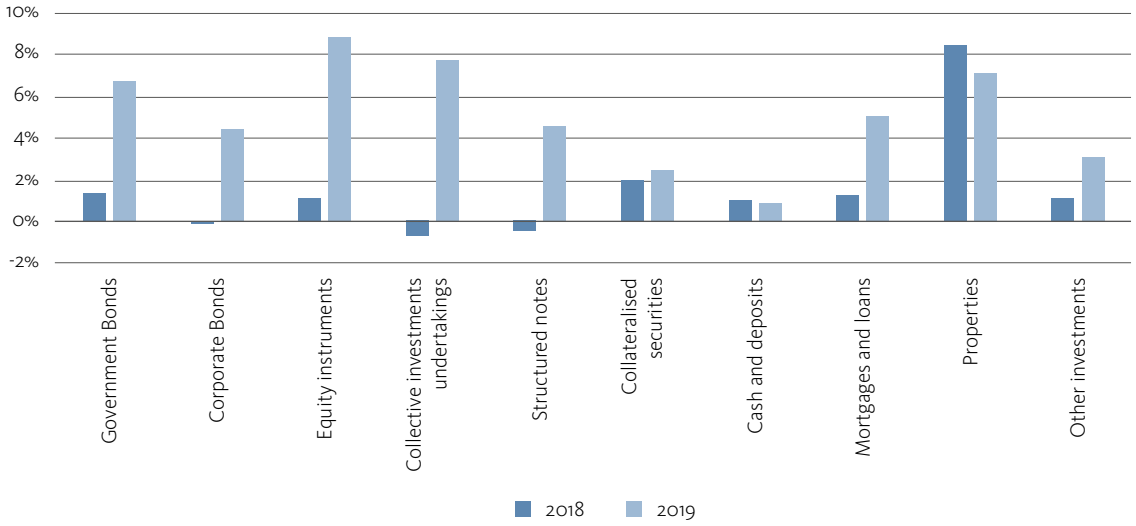
Source: EIOPA Quarterly solo
Reference date: Q4 2019

Figure 2.3: Gross Combined Ratio across lines of business (in %; median, interquartile range and 10th and 90th percentile)



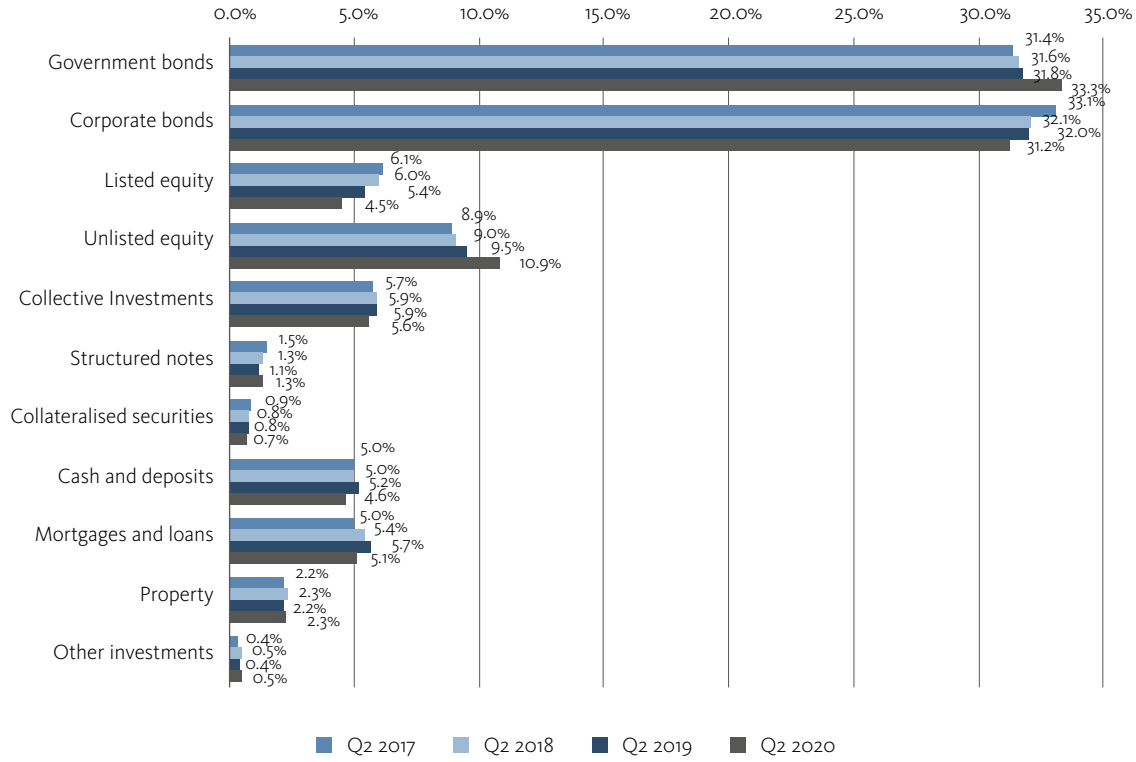
Source: EIOPA Quarterly solo

Figure 2.4: Return on Investments per asset class (in %)



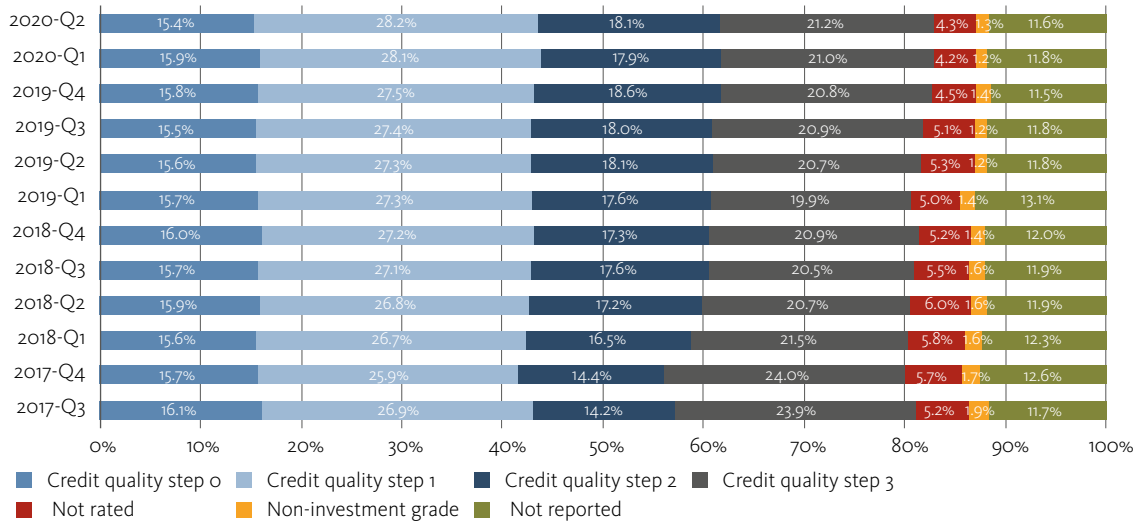
Source: EIOPA Quarterly solo

Figure 2.5: Investment split in Q4 2019 compared to Q4 2018, Q4 2017 and Q4 2016



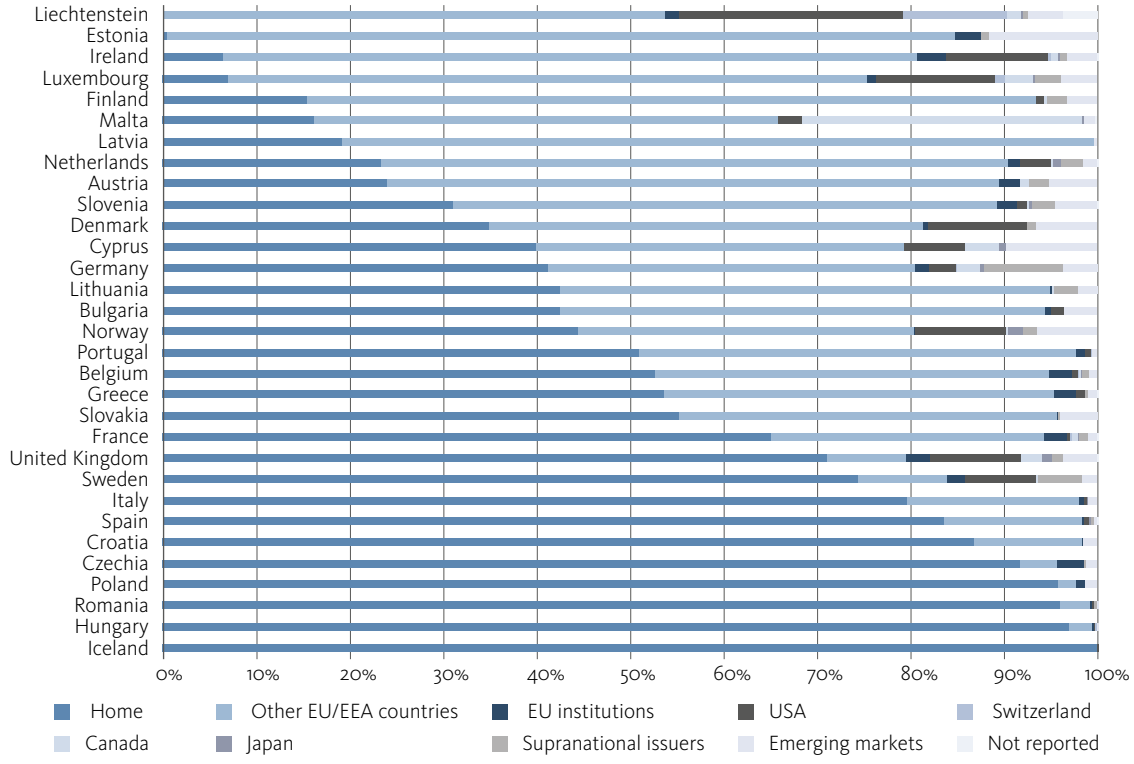
Source: EIOPA Quarterly solo

Figure 2.6: Credit quality of bonds portfolio across countries



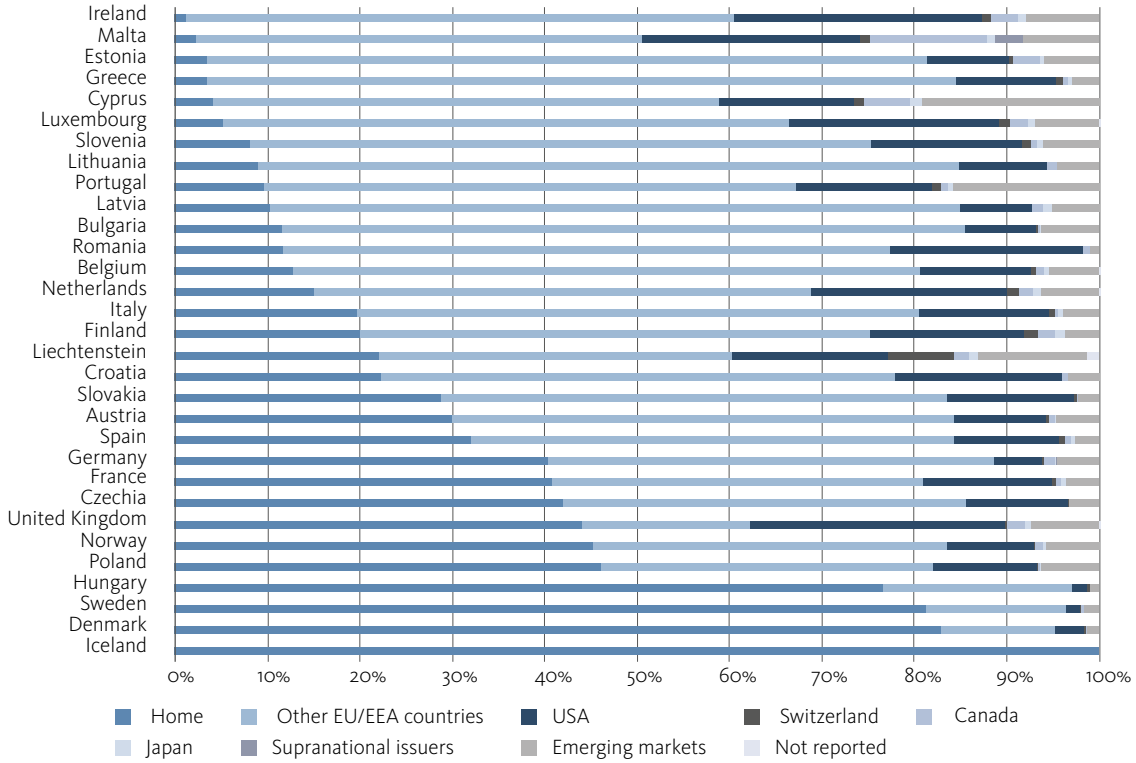
Source: EIOPA Quarterly solo
Note: Government and corporate bond portfolios combined. Assets held for unit-linked are included.

Figure 2.7: Investment breakdown by issuer country for insurers' holdings of government bonds



Source: EIOPA Quarterly solo

Figure 2.8: Investment breakdown issuer country for insurers' holdings of corporate bonds



Source: EIOPA Quarterly solo

REINSURANCE SECTOR

Figure 2.9: Gross Written Premiums in the EEA (in EUR billion and %)

Non-life direct business	Life direct business	Life reinsurance obligations	Non-life reinsurance accepted
37%	47%	5%	11%
€ 285	€ 358	€ 37	€ 83

Source: EIOPA Quarterly Solo
Reference date: Q2 2020

Figure 2.10: Reinsurance Gross Written Premiums in the EEA (in EUR billion)

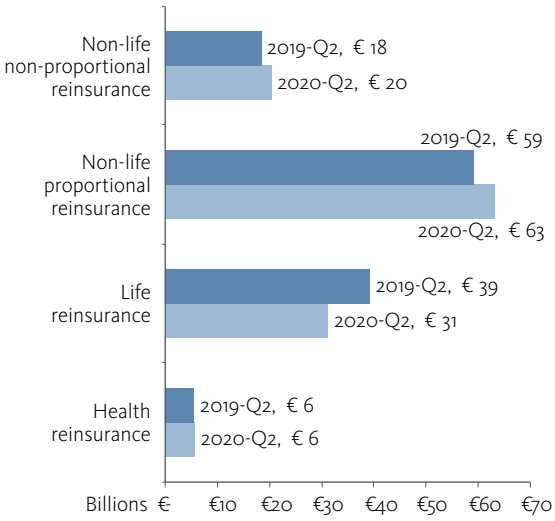
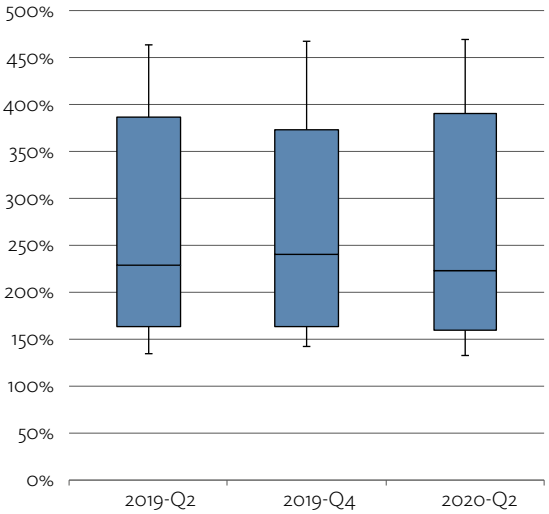
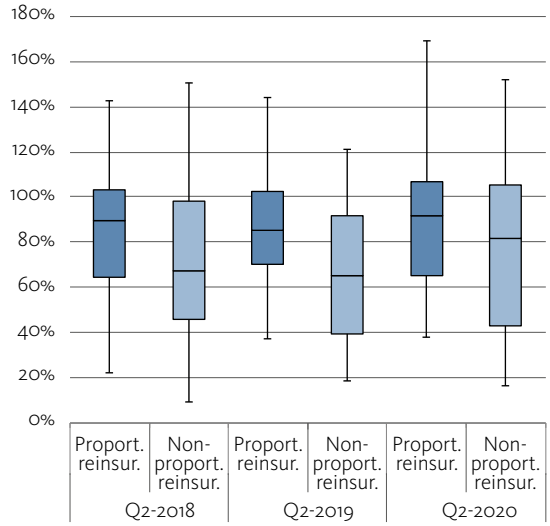


Figure 2.11: Solvency ratio of EEA reinsurance undertakings (median, interquartile range and 10th and 90th percentile)



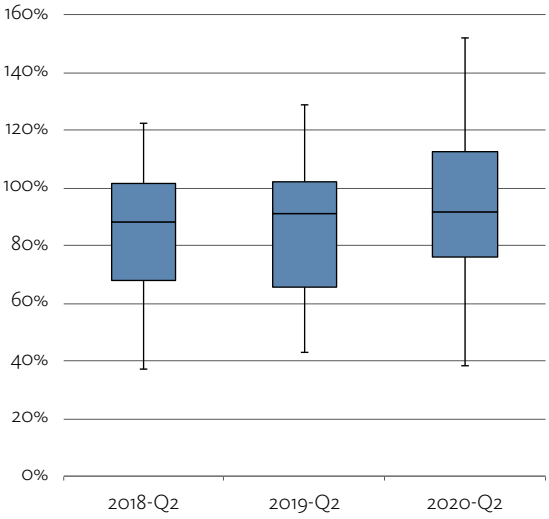
Source: EIOPA Quarterly Solo
Note for figure 2.10: Year-to-date amounts. Non-life reinsurance accepted includes proportional and non-proportional reinsurance. Life reinsurance obligations include life reinsurance and health reinsurance.

Figure 2.12: Gross Combined Ratio for non-life direct business of EEA reinsurance undertakings (median, interquartile range and 10th and 90th percentile)



Source: EIOPA Quarterly solo

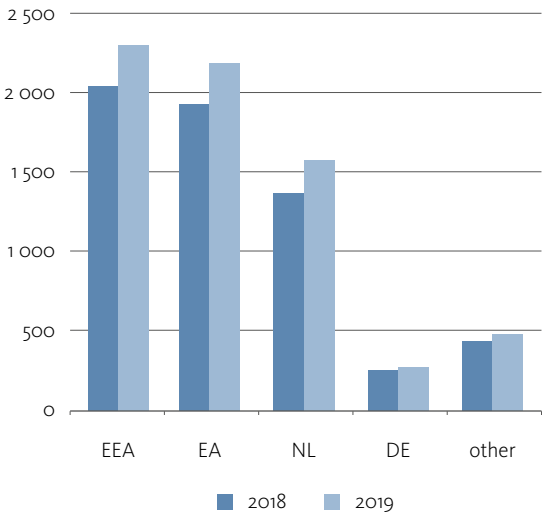
Figure 2.13: Gross Combined Ratio for life reinsurance obligations of EEA reinsurance undertakings (median, interquartile range and 10th and 90th percentile)



Source: EIOPA Quarterly solo

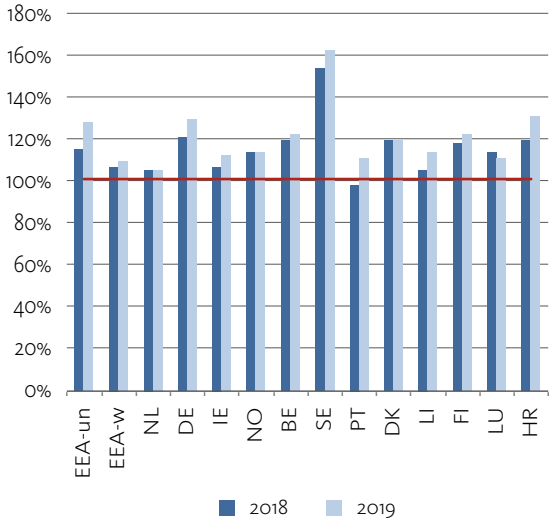
IORP SECTOR[73]

Figure 2.14: Total Assets (in EUR bn)



Source: EIOPA annual PF.
Figure 2.14 is based on data received by 24 countries (EEA) and 15 countries (euro area) which provided total assets for 2019. The category "other" includes all countries except UK and DE.

Figure 2.15: DB IORPs cover ratios (in per cent)



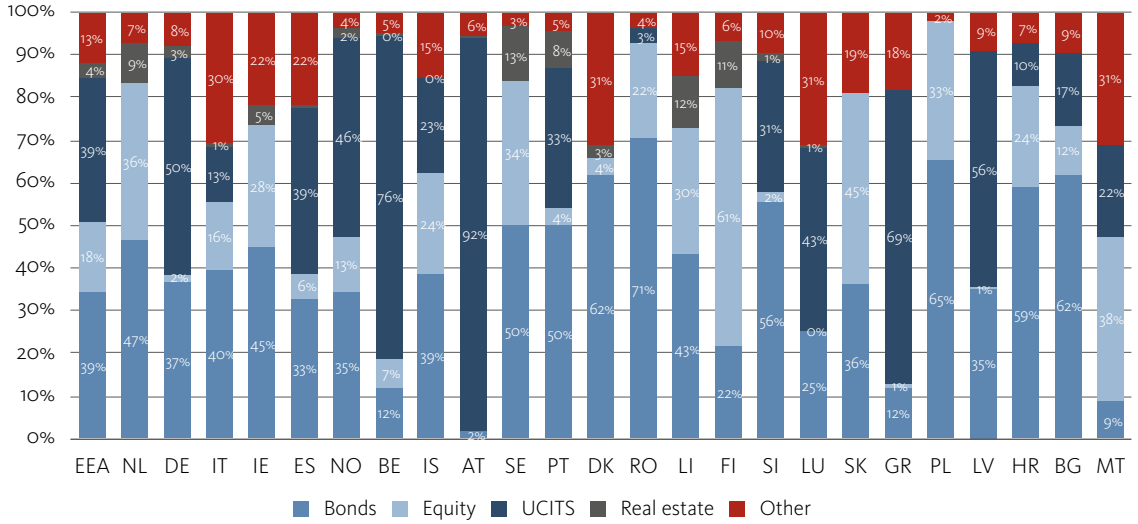
Source: EIOPA PF annual.
Note: Cover ratios are defined as net assets covering technical provisions, divided by technical provisions. Both the weighted and un-weighted averages for the cover ratio are calculated on the basis of the 12 countries that provided data and are depicted in this chart. The weighting 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.

Penetration rates (total assets as % of GDP)

NL	LI	IS	IE	NO	PT	IT	BE	DE	AT	SI	RO	SE	LU	ES	DK	SK	FI	LV
194%	132%	127%	21%	11%	9%	8%	8%	8%	6%	6%	6%	4%	3%	3%	2%	3%	2%	1%

Source: EIOPA annual PF.
Note: Penetration rate for GR, HR, PL, MT and BG is lower than 1 per cent. For RO, the data refers to 1st Pillar bis and 3rd Pillar private pension schemes only.

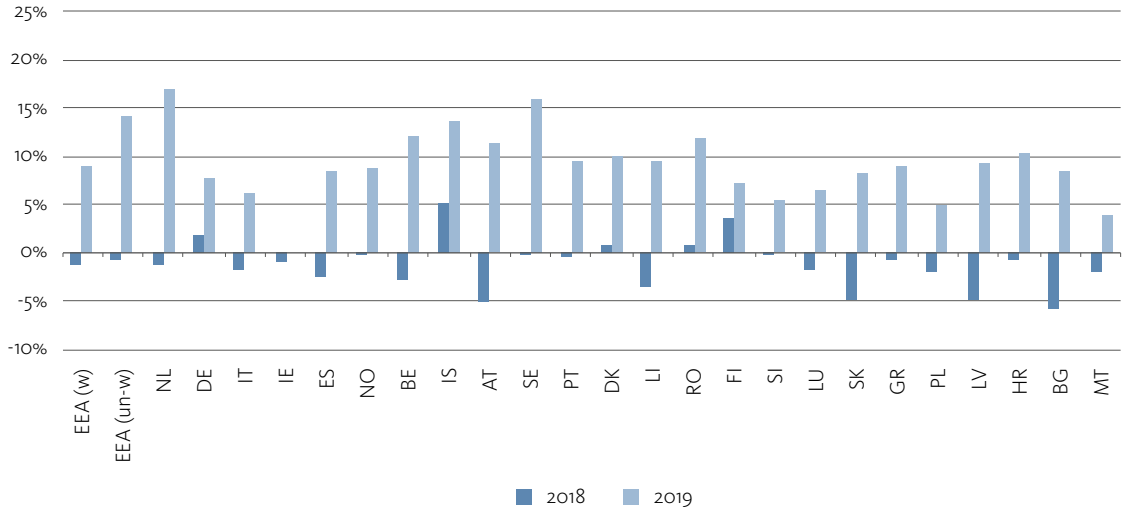
Figure 2.16: Investment Allocation in 2019 (in %)



Source: EIOPA annual PF.

73 2019 Data for BE, DE, ES, LU, LV, MT is derived from EIOPA's database on occupational pensions information. Information on small IORPs, which are exempted from the full reporting requirements, are excluded, so that for some Member States 2019 data may not represent 100% of the total national IORPs sector.

Figure 2.17: Rate of return on assets (ROA) in per cent



Source: EIOPA annual PF.
Note for figure 2.17: Return on assets for BE, DE, ES, LU, LV, MT and NO for 2019 is defined as net investment income as a share of total assets.

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