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2016 EIOPA Insurance Stress Test Report

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Executive Summary

1. The current macroeconomic environment poses several challenges for the European life insurance market. To assess the resilience of the life insurance industry to the most prominent and prevalent risks, EIOPA launched a stress test exercise with reference date the 1st of January 2016. Two scenarios were tested in this exercise i.e. a low-for-long yield scenario and a so-called 'double-hit' scenario. The low-for-long yield scenario aims at emulating a situation of entrenched secular stagnation where a lack of long-term investment opportunities and permanently low productivity growth is combined with an extended scarcity of risk free assets which drives down yields at all maturities[1]. The 'double-hit' scenario was set-up by EIOPA in cooperation with the ESRB. This scenario reflects the prevailing systemic risks to the European financial system i.e. an abrupt increase in risk premia combined with a prolonged low yield environment.

2. In both stress scenarios, an instantaneous shock is applied to the regulatory balance sheet and related reported figures, such as the composition of assets and liabilities and cash flow projections. The valuation of the pre and post stress test balance sheets was based on Solvency II and participating insurance undertakings were obliged to use those Solvency II measures and features for which they have obtained supervisory approval (if required).

3. The exercise included 236 companies at solo level, from 30 countries. These companies were perceived as particularly vulnerable to an extended period of low interest rates due to their relatively long-term life business often involving interest rate guarantees. In addition to the major European undertakings, the stress test sample also includes medium and small sized undertakings, consistent with the aim of the exercise to target both life and mixed insurers offering products with interest rate guarantees. Those undertakings reported close to the 75% of their total technical provisions to be life excluding health and unit-linked which overall translates into a European market coverage of 77% for this type of business.

4. In aggregate, all participating undertakings show an excess of assets over liabilities in the baseline. Tier 1 unrestricted own-funds account for 90% of total own-funds of the sample companies, indicating that the quality of the own-funds is generally high. However, the composition of available own funds varies markedly across companies. The overall SCR ratio for the sample is 196% and the overall MCR ratio is 533%. Only two companies reported a SCR ratio below 100% in the baseline scenario accounting for 0.02% of the total assets in the sample. The overall SCR ratio falls to 136% and technical provisions increase by 3% if all LTG and transitional measures[2] are excluded. In this case, the proportion of entities with a SCR cover below the 100%-threshold would increase to 14% of the sample representing 26% of the total assets. The stress test results also indicate that in some cases the LTG measures may have a larger positive impact on insurers' balance sheets than the initial negative impact of the shocks, as would be expected by the virtue of the design of the volatility adjustment in such extreme scenarios like the double-hit.

5. The impact of the two scenarios is discussed in the report in terms of impact on the assets over liabilities including subordinated debt, and excludes any consideration regarding capital requirements. Potential vulnerabilities in the financial position of the

[1] The low-for-long scenario also prescribes a decrease in the UFR

[2] The LTG measures reflect the specificities of the insurance market. The transitional measures provide a smooth transition to the full application of Solvency II after the transitional period, without alleviating the pressure to progress towards pure Solvency II.

stress test participants are assessed based on information from the baseline situation and how it changes after the stress scenarios.

6. The double-hit results in a 9.7% decline (almost 610 billion euro) of the total assets in the baseline. As liabilities only decline by 7.8% (450 billion euro)of the total liabilities in the baseline, this scenario has a negative impact on the balance sheet of stress test participants of 28.9% (close to 160 billion) of the total excess of assets over liabilities in the baseline. In the event of the low-for-long scenario, the impact for the insurance sector would represent a 18% fall (about 100 billion euro) in the total excess of assets over liabilities in the baseline.

7. The impact of both scenarios is not equally spread among the different undertakings or national markets. Different levels of vulnerabilities are identified which correspond to different market characteristics and/or balance sheet structures. Regarding the latter, the 2016 exercise elaborates on the composition of assets and liabilities separately. Moreover, the results of the analysis of asset and liability durations were in line with those found in the 2014 stress test. However, the analysis of the sensitivity of the best estimate of the liabilities to changes in interest rates revealed that a number of assumptions for the valuation of technical provisions were not necessarily consistently applied across undertakings. Given the implications for financial stability and consumer protection, these assumptions require supervisory assessment in order to assure their validity and consistency of results across different products, undertakings and countries.

8. The EIOPA Stress Test, is designed as a vulnerability analysis and does not constitute a pass or fail exercise. It does not attempt to assess capital requirements for the industry and, considering the specific 2016 circumstances, no recalculation of SCR or MCR post stress was required in the first year of application of Solvency II. In order to provide an indication on how an adverse scenario affects the life insurance sector, the impact on the excess of assets over liabilities is assessed. In the double-hit, 104 insurance undertakings, constituting more than 40% of the sample would lose more than a third of their excess of assets over liabilities. Moreover, 42 undertakings would see more than half of their excess of assets over liabilities lost in this scenario while 5 undertakings would see all of the excess of assets over liabilities disappear. In the low-for-long scenario, 38 undertakings (16% of the sample) would lose more than a third of their excess of assets over liabilities. In the absence of LTG and transitional measures, this impact would be significantly larger, a finding that confirms the importance of these measures for financial stability purposes. If LTG and transitional measures were not included, almost three quarters of the sample would lose more than 1/3 of their excess of assets over liabilities in the double-hit scenario. In the low-for-long scenario a quarter of the sample would lose more than 1/3 of their excess of assets over liabilities if LTG and transitional measures were excluded.

9. Hence, conclusions on the vulnerability of the participating undertakings need to consider the sensitivities to the shocks applied as well as the initial level of capitalization. The two stress scenarios imply approximately a 2% point reduction of the average assets over liabilities ratio at aggregate level. Without the use of LTG and transitional measures[3], the decline in the excess of assets over liabilities would be 102.8% and 30.5% in the double-hit and low-for-long scenarios respectively. Especially in the case of the double-hit scenario, these measures seem to provide the financial stability cushion they were meant to give for this particular type of long-term insurance business. In the absence of the alleviating effect of the LTG and transitional measures, insurers may be induced to forced sales and de-risking in order to lower

[3] The LTG and transitional measures are legal elements of the Solvency II capital regime.

their SCR and MCR, possibly pushing further down asset prices, adding to the market volatility and potentially affecting financial stability.

10. The exercise also includes a qualitative questionnaire meant to detect collective second order actions taken by insurers that may amplify or cause additional risks at aggregate level. For example, while the selling of assets may be a rational response to a stress for an individual insurer, such a strategy – if pursued by many – could amplify the original stress and lead to spill-overs to other financial sectors. The answers to the qualitative questionnaire did not confirm large scale asset sales as an intended strategy to regain profitability. Almost half of the respondents (101 out of 226) signalled the intention to increase their holdings of sovereign bonds. Nevertheless, this intended action in turn could also – if it materialises – have significant impact on the market for sovereign bonds.

Conclusions and next steps

11. The exercise confirmed the vulnerability of the insurance sector to the low interest rate environment, and to a pronounced reassessment of risk premia. During their supervisory review process, NCAs should assess whether the vulnerabilities identified from the exercise pose a threat to the viability of the supervised entity and, collectively, to the system as a whole.

12. The impact exhibited in the low-for-long scenario is of similar magnitude to the double-hit scenario in terms of the reduction of the average assets over liabilities ratio. This is an interesting finding as current economic circumstances have increased the probability of such a scenario. A prolonged low interest rate environment, in a macroeconomic setting of secular stagnation, may lead into lower rates even for very long maturities. Such a scenario would exert further pressure on the viability of specific business models, particularly those offering long-term guarantees. LTG and transitional measures provide the cushion intended, potentially acting in a counter cyclical manner, but supervisory vigilance is required in order to avoid a misestimate of the risks due to the longer-term type of concerns implied by the scenario. Given the high relevance of the low-for-long scenario under the current macroeconomic environment, supervisors are furthermore prompted to consider to what extent further measures need to be taken for those companies that have shown particular vulnerabilities to such a scenario.

13. Life insurance business includes a number of different products with varying cash flows to policyholders and optionalities. This exercise revealed the need to carefully assess the assumptions underlying the calculation of the best estimate of technical provisions.

14. The qualitative questionnaire indicates that insurers do not foresee the need for large scale asset sales. On the contrary, almost half of the participants indicated that they would intend to increase holdings in assets mostly hit by the adverse scenario, potentially acting in a counter-cyclical manner.

15. Based on the above, the 2016 Stress Test exercise revealed vulnerabilities that deserve a supervisory response. Such response needs to be coordinated on the European level in line with EIOPA's responsibility of facilitating and coordinating supervisory actions. The EIOPA Board of Supervisors, having considered the results of the stress test exercise and based on Article 21 of the EIOPA regulation has decided to issue a set of general recommendations addressing the need for the follow-up actions set out in this report. These recommendations are published separately, in the appropriate legal form, simultaneously with this report (see https://eiopa.europa.eu/Pages/Financial-stability-and-crisis-prevention/Stress-test-2016.aspx).

1. EIOPA 2016 insurance stress test framework

1. **In line with article 21 of its regulation[4] EIOPA, in cooperation with the ESRB, initiated and coordinated this European wide stress test to assess the resilience of insurance undertakings to adverse market developments**. This macro-exercise is carried out in order to identify potential systemic risks and vulnerabilities stemming from the micro-prudential level and across borders.

2. **Conscious of the relevance of cross-border comparable results upon which to base the conclusions, particular emphasis was put in ensuring that a consistent methodology was applied by all participants in this test.** In order to ensure consistency, the stress test specifications were consulted with the major European industry representatives and actuarial associations at an early stage. In addition, a centralised questions and answers procedure was organized to assist participating companies to consistently interpret the stress test specifications. Finally, consistency was ensured by establishing a two-step validation process, where the reported results were scrutinised against the stress test framework, first at country level and then at European level.

3. **Guided by the market picture and due to the focused nature of the exercise, EIOPA prioritised the investigation of the resilience of the insurance industry to market risk for this 2016 edition.** For the sake of an efficient use of resources at industry and supervisory level, the exercise was tailored to fit the relevant risk outlook and the priorities for the insurance sector in 2016.

4. **EIOPA issued in 2013 an Opinion on the Supervisory response to prolonged low interest rates, which remains highly relevant as the interest rates have not only remained at low levels, but also have further decreased since the opinion was issued.** Equally relevant is the need to follow up on key questions related to the impact of the low yield scenarios in the insurance sector: i) What is the scale of the challenge posed by such scenarios? ii) What is the scope of the challenge posed by such scenarios? iii) When are serious problems expected to emerge?

5. **The findings of the previous stress test exercise were the basis for general recommendations issued by EIOPA to the National supervisory authorities under the low yield environment.** The 2016 stress test, in particular through a streamlined cash flow analysis, further investigated the reinvestment risk and compared the maturity-rate bucketing on the asset and on the liability side under the low-for-long scenario. To that aim, the analysis of the Macaulay duration of the liabilities undertaken in 2014 has been complemented with a measurement of the sensitivity of the liability cash flows to the low yield scenario. Additionally, the 2016 exercise investigates the effect of derivatives on the SCR sensitivity to the decline of interest rates.

1.1. Risk outlook and priorities

6. **The financial year 2016, with the application of Solvency II, is a milestone in regulation for the European insurance and reinsurance undertakings.** This major change in the regulation and the implied complexity for insurers to comply with the new standard does not obviate the need for EIOPA to continuously oversee the financial stability of the insurance industry. These circumstances require a focused strategy aimed at scrutinizing the most relevant risks for the industry.

[4] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV:mi0070

7. **The macroeconomic environment at the reference date of the exercise is posing severe challenges to the European insurance sector.** The high volatility driven by recent economic and political events exacerbates the burden exerted on insurers by the persistent low growth and low yield environment. Based on the assumptions of continued low growth and low yields in Europe, EIOPA, in collaboration with the European Systemic Risk Board (ESRB), developed two specific scenarios, namely the low-for-long yield and the double-hit, encompassing low interest rates and a persistent stagnation of the economy in the EU characterized by drops in the values of the main insurance asset holdings[5].

8. **The tested scenarios aim at assessing vulnerabilities with a forward looking perspective under extreme, but plausible circumstances with a specific narrative as background.** However, the results of the stress test shall be interpreted in the light of market conditions emerging from those singular events that would have caused severe consequences during the timeline of the exercise, such as the UK's referendum vote to exit the EU.

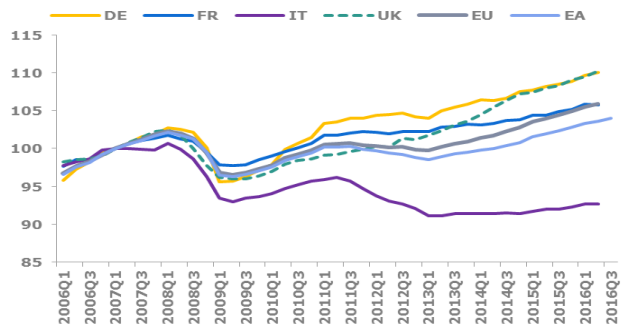
9. **Life insurers with their long-term liability based business are deemed to be more vulnerable to a low interest rate environment.** Undertakings offering life contracts with future discretionary and guaranteed benefits struggle to match their obligations towards policyholders while maintaining sufficient levels of profitability in the current low yield environment. Following the focused nature of the exercise, EIOPA decided to include in the 2016 stress test exercise solo life and mixed insurers offering any type of interest guaranteed products. Selected undertakings were representative of each national market. Moreover, in order to fully assess the different insurance markets, each national sample included an adequate number of medium and small sized undertakings and mutuals, depending on their representation in the particular national market.

1.2. Description of the macroeconomic situation

1.2.1. Situation at reference date and official launch of the exercise

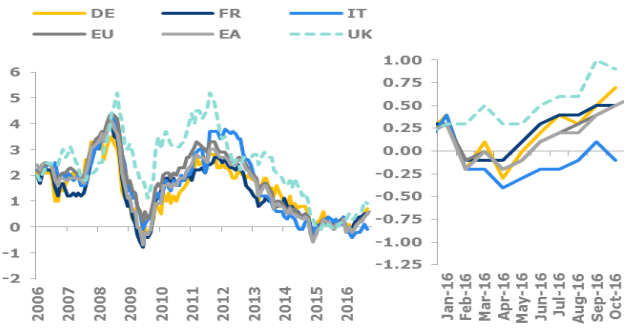
10. **European economic growth, although gradually improving at the reference date of the stress test calculations (i.e. reference date: 1-1-2016), appeared weak and heterogeneous, with economies characterized by large public debt and still struggling to recover from pre-crisis periods.** The weak growth was accompanied by deflating signals driven both by the economic and political uncertainties in the euro area and low commodity prices (Figure 1). The same trend can be observed during the first quarter of 2016 which preceded the official launch of the stress test.

Figure 1: Real GDP development (index 2007Q1=100)



Source: Eurostat and EIOPA calculations - Last observation: Q3 2016.

Figure 2: Inflation rate (in %)



Source: ECB and Eurostat, latest observation – October 2016

[5] For a detailed description of the scenarios (stresses, calibration, magnitude) refer to Annex I.

11. **Ample sources of funding contribute to the reduction of interest rates, encouraging "search for yield" behaviour and increasing valuation risks.**

Figure 3: EUR swap curve (in per cent)

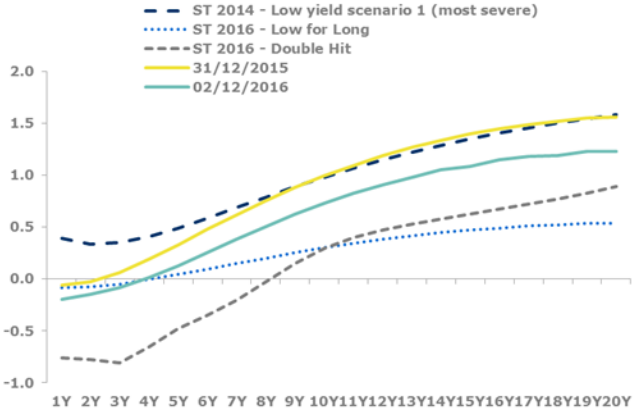
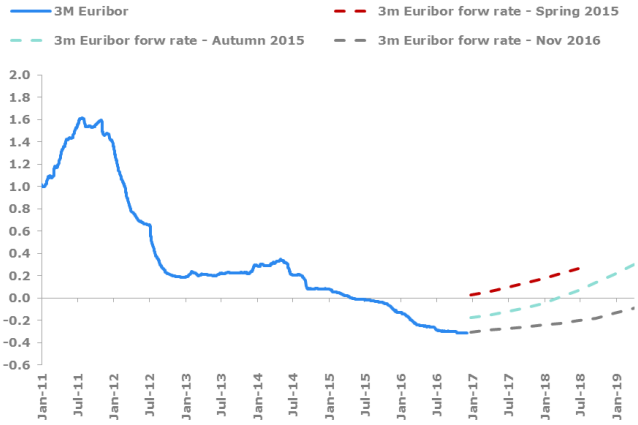


Figure 4: 3M EURIBOR (in per cent)



Source: Bloomberg - Final observation: 02/12/2016

12. **The excess of liquidity in the market leads to reduced sovereign bond yields and investment grade corporate bond yields, which might not be in line with what credit risk fundamentals suggest** (Figure 5 and Figure 6).

Figure 5: 10-year government bond yields (in per cent)

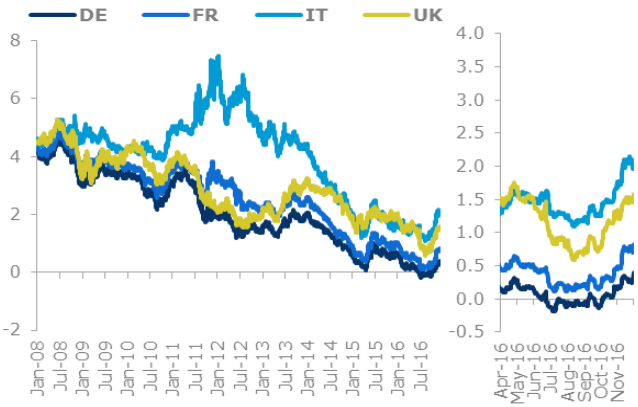
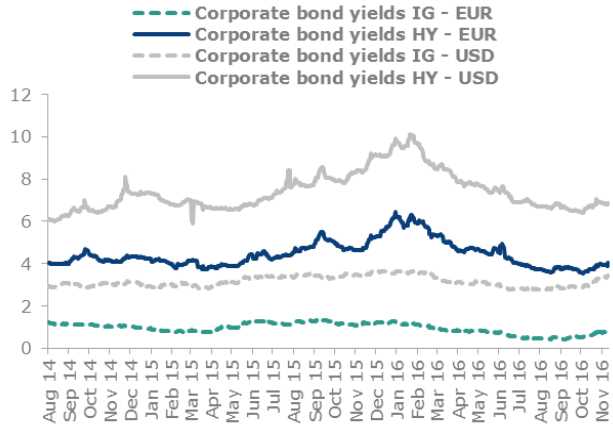


Figure 6: Corporate bond yields and EMU and US Indices (in per cent)



Source: Bloomberg; Last observation: 02/12/2016

1.2.2. Situation at the time of the analysis (November 2016)

13. **European economic growth remains fragile. In many cases, GDP is still below the pre-crisis levels and clear market fragmentation persists.** The recent risks that emerged in the European banking sector could trigger a potential slow down. Inflation rate across the EU countries has started to pick up, but remains very low with a few countries still experiencing deflation (Figure 1 and Figure 2).

14. **Despite the continuation of the ECB's unconventional market stimulus, inflation expectation has not changed compared to the reference date and the yield curve has further moved down** (Figure 3 and Figure 4).

15. **Government, as well as corporate, yields have further decreased incentivising insurers to re-allocate portfolios towards more risky markets or more risky assets, and increasing the vulnerabilities of the insurance sector to adverse market developments.**

1.3. Methodological approach

1.3.1. Scenarios tested

1.3.1.1. Narrative and stress assumptions

16. **Two stress scenarios were tested in this exercise i.e. a low-for-long yield scenario and a so-called 'double-hit' scenario.** A detailed description of both these scenarios can be found in Annex I. Both scenarios were designed so as to target particular vulnerabilities of the EU insurance sector.

17. **The low-for-long yield (LY) scenario aims at emulating a situation of entrenched secular stagnation where a lack of long-term investment opportunities and permanently low productivity growth is combined with an extended scarcity of risk free assets which drives down yields at all maturities.** The input to this scenario consists solely of a low risk free yield curve compared to the one observed at 20-04-2015, in particular for medium-term (7-10 years) and especially for longer term maturities. In achieving the goal of creating low long-term rates, an ultimate forward rate (UFR) of 2%[6] (instead of 4,2%) was assumed in order to fully reflect the hypothesis of a scenario characterized by persisting low yield across all (long-term) maturities.

18. **The so called 'double-hit' scenario (DH) is a hypothetical scenario which was set-up by EIOPA in cooperation with the ESRB. The scenario reflects the ESRB's assessment of prevailing systemic risks to the European financial system i.e. a further increase in risk premia combined with a continuing low yield environment**. The idea behind the scenario is that both sides of the balance sheet of an insurance undertaking are simultaneously affected negatively. Short to medium term swap rates decline, thereby increasing the value of liabilities. At the same time all material asset[7] prices are assumed to fall potentially exposing insurers to a failure of traditional investment strategies and hedges. The particular combination of stresses, as they were defined in the scope of this scenario, should be understood as an extremely remote scenario but one which would allow the impact of different possible stresses on the balance sheet of the insurer to be tested and one which, either partly or even fully, could become reality.

1.3.1.2. Effective implementation of the stress scenarios

19. **In both stress scenarios, an instantaneous shock approach is applied to the regulatory balance sheet and related reported figures, such as the composition of assets and liabilities and cash flow projections.** The instantaneous shock approach entails a few important assumptions which need to be taken into account when interpreting the stress test results obtained:

i. **Stresses are applied to the asset and liability portfolios effectively held by participants on 01/01/2016.** When calculating the instantaneous stress impacts, participating insurance undertakings cannot assume new insurance business or alter their post stress asset structure. Future premiums on insurance business can be taken into account to the extent they fall within the Solvency II contract boundaries (see also next chapter).

[6] This hypothesis is only used for the purpose of designing a theoretical low-for-long scenario and it should not be considered as the actual outcome of any methodological proposal from EIOPA on the UFR.

[7] Annex I details how the asset classes were shocked.

ii. **This is not a multi-period stress test exercise and, as such, does not include future roll-over of the insurer's balance sheet.** Only the impact on the day-one balance sheet needed to be calculated.

iii. **As Solvency II values both assets and liabilities on a forward-looking market-consistent basis, all future profits following the current asset and liability portfolio are taken into account when stressing the balance sheet.** As the difference between the market value of the assets and the liabilities constitutes a material part of the own funds of the insurance undertakings, the actual impact of a particular stress scenario can, in this set-up, best be assessed by investigating the impact of the stresses on the assets, liabilities and own funds of the insurance undertaking.

iv. **There is no recalculation of the capital requirement (SCR or MCR) after stress.** This is in line with the aim of the exercise of identifying the vulnerabilities of the insurance sector to a particular set of scenarios rather than running a pass or fail test of the capital requirements. Furthermore, it is more proportionate in terms of the burden and the resource requirements in the first year of Solvency II implementation. As a consequence of this assumption, no official regulatory post stress SCR ratio (i.e. post stress own funds/ post stress SCR) is determined and results are not to be used to determine potential capital shortfalls.

v. **There was no full quantitative analysis of the potential second order effects following the prescribed scenarios. A qualitative questionnaire was set up to capture some of the second order effects.**

1.3.2. Regulatory framework: Solvency II based calculations

20. **The valuation of the pre and post stress test balance sheets was based on Solvency II.** The reference date of the stress test which was 01/01/16 implied that the pre stress values were expected to be consistent with the figures reported in scope of the Solvency II day-one reporting. The reporting templates relied heavily on Solvency II day-one reporting and additional data items were based mainly on the future annual reporting templates. In a few instances, new templates were designed for the purpose of the stress test only.

21. **In order to correctly reflect the pre stress situation at 01/01/2016, participating insurance undertakings were obliged to use those Solvency II measures and features for which they had obtained an explicit approval by their supervisors in light of the day-one-reporting** (e.g. partial or full internal models, undertaking specific parameters [USP], long-term guarantees [LTG] measures, ancillary own funds, etc.). As a result, the insurance undertakings were allowed to use the so-called LTG measures for their pre and post stress figures as long as a timely approval had been obtained within the regular Solvency II framework[8].

[8] For some countries it needs to be noted that the 'volatility adjustment', one of the LTG measures, can be used by undertakings in case they have just notified the local supervisor as no explicit approval process is set-up for these countries. In these cases, it is expected that the participating insurance undertaking has notified their local supervisor of the use of the 'volatility adjustment' in order to be able to use the measure as well in scope of this stress test exercise. In case certain measures or features did not need any type of approval or notification, application was at the undertakings' discretion.

22. **To allow for a meaningful analysis of the stresses, undertakings had to provide additional information on the impact of LTG and transitional measures.** This information was not part of the day-one reporting, but will be part of the regular annual reporting and was deemed especially relevant for the stress test in order to correctly identify the sectoral vulnerabilities following the prescribed stress test scenarios. Further particular details regarding the treatment of these LTG and transitional measures were described as follows:

i. **The volatility adjustment (VA) and the matching adjustment (MA) were included in line with the general Solvency II rules and were expected to move in line with the prescribed stress scenarios.** As a result, EIOPA provided the recalculated VA figures in scope of the 'double-hit' scenario. For the low-for-long scenario, credit spreads were assumed to be constant after stress implying no change in the volatility and matching adjustment.

ii. **The adjustments derived from the transitional measures both on the risk-free interest rates and on technical provisions had to be calculated in the pre stress scenario and then kept constant in the post stress scenario.** This assumption is in line with the Solvency II standard formula approach to assess the impact of a risk free curve change and is also necessary to assess the full potential impact of a change in the risk free curve in scope of a stress test. However, the stress test template additionally allowed for an optional full recalculation of these transitionals, in order to flag that in a context other than the stress test exercise, the transitional adjustments post stress would likely be recalculated (subject to supervisory approval).

23. **The Solvency II framework was also imposed regarding the assumptions used to derive the liability cash flow projections.** In particular contract boundaries and the valuation to derive the cash flows should follow the corresponding Solvency II best estimate calculation of the technical provisions.

1.3.3. Other methodological aspects

24. Although the set-up of the balance sheet used the Solvency II rules and specifications, the stress test does not aim at computing any eventual loss after the prescribed shocks for regulatory purposes but rather it aims at increasing understanding of what would be the impacts in the balance sheet of insurance companies if certain scenarios would materialise. It is then worth noting for illustrative purposes that **the developed stress methodology was different from the Solvency II SCR standard formula calculations at least in the following ways**:

i. In the stress scenarios whenever they include several factors such as equity, property, spreads, interest rates, those were shocked at the same time and the use of a correlation matrix was not needed.

ii. All assets were revalued after stress. In the scope of the standard formula for example, certain derivatives which do not qualify as a risk mitigation technique according to the Solvency II rules, are not allowed to increase in value following a shock scenario.

iii. Stress test scenario shocks were often defined in different ways compared to the standard formula SCR specifications. For illustrative purposes a non-exhaustive list of differences is provided below:

- Equity shocks were confined to the European markets and defined per country instead of per 'type';
- Property shocks were confined to the European markets and defined on a country level and a differentiation was made for commercial and residential property. Neither of these distinctions is made within the SCR Standard formula calculation.
- Spread shocks were applied to European sovereign bonds. In the scope of the standard formula SCR calculation, sovereign bonds are assumed not to be exposed to spread risk.
- Risk free rates could turn negative following the prescribed stress shocks which is currently prevented in the scope of the standard formula SCR calculations. In the scope of the low yield scenario a 2% ultimate forward rate is used compared to the 4.2% in the baseline.

25. **Lastly, it is important to understand that, apart from the assumptions and requirements explicitly disclosed in the EIOPA stress test specifications, EIOPA set up an official question and answer process in order to provide further guidance to the participating undertakings.** Additionally, EIOPA established a validation process to pursue a consistent interpretation of the instructions when determining the actual impact of the stress scenarios.

2. Baseline situation

2.1. Participation and data

26. **The 2016 insurance stress test included 236 solo companies[9] from 30 countries. The companies selected for participation underwrite long-term business involving investment guarantees and are thus vulnerable to a scenario with an extended period of low interest rates.** Therefore, the sample consists largely of life undertakings, or undertakings performing both life and non-life insurance activities.

27. **In terms of technical provisions, the companies in the sample report 75% of their total technical provisions to be life excluding unit-linked** (Figure 7)**. Less than 2% is non-life business.** There are 5 non-life undertakings included in the stress test sample, which were considered to be relevant by the NCA because of their large technical provisions in life actually stemming from non-life business. As a consequence, these undertakings are potentially sensitive to the two scenarios in the stress test.

Figure 7: TP by line of business

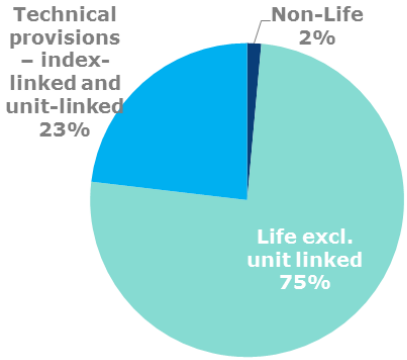


Table 1: Number of participants by type of undertaking

Undertaking pursuing both life and non-life insurance activities	102
Life undertaking	129
Non-Life undertaking	5

2.1.1. Representativeness of the sample

28. **Overall, a market coverage of 77% in terms of the relevant business was achieved, gathering a sample of life and mixed insurers offering any type of interest guaranteed products.** In particular, EIOPA aimed to ensure that the sample of participants included a coverage of a minimum of 75% of the national market share in terms of gross life technical provisions (excluding health, index-linked and unit-linked) by year-end 2015. Table 2 displays the market share per country in terms of life technical provisions excluding unit-linked and health.

[9] See Annex III, list of participants in the 2016 Stress Test

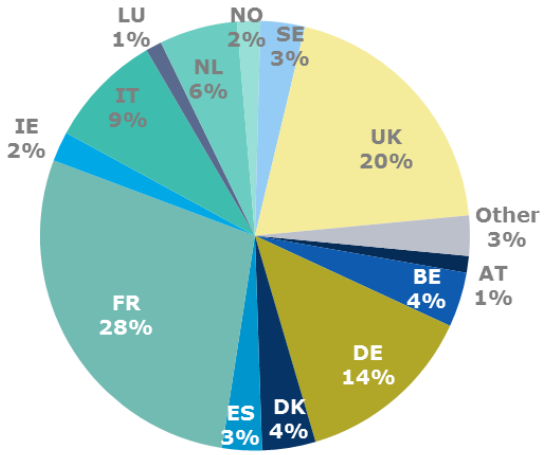
Table 2: Number of companies and market share of the sample

	Number of companies	TP excl. unit-linked and health		
		TP (k Euro)	Market TP reported	Market share
AT	9	46 131 640	58 234 178	79%
BE	9	163 431 710	197 260 621	83%
BG	4	299 436	435 208	69%
CY	5	445 020	524 059	85%
CZ	10	5 561 590	5 640 127	99%
DE	20	659 537 300	880 947 722	75%
DK	12	132 465 416	178 065 921	74%
EE	3	262 192	308 456	85%
ES	17	133 023 623	162 873 933	82%
FI	9	15 768 065	17 690 565	89%
FR	17	1 243 778 432	1 602 737 191	78%
GR	8	4 868 135	5 526 457	88%
HR	6	1 616 431	1 993 804	81%
HU	10	1 843 871	2 102 750	88%
IE	14	31 200 601	41 716 128	75%
IT	16	373 290 648	488 329 336	76%
LI	6	510 061	753 446	68%
LT	3	204 028	207 552	98%
LU	7	29 184 265	43 113 141	68%
LV	1	*	*	80%
MT	2	*	*	93%
NL	6	208 721 262	234 697 357	89%
NO	3	82 733 829	98 184 267	84%
PL	5	5 203 771	6 474 242	80%
PT	5	23 032 032	28 348 823	81%
RO	3	326 188	424 354	77%
SE	5	110 893 794	148 033 339	75%
SI	5	1 670 556	2 011 913	83%
SK	6	1 961 155	2 385 073	82%
UK	10	584 406 929	789 285 610	74%
TOTAL	236	3 864 119 904	5 000 199 592	77%

Note: The 75% market share requirement was based on data available before launch, so the final market share in terms of Solvency II (as given in the table) could be slightly below 75% in some cases. For instance, the market shares for BG based on Solvency I would be 75.7%. The market share calculation for MT is based on Direct Life and Non-Life undertakings only. For SE, the market TP includes also companies not reporting for SII. For IE, the sample includes a range of different business models, including a number of undertakings that do not have exposure to long-term guarantees. Information on technical provisions for LV and MT is not disclosed because the number of participants is less than 3 in these countries.

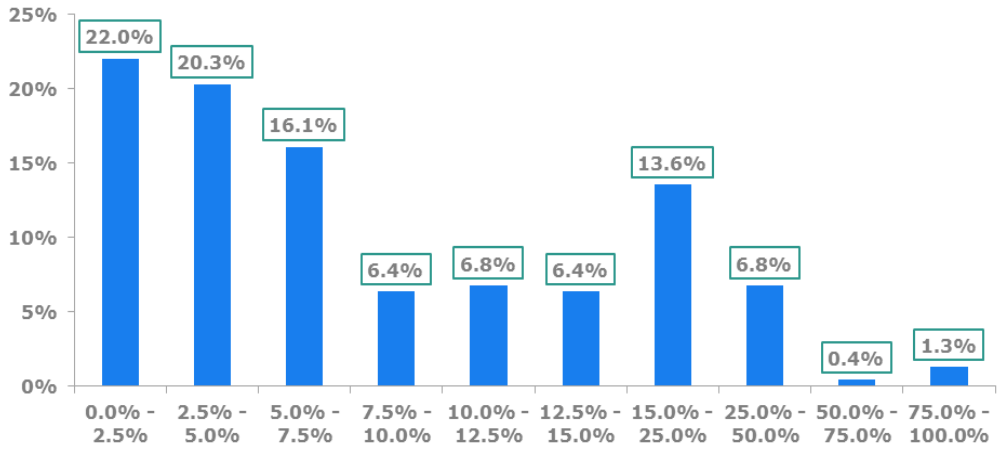
29. **The companies in the sample hold close to EUR 6.3 trillion in total assets, representing almost 60% of the total assets held by EU/EEA insurers. The sample is dominated by four countries (DE, FR, IT, UK) which together represent almost ¾ of total assets (Figure 8).**

Figure 8: Share of total assets in the sample, main countries



30. **EIOPA also wanted to ensure that the selected undertakings were representative for each national market, and the sample should include an adequate number of medium and small sized undertakings.** Figure 9 illustrates the variation in terms of size (measured as market share per country). Almost half of the companies in the sample are relatively small on a national market basis, individually making up less than 5% of their respective markets in terms of life technical provisions (the two bars to the left). At the same time, 20% of the companies have a national market share of more than 15% and can be considered large.

Figure 9: Distribution of individual companies' national market share

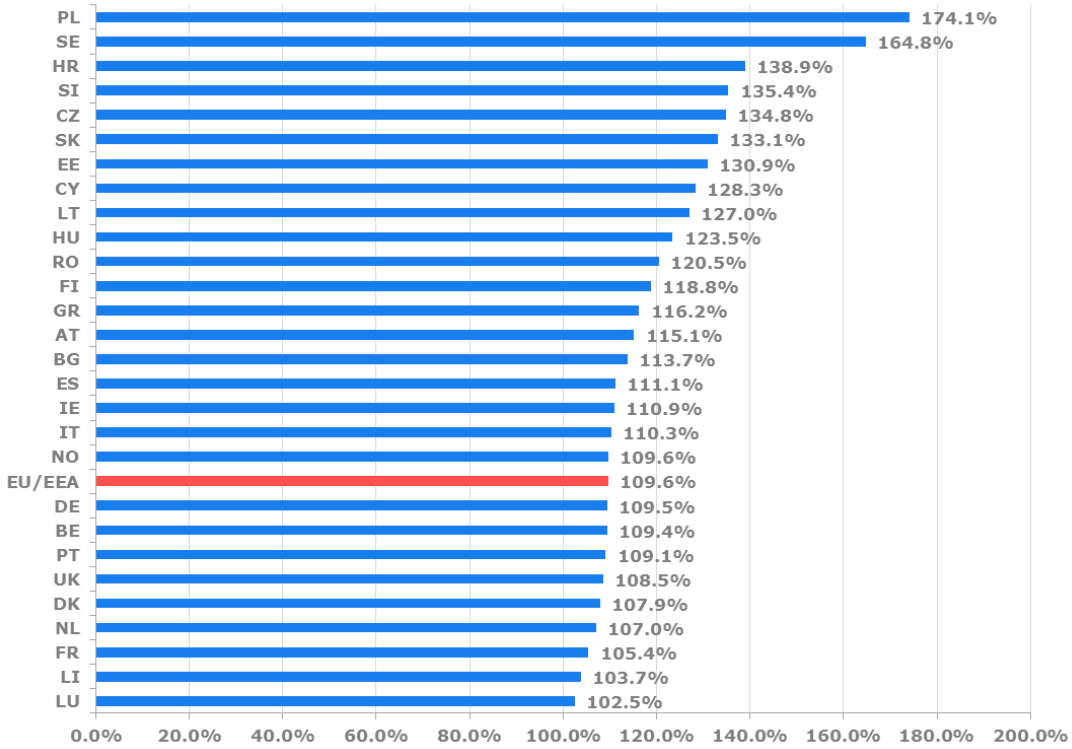


2.2. Portfolio description in the baseline scenario

2.2.1. Total assets and liabilities

31. **At aggregate level, all countries have an excess of assets over liabilities in the baseline.** The (weighted) average share of assets divided by liabilities (assets over liabilities – AoL – ratio) range from 103% in LU to 174% in PL (Figure 10). The EU/EEA average stands at 110%, implying that in principle insurers in Europe hold around 10% more assets than the (net present) value of their liabilities. The AoL ratio should be distinguished from a solvency ratio. First of all, the liabilities value includes subordinated debts that could be eligible as own funds. Second, the AoL ratio does not encompass any risk measure (for instance stemming from guarantees embedded in technical provision), contrary to the SCR.

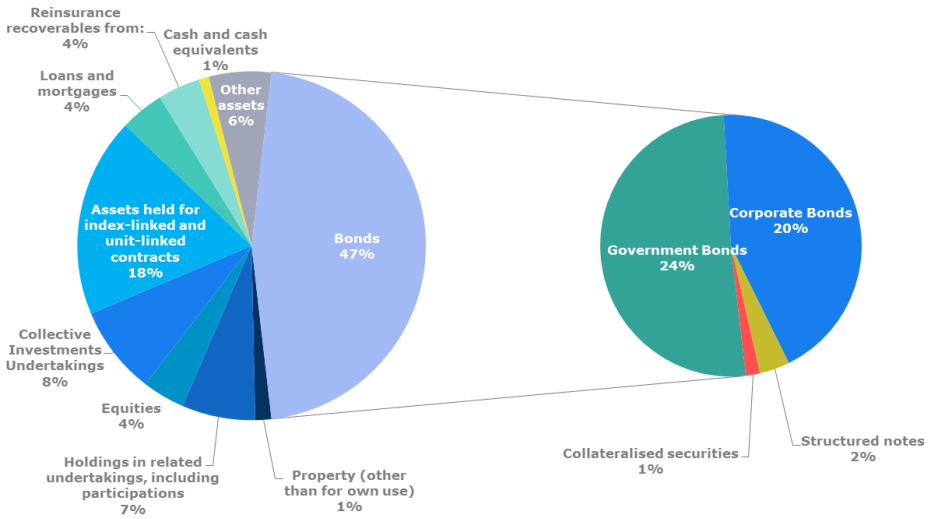
Figure 10: Total assets divided by total liabilities in the baseline situation[10]



2.2.2. Assets profile and type of investments

32. **Bonds account for the biggest share of assets (47%) for the stress test participants.** Figure 11 shows the EU/EEA aggregate asset composition, accounting for 6.3 trillion euro. Of the bond portfolio, about half is government bonds and half is corporate bonds (incl. collateralized assets and structured notes), both being sensitive to interest rate and spread widening stresses tested in this 2016 exercise.

Figure 11: Assets decomposed (total assets sum to 6.3 trillion euros)



33. **Assets held for unit linked business account for 18% of total assets.** No asset composition breakdown is available for these investments, but they are stressed in a similar fashion as other assets in this exercise. However, as they related to unit

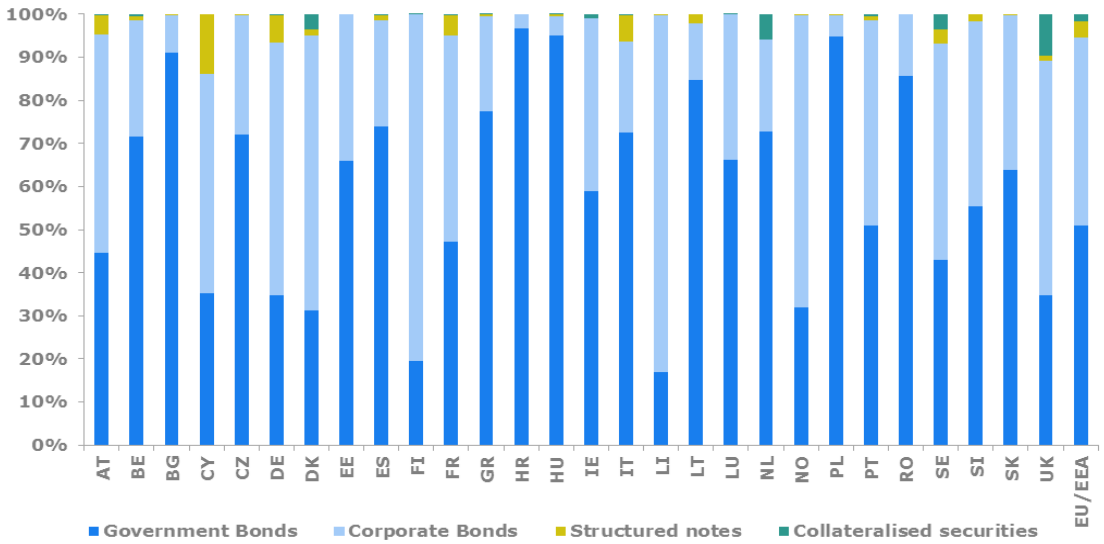
[10] Throughout this report, data for LV and MT are not shown or identified as the number of participants was less than 3 in these two countries. This is done to avoid linking results to individual stress test participants. Data for LV and MT is, however, included in all totals.

linked business where the policy holders bear the risk of price changes, any change in these assets will have an off-setting change in the liabilities of the insurer.

2.2.3. Government bond holdings

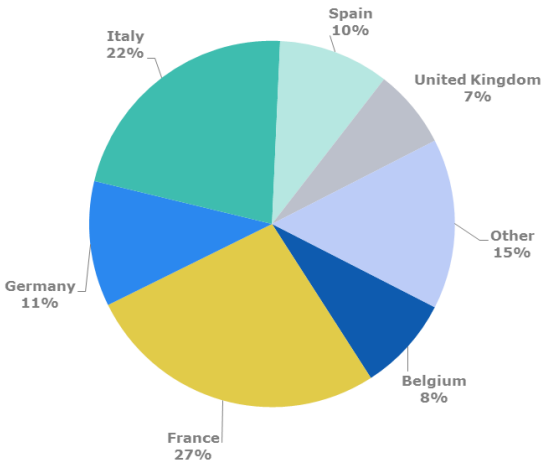
34. **The share of government bond holdings vary by country**, particularly dominating the bond portfolio in BG, HR, HU, and PL where they account for more than 90% of the bond holdings.

Figure 12: Decomposition of bonds by country in %



35. For sovereign bonds, the analysis per country of issuance reveals that **50% of the total exposure excluding unit-linked is concentrated in securities issued by two countries** (i.e. IT and FR) and 85% issued by six countries (i.e. UK, ES, IT, DE, FR, BE) (see Figure 13)[11]. Bonds issued by EEA countries in their own currency account for 90% of the total sovereign bond holdings (with 2% being issued by EEA-countries in another currency and 8% issued by non-EEA countries and supranational institutions).

Figure 13: Decomposition of sovereign bonds by country (% and value), excluding unit-linked



36. **There is a degree of home bias in the sovereign bond holdings of the stress test participants.** Table 3 shows the distribution of these sovereign

[11] The different size of national samples in the stress test should also be taken into account. E.g. FR companies hold 28% of the total assets in the stress test sample (Figure 8).

exposures per country and per country of issuance as a per cent of the total holdings per country. The shaded area shows the holdings of sovereign bonds that are issued by the "home" government as a share of total sovereign exposure per country. For example, insurers in FR, on average, hold around 70% of their sovereign bond portfolio in bonds issued by the French Government.

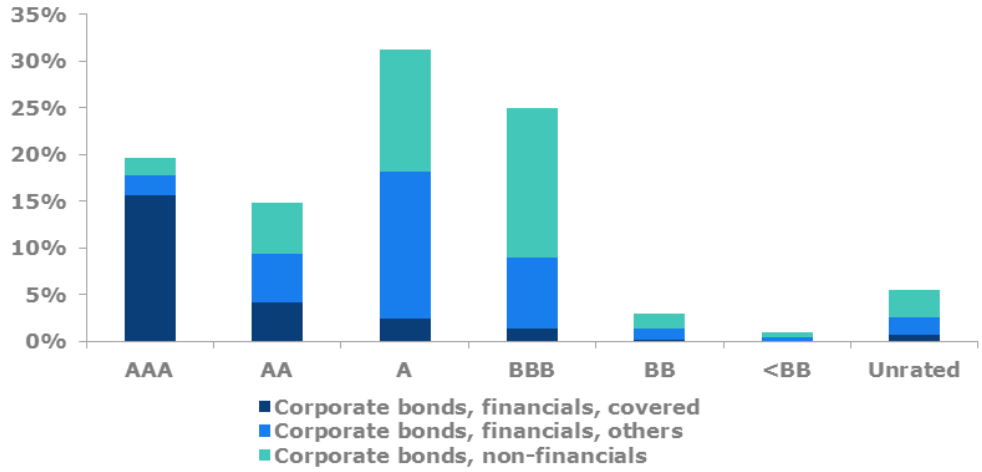
Table 3: Sovereign exposures per country of issuance as a percentage of total sovereign holdings per country[12] for the EEA

	Country of issuance																										
	AT	BE	BG	HR	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LI	LT	LU	NL	NO	PL	PT	RO	SK	SI	ES	SE	UK
AT	32%	8%	0%	0%	0%	0%	0%	0%	3%	14%	10%	0%	0%	4%	4%	0%	1%	4%	5%	0%	1%	0%	0%	7%	2%	3%	0%	0%
BE	4%	65%	0%	0%	0%	0%	0%	0%	0%	12%	4%	0%	0%	1%	5%	0%	0%	0%	1%	0%	0%	0%	0%	1%	0%	3%	0%	0%
BG	4%	1%	45%	0%	0%	0%	0%	0%	0%	3%	11%	0%	0%	2%	16%	0%	2%	0%	1%	0%	0%	0%	0%	0%	5%	12%	0%	0%
HR	1%	1%	0%	69%	0%	0%	0%	0%	0%	1%	10%	0%	0%	2%	3%	0%	1%	0%	0%	0%	0%	0%	0%	4%	2%	4%	0%	0%
CY	4%	5%	1%	0%	46%	1%	0%	0%	0%	10%	6%	0%	3%	0%	10%	0%	0%	0%	1%	0%	1%	0%	1%	0%	9%	1%	0%	2%
CZ	0%	0%	0%	0%	0%	96%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	1%	0%	0%	0%
DK	0%	2%	0%	0%	0%	0%	41%	0%	0%	4%	33%	0%	0%	2%	7%	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%	6%	0%	2%
EE	6%	3%	0%	0%	0%	0%	0%	0%	6%	5%	20%	0%	0%	0%	7%	0%	17%	0%	8%	0%	0%	1%	0%	13%	3%	0%	0%	0%
FI	2%	2%	0%	0%	0%	0%	0%	0%	48%	7%	25%	0%	0%	1%	4%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	4%	0%	0%
FR	4%	6%	0%	0%	0%	0%	0%	0%	0%	71%	2%	0%	0%	1%	9%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	5%	0%	0%
DE	7%	6%	0%	0%	0%	0%	0%	0%	1%	14%	48%	0%	0%	2%	8%	0%	0%	2%	3%	0%	1%	0%	0%	1%	0%	5%	0%	0%
GR	1%	5%	0%	0%	0%	0%	0%	0%	1%	11%	6%	36%	0%	3%	16%	0%	0%	0%	4%	0%	0%	4%	1%	1%	0%	11%	0%	0%
HU	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	99%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
IE	6%	5%	0%	0%	0%	2%	0%	0%	2%	22%	24%	0%	1%	11%	3%	0%	0%	0%	5%	0%	0%	0%	0%	1%	0%	2%	0%	16%
IT	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	94%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%
LI	6%	4%	0%	0%	0%	2%	0%	0%	1%	14%	21%	0%	0%	5%	1%	0%	2%	5%	15%	3%	7%	0%	0%	5%	0%	1%	4%	3%
LT	11%	9%	0%	0%	0%	0%	0%	0%	4%	18%	17%	0%	0%	3%	6%	0%	11%	0%	6%	0%	0%	0%	0%	2%	3%	6%	0%	0%
LU	37%	5%	0%	0%	0%	0%	0%	0%	0%	37%	2%	0%	0%	0%	9%	0%	0%	0%	1%	0%	0%	0%	0%	1%	0%	7%	0%	0%
NL	8%	6%	0%	0%	0%	0%	0%	0%	3%	11%	35%	0%	0%	1%	2%	0%	0%	0%	30%	0%	0%	0%	0%	0%	0%	2%	1%	0%
NO	0%	1%	0%	0%	0%	0%	0%	0%	3%	3%	8%	0%	0%	0%	2%	0%	0%	0%	2%	71%	0%	2%	0%	3%	0%	0%	1%	4%
PL	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	97%	0%	0%	0%	0%	0%	0%	0%
PT	2%	2%	0%	0%	0%	0%	0%	0%	0%	5%	3%	0%	0%	1%	11%	0%	0%	0%	5%	0%	0%	60%	0%	0%	0%	11%	0%	0%
RO	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%
SK	2%	0%	0%	0%	0%	2%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%	85%	1%	0%	0%	0%
SI	3%	3%	0%	0%	0%	0%	0%	0%	3%	3%	12%	0%	0%	3%	6%	0%	1%	0%	5%	0%	0%	2%	0%	3%	47%	8%	0%	0%
ES	0%	1%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	90%	0%	0%
SE	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	2%	0%	0%	5%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	68%	12%
UK	1%	1%	0%	0%	0%	0%	0%	0%	0%	3%	5%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	89%

2.2.4. Corporate bond holdings

37. For corporate bond ratings, **the majority (approximate 60%) of bonds are held in the AAA to A buckets.** But there is a significant concentration in the BBB bucket (approximate 25%) as well.

Figure 14: Corporate bond investment decomposed

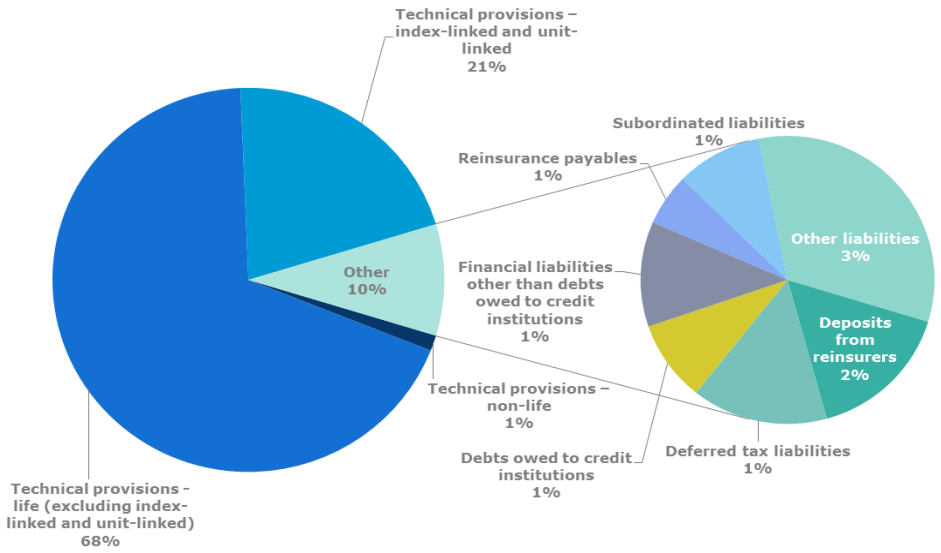


[12] Table covers sovereign exposures from EEA countries issued in their own currency

2.2.5. Liability profile

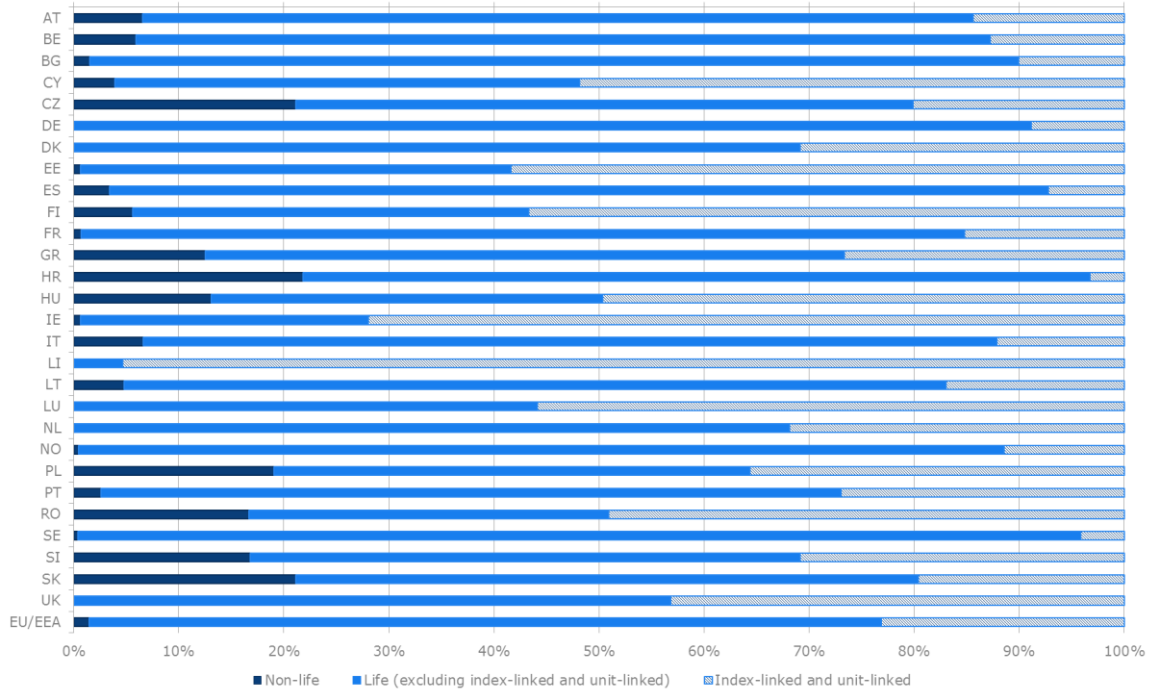
38. **Technical provisions account for more than 90% of the total liabilities** in the sample, with life, excluding unit linked (the main source of interest for this stress test), alone making up 68% of total liabilities. Unit linked-business accounts for 21% of total liabilities. The liability profile shows that in terms of pure financial leverage (i.e. debt to credit institutions and others excl. re-insurance deposits), insurers do not rely extensively on external market financing, and financial leverage is small compared to overall technical provisions.

Figure 15: Breakdown of main liability structure



39. **Overall, of TP related to life excl. unit linked business accounts for 75% of the total TP in the sample.** Figure 16 shows the share of technical provisions (TP) in non-life, life (excl. unit linked) and unit linked business per country. Index linked TP accounts for 23%. In LI, almost all of the business written is unit-linked.

Figure 16: Share of TP in non-life, life (excl. unit linked) and unit linked business per country

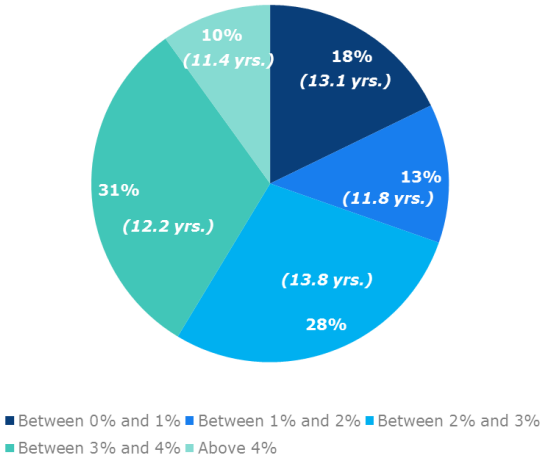


40. **Insurance undertakings with high guaranteed rates are more vulnerable to a low-for-long scenario.** In traditional life business with guarantees (part of the life technical provisions), insurers have offered varying levels of guarantees in the past. While these guarantees are coming down and are often much lower in new contracts, the legacy guarantees still remain part of the life technical provisions. Figure 17 shows the share of contracts per guaranteed rate in percent for those (often legacy) contracts where the guaranteed rate also applies to future premiums. The average year to maturity for these contracts in the stress test sample is given in the brackets.

41. Overall, the **guaranteed rates remain relatively high compared to current interest rate levels**. Close to two thirds of the companies in the sample report that the average guaranteed rates exceeds 3% and one third that the rate exceeds 4%. This interest rate guarantee also applies to future premiums, implying that policyholders will receive the same guarantee also on their savings today as long as they keep to the given contract.

42. These **legacy guarantees are related to contracts with more than 10-15 years before they are expected to mature** on the whole. Moreover, ten percent of the sample reports that contracts with guaranteed rates will take more than 24 years to mature. The average year to maturity for all contracts is above 12 years and contracts with a guarantee above 3% also take more than 12 years to mature on average.

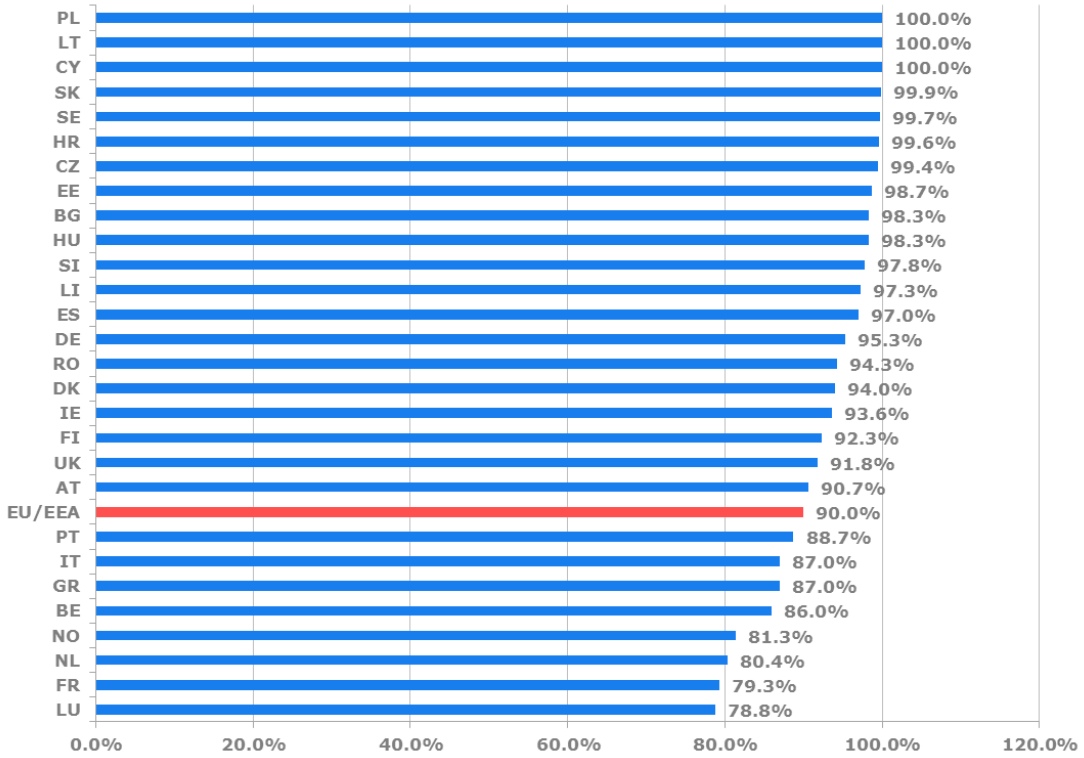
Figure 17: Share of contracts per guaranteed rate in percent and average year to maturity



2.3. Own funds profile and SCR ratios

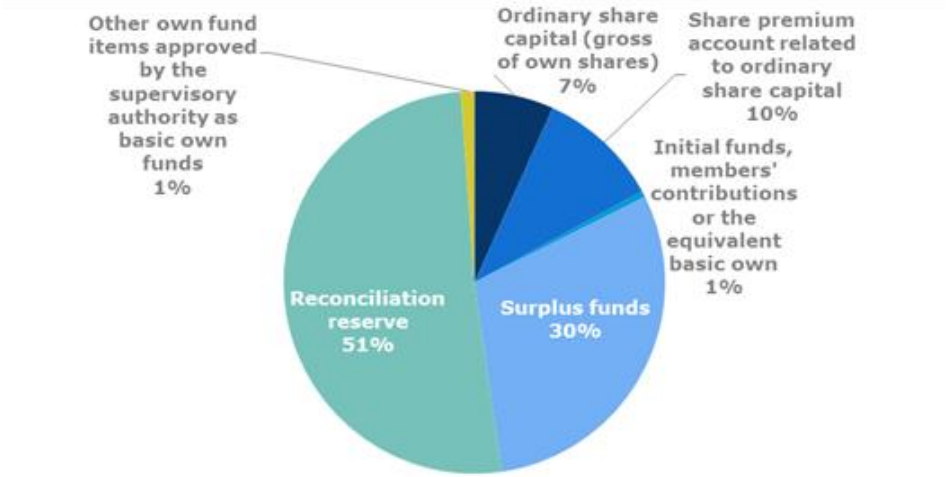
43. **Tier 1 unrestricted eligible own-funds account for 90% of total own-funds** for the sample companies, indicating that the quality of the own-funds is generally high though the composition of eligible own funds varies considerably between companies. Figure 18 shows per country, the weighted average share of Tier 1 unrestricted eligible own-funds to total eligible own funds. The use of transitional and LTG measures increase the reconciliation reserves and therefore also the amount of unrestricted Tier 1 own funds and the percentages as shown in Figure 18.

Figure 18: Unrestricted Tier 1 own funds in percent of total eligible own funds



44. **Tier 1 unrestricted own-funds are mainly made up by the reconciliation reserve[13] and surplus funds**, accounting for more than 80% of total basic own funds before deductions (Figure 19).

Figure 19: Composition of Tier 1 unrestricted in %.



2.3.1. SCR-MCR profile

45. **Overall, on an EU/EEA wide level, the sample undertakings are seen to be adequately capitalized from a regulatory point of view (Table 4).** In aggregate terms, the overall surplus (i.e. eligible own funds minus SCR) for the sample was reported as 280 billion euro, leading to an overall SCR ratio of 196%. This

[13] The reconciliation reserve equals the total excess of assets over liabilities, reduced by the amount of own shares held, foreseeable obligations and further items according to Article 70 of the Solvency II Delegated Regulation. The reconciliation reserve does not need approval by the supervisory authority. It includes items such as retained earnings and also differences between Solvency II valuations and accounting valuations. Approval is necessary for the ancillary own funds according to the Solvency II Delegated Regulation.

means that the sector holds around 280 billion euro more capital than what is required for purely regulatory purposes, which can be seen as coming in addition to the assets held to cover the promises to policyholders (as measured by the size of technical provisions). The MCR ratios are significantly higher than the SCR ratios, both overall (i.e. 533%) as well as in all countries. Undertakings failing to reach an MCR ratio above 100% will be subject to strict supervisory measures and even to lose the business licence.

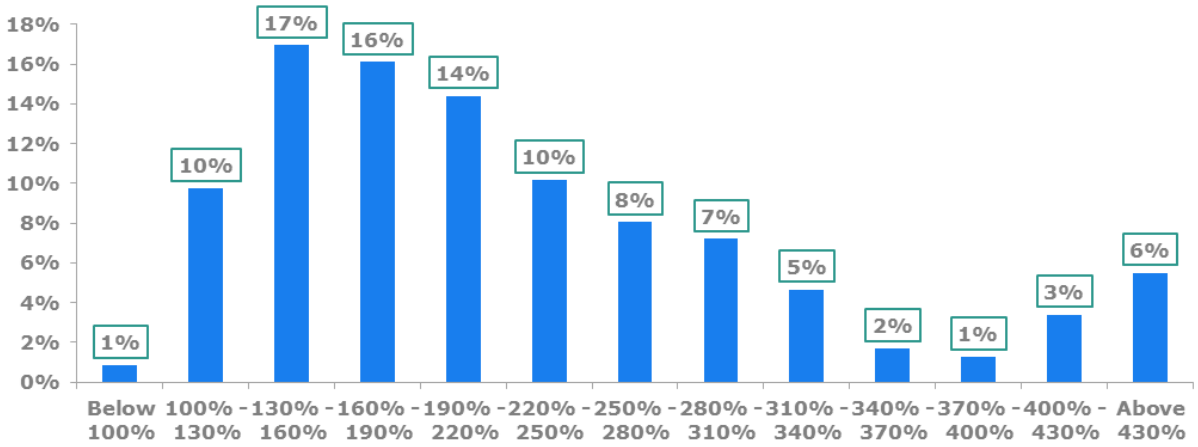
46. **The available own funds are not necessarily considered eligible to cover the MCR or the SCR** due to regulatory limits and eligibility criteria. However, the difference between available and eligible own funds is negligible in most countries (Table 4), at least in the baseline. This finding cannot be extrapolated to the adverse scenarios, since some of the eligibility limits would require a recalculation of the SCR and MCR post stress (which were not requested in this exercise). Eligible own funds post stress are therefore not known. The change in available own funds after the stresses can be approximated by the changes in excess of assets over liabilities as those are not subject to eligibility limits.

Table 4: Own Funds (Available and Eligible) and SCR – MCR ratios

	Available own funds (SCR)	Eligible own funds (SCR)	SCR	SCR Ratio	MCR Ratio
AT	11 139	11 139	6 093	183%	569%
BE	24 486	24 486	11 898	206%	425%
BG	47	47	29	163%	240%
CY	325	325	117	278%	765%
CZ	3 652	3 652	1 543	237%	746%
DE	77 327	77 283	28 362	272%	638%
DK	19 164	19 164	6 734	285%	688%
EE	177	177	113	157%	604%
ES	17 167	17 063	8 889	192%	451%
FI	9 942	9 942	4 994	199%	677%
FR	109 123	109 123	55 786	196%	414%
GR	1 523	1 385	983	141%	396%
HR	961	961	364	264%	868%
HU	1 115	1 115	526	212%	578%
IE	14 505	14 505	9 102	159%	428%
IT	55 331	54 937	22 587	243%	563%
LI	428	428	310	138%	401%
LT	72	72	27	267%	487%
LU	2 322	2 322	1 473	158%	461%
NL	26 122	25 321	15 701	161%	358%
NO	13 016	11 364	5 353	212%	562%
PL	9 406	9 406	2 938	320%	1146%
PT	3 482	3 451	3 095	112%	376%
RO	191	191	91	210%	513%
SE	82 205	82 205	41 231	199%	794%
SI	1 131	1 131	410	275%	742%
SK	1 079	1 079	438	247%	671%
UK	90 310	90 310	63 695	142%	516%
EU/EEA	**576 010**	**572 847**	**292 968**	**196%**	**533%**

47. **Two companies reported a SCR ratio below 100% in the baseline scenario.** This accounts for less than 1% of the stress test sample (Figure 20). These two companies are small, accounting for only 0.02% of the total assets in the sample. Above 70% of the participants in the sample reported a SCR ratio above 160%, indicating that most solo undertakings are reasonably capitalized from a regulatory point of view. These figures compare positively with the baseline situation observed in the 2014 EIOPA stress test which was undertaken ahead of the application of Solvency II.

Figure 20: Distribution of baseline SCR ratios



48. **Market risk accounts for 64% of the net solvency capital requirement before diversification benefits for standard formula users** (Figure 21). Diversification benefits reduced the net basic SCR by 20%. Figure 22 shows that 81% of the companies in the sample were standard formula users. Full internal models were only employed by 6% of the insurers, but accounting for 16% of the sample in terms of total assets.

Figure 21: Net basic SCR breakdown for standard formula users

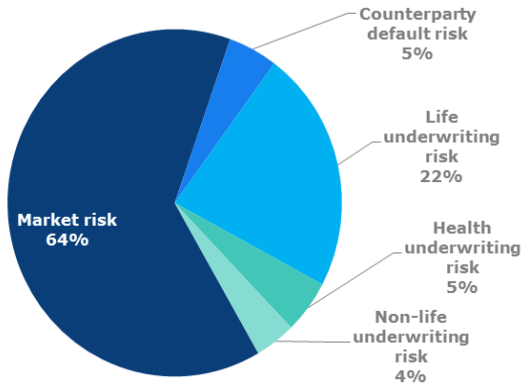
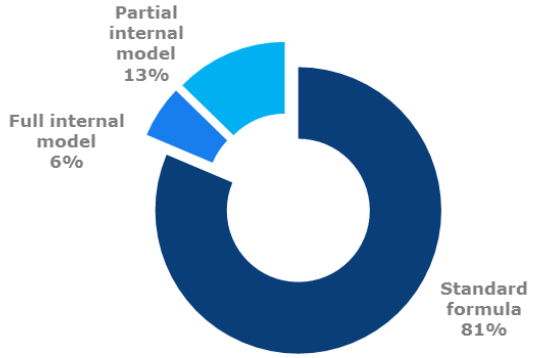
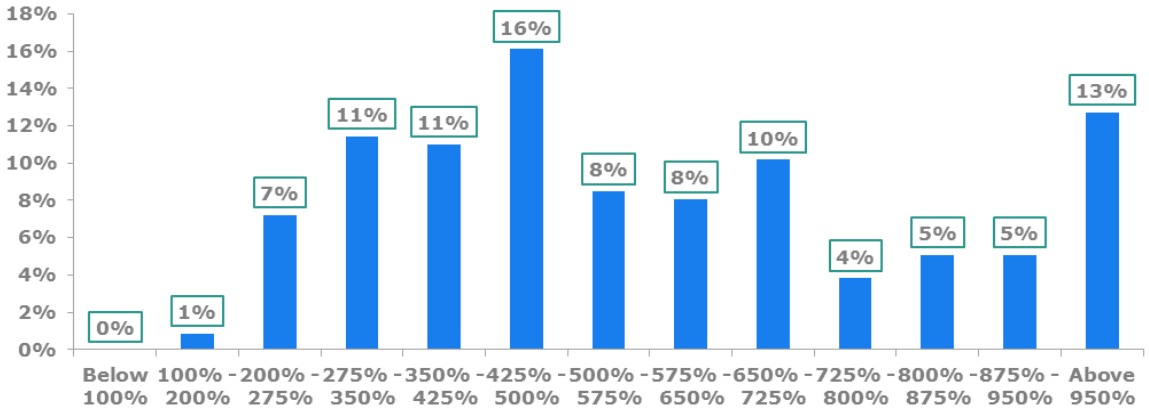


Figure 22: Share of companies by method of SCR calculation



49. **The overall MCR ratio for the sample taken as a whole is 533%.** The surplus of own funds over the MCR was almost 450 billion euro. Figure 23 shows the distribution of MCR ratios across the sample. The MCR ratios are generally high – only 1 per cent of the companies have an MCR ratio below 200% (and no insurer in the sample has an MCR ratio below 100%).

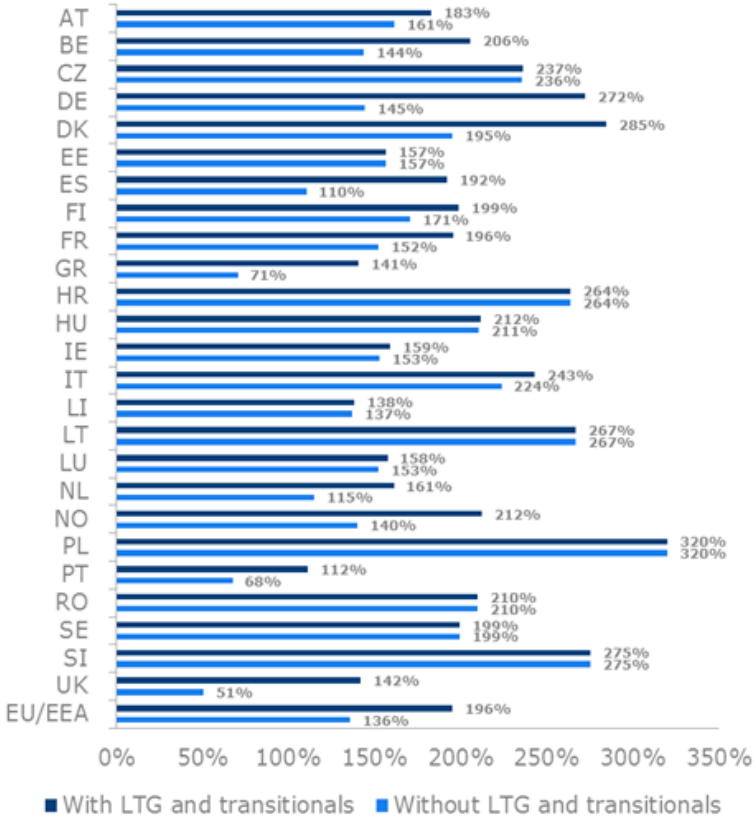
Figure 23: Distribution of baseline MCR ratios



2.4. LTG measures and application[14]

50. The SCR ratios are affected by the **application of the so-called long-term guarantee (LTG) measures and transitional measures (transitionals)**. Figure 24 provides an overview of the SCR with and without the LTG and transitional measures per country. The overall SCR ratio falls from 196% to 136% if all LTG and transitional measures are excluded. Notwithstanding the different nature of these measures (transitionals are by nature temporary), it is important to mention the relative difference of the impact between the two types of measures in different countries (see Figure 26 for the impact on technical provisions).

Figure 24: Baseline SCR ratios with and without LTG and transitional measures[15]

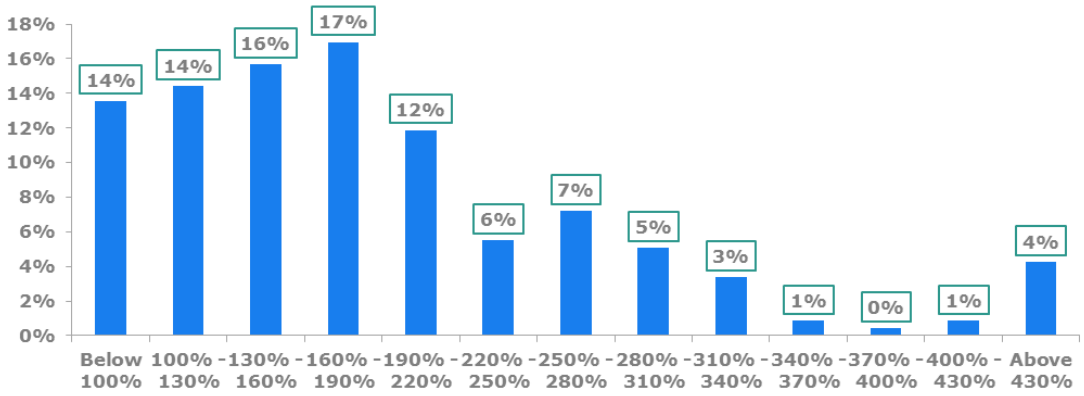


51. Overall, **eligible own funds fall by 19% and the SCR increases by 17% when the LTG and transitional measures are excluded**, shifting the distribution of SCR ratios to the left and would increase the proportion of entities with SCR cover below the 100%-threshold to 14% of the sample (Figure 25).

[14] For the purposes of this report, the LTG and transitional measures refers to the Matching adjustment (MA), the Volatility Adjustment (VA), the transitional on technical provision and the transitional on interest. In contrast with the MA and VA, the transitional measures are of temporary nature. For further details on LTG measures and their application, please refer to the separate *Report on long-term guarantees measures and measures on equity risk 2016* (published on 16 December 2016)

[15] In order to avoid that data is linked to individual companies, the impact of LTG measures are not shown for BG, CY and SK throughout this report (as the number of undertakings using these measures was less than 3).

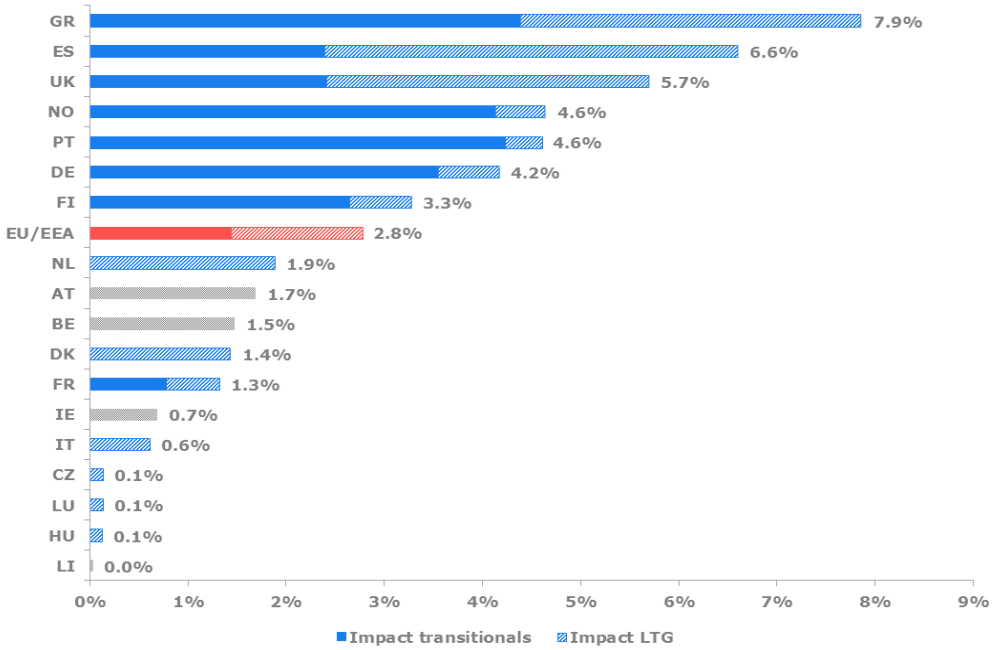
Figure 25: Distribution of baseline SCR ratios excluding all LTG and transitional measures



52. **A majority (64%) of the undertakings in the sample reported using the volatility adjustment**, and this measure was by far the most widely used LTG and transitional measures. The transitional measure on technical provisions was used by 18% of the companies, while only 3 companies used the transitional on interest rate (1%). Matching adjustment was used by 7% of the companies in the sample.

53. **In the EU/EEA, the LTG and transitional measures reduced the overall technical provisions by 3%.** Figure 26 displays the impact of LTG and transitional measures on overall technical provisions broken down by country. In the EU/EEA, half of the impact came from the LTG and half from transitionals. However, in NO, PT, DE and IE, the transitionals play a particularly larger role than on average.

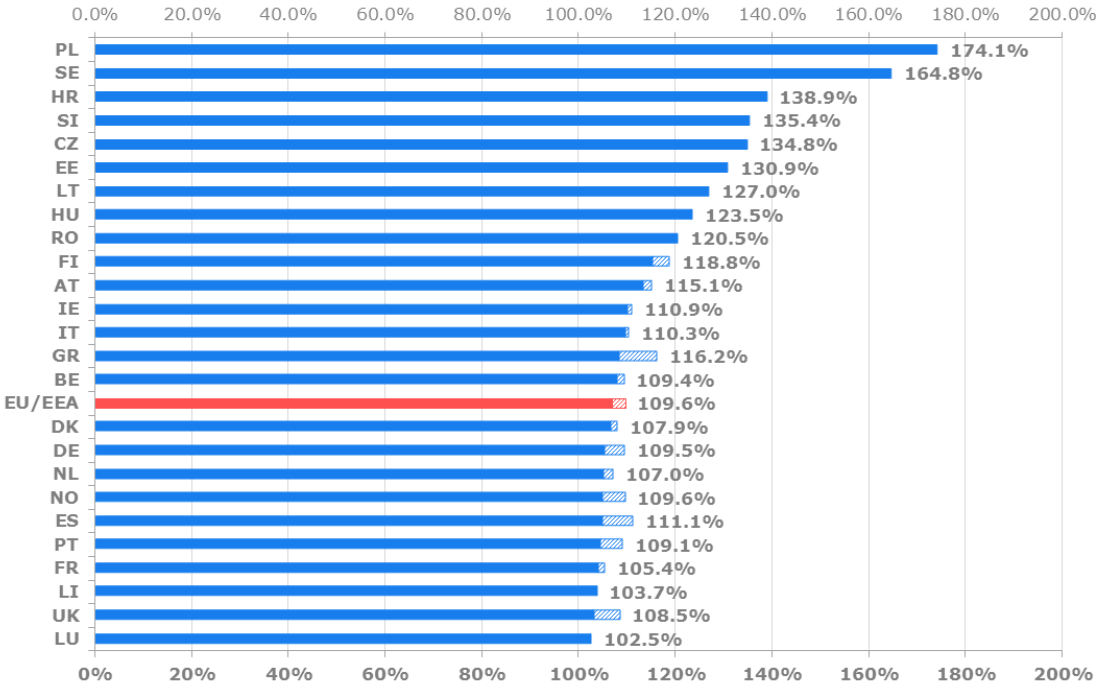
Figure 26: Impact of LTG and transitional measures on overall (market-wide) technical provisions in the baseline. Total impact in %[16]



54. **The 3% reduction in technical provisions for the EU/EEA translates into a 110% ratio of assets over liability compared to 107% without the LTG and transitional measures** overall. Figure 27 shows the overall impact of these measures on the AoL ratios per country.

[16] In order to avoid that data is linked to individual companies, the split between LTG and transitional measures are not shown for AT, BE, LI, and IE to align with the EIOPA's Report on long-term guarantees measures and measures on equity risk 2016. These countries are shown with grey bars.

Figure 27: Baseline assets over liability ratios including the effects of LTG and transitional measures (in lighter shade) sorted by ratio excl. LTG and transitional measures[17]



[17] The impact of LTG measures are not shown for BG, CY and SK. The ratios excluding LTG and transitional measures for these countries are given in Figure 10.

3. Stress test results

3.1. EU-wide results

55. **The aim is to identify undertakings which are more exposed to the specific risks tested in terms of impact and exhibit a weaker resulting financial situation if any of the scenarios materialize**. Conclusions on the vulnerabilities of the participating undertakings therefore need to take into account not only the exposure of the undertakings in terms of the potential impact of the adverse scenarios, but also whether the higher or lower impact is due to the extensive use of the LTG and transitional measures as well as the overall starting position (initial capitalization) to cope with the impact.

56. **The impact of the two scenarios is discussed on different indicators built from reported balance sheet figures**, as well as assets and liability cash flows. To assess the vulnerability of insurance undertakings against the stress scenarios, their financial situation under the baseline was compared with their financial situation after application of the stress scenarios.

57. **The difference between assets and liabilities is used to highlight the impact of the stress scenarios on the balance sheet of the participants.** This measure allows a comparison between the post stress and pre stress situation. This ratio takes into account the market value of the assets and liabilities, but does not reflect the risk of losses stemming from changes in these values. Moreover it does not take into account any other own fund element than the one coming directly from the excess of assets over liabilities. This contrasts with the regulatory capital requirement ratios (SCR and MCR ratios). The SCR and the MCR ratios compare the eligible own funds with the amount of capital which is required from a regulatory point of view to run the business. These ratios take into account all available own funds (to the extent they are eligible), and any risks of deviation in the valuation of assets and liabilities (among others).

58. As the aim of this stress test was to assess vulnerabilities and not compliance with regulatory capital requirements, **the focus of this analysis is on the changes in excess of assets over liabilities instead of in SCR or MCR ratios**.[18] It is important to note that it is not possible to estimate SCR or MCR ratio changes based on changes in assets and liabilities alone.

59. **Overall, the double-hit results in a decline in total assets by almost 610 billion euro** (i.e. 9.7% of the total assets of the sample in the baseline). As liabilities only decline by 450 billion euro, this scenario has a negative impact on the balance sheet of insurers of close to 160 billion euro (the excess of assets over liabilities fall by 28.9%). Similarly, the fall in the excess of assets over liabilities in the low-for-long scenario is about 100 billion euro (18% of the total). This negative impact stems from an increase in liabilities of more than 380 billion euro where the increase in asset values (about 280 billion euro) is not sufficient to cover it.

[18] Participants were therefore not required to recalculate their SCR or MCR post stress.

Table 5: Impact of the scenarios on assets, liabilities and excess of assets over liabilities in billion euros

	Double hit			Low for long		
	Δ Assets	Δ Liabilities	Δ Assets-Liab.	Δ Assets	Δ Liabilities	Δ Assets-Liab.
AT	-6.96 (-8.8%)	-3.63 (-5.3%)	-3.32 (-31.9%)	3.98 (5.0%)	7.85 (11.4%)	-3.87 (-37.1%)
BE	-24.29 (-9.4%)	-15.77 (-6.7%)	-8.52 (-38.4%)	10.83 (4.2%)	14.35 (6.1%)	-3.51 (-15.8%)
BG	-0.03 (-7.1%)	0.00 (-0.3%)	-0.03 (-56.5%)	0.01 (3.0%)	0.02 (5.7%)	-0.01 (-17.2%)
CY	-0.09 (-5.9%)	-0.03 (-2.6%)	-0.06 (-17.8%)	0.01 (0.7%)	0.02 (1.9%)	-0.01 (-3.3%)
CZ	-1.32 (-8.5%)	-0.54 (-4.7%)	-0.78 (-19.5%)	0.47 (3.0%)	0.41 (3.6%)	0.06 (1.4%)
DE	-73.55 (-8.6%)	-46.78 (-6.0%)	-26.76 (-36.3%)	61.65 (7.2%)	89.54 (11.5%)	-27.89 (-37.8%)
DK	-5.94 (-2.4%)	-4.24 (-1.8%)	-1.70 (-9.2%)	16.28 (6.4%)	16.06 (6.9%)	0.22 (1.2%)
EE	-0.06 (-6.9%)	0.00 (-0.5%)	-0.06 (-27.5%)	0.02 (1.8%)	0.05 (8.1%)	-0.04 (-18.9%)
ES	-18.68 (-10.0%)	-12.64 (-7.5%)	-6.04 (-32.2%)	12.24 (6.5%)	11.95 (7.1%)	0.29 (1.6%)
FI	-6.33 (-10.2%)	-4.30 (-8.3%)	-2.03 (-20.8%)	0.54 (0.9%)	2.48 (4.8%)	-1.94 (-19.8%)
FR	-179.72 (-10.1%)	-150.40 (-8.9%)	-29.32 (-32.1%)	42.68 (2.4%)	62.60 (3.7%)	-19.92 (-21.8%)
GR	-0.82 (-7.8%)	-0.31 (-3.4%)	-0.51 (-34.4%)	0.27 (2.5%)	0.54 (5.9%)	-0.27 (-18.2%)
HR	-0.18 (-5.3%)	0.07 (2.7%)	-0.25 (-25.6%)	0.04 (1.3%)	0.09 (3.4%)	-0.04 (-4.2%)
HU	-0.48 (-7.2%)	-0.31 (-5.8%)	-0.17 (-13.2%)	0.06 (0.9%)	0.08 (1.5%)	-0.02 (-1.4%)
IE	-9.57 (-6.8%)	-6.77 (-5.3%)	-2.80 (-20.2%)	5.04 (3.6%)	7.61 (6.0%)	-2.56 (-18.5%)
IT	-57.20 (-10.5%)	-40.07 (-8.1%)	-17.14 (-33.8%)	20.70 (3.8%)	23.30 (4.7%)	-2.60 (-5.1%)
LI	-1.32 (-11.2%)	-1.19 (-10.5%)	-0.13 (-31.8%)	0.24 (2.1%)	0.32 (2.8%)	-0.07 (-17.3%)
LT	-0.02 (-6.1%)	0.01 (4.7%)	-0.03 (-46.1%)	0.01 (3.5%)	0.02 (8.5%)	-0.01 (-14.9%)
LU	-10.52 (-13.9%)	-9.84 (-13.3%)	-0.68 (-36.2%)	1.05 (1.4%)	1.10 (1.5%)	-0.05 (-2.8%)
NL	-15.24 (-4.1%)	-13.36 (-3.9%)	-1.88 (-7.8%)	42.87 (11.6%)	52.09 (15.1%)	-9.22 (-38.2%)
NO	-9.28 (-8.4%)	-5.54 (-5.5%)	-3.74 (-38.8%)	2.37 (2.2%)	4.51 (4.5%)	-2.13 (-22.1%)
PL	-2.94 (-12.1%)	-0.87 (-6.3%)	-2.07 (-20.0%)	0.22 (0.9%)	0.68 (4.9%)	-0.46 (-4.5%)
PT	-1.69 (-4.4%)	0.03 (0.1%)	-1.73 (-53.6%)	0.45 (1.2%)	0.57 (1.6%)	-0.12 (-3.6%)
RO	-0.04 (-4.1%)	0.00 (-0.4%)	-0.04 (-22.4%)	0.01 (0.7%)	0.02 (2.0%)	-0.01 (-5.5%)
SE	-19.96 (-9.5%)	8.32 (6.6%)	-28.29 (-34.4%)	2.40 (1.1%)	20.85 (16.4%)	-18.45 (-22.4%)
SI	-0.41 (-9.0%)	0.00 (-0.1%)	-0.41 (-33.9%)	0.07 (1.6%)	0.20 (5.8%)	-0.12 (-10.2%)
SK	-0.41 (-8.2%)	-0.17 (-4.6%)	-0.24 (-19.1%)	-0.01 (-0.2%)	0.08 (2.0%)	-0.09 (-6.8%)
UK	-160.95 (-13.0%)	-140.72 (-12.3%)	-20.23 (-20.8%)	57.78 (4.7%)	64.01 (5.6%)	-6.23 (-6.4%)
EU/EEA	**-608.47 (-9.7%)**	**-449.49 (-7.8%)**	**-158.99 (-28.9%)**	**282.38 (4.5%)**	**381.47 (6.7%)**	**-99.09 (-18.0%)**

3.1.1. Balance sheet based indicators

60. **The two stress scenarios imply an approximately 2% points reduction of the average assets over liabilities ratio** with slightly higher impact under the low-for-long scenario than under the double-hit (Figure 28 and Figure 29). Even if the stress test sample shows a positive excess of assets over liabilities after the application of the two adverse scenarios it is noteworthy that insurance undertakings lose approximately a quarter of the total excess of assets over liabilities.

61. **The higher impact on the average assets over liabilities ratio in the low-for-long scenario contrasts with the absolute impact** on the excess of assets over liabilities, which is higher in the double-hit scenario (Table 5). This is explained by the, in general, opposite behaviour of the assets and liabilities under both scenarios (see Figure 33 and Figure 34).

Figure 28: AoL impact double-hit

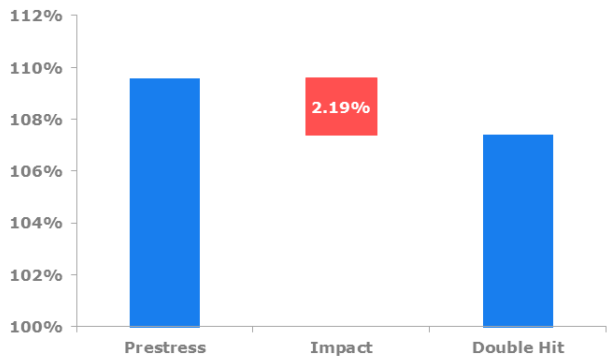
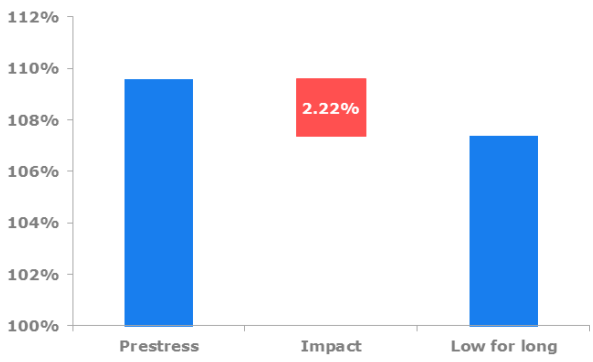


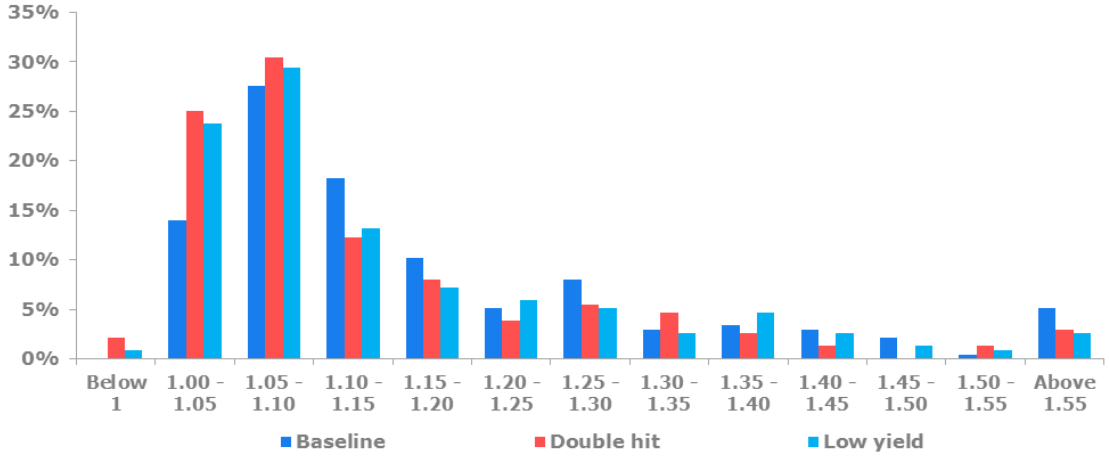
Figure 29: AoL impact low-for-long



62. Considering the number of undertakings, **the majority of the stress test participants are most severely impacted by the double-hit scenario when looking at the change in assets over liabilities ratios.** In the sample, 64% of the

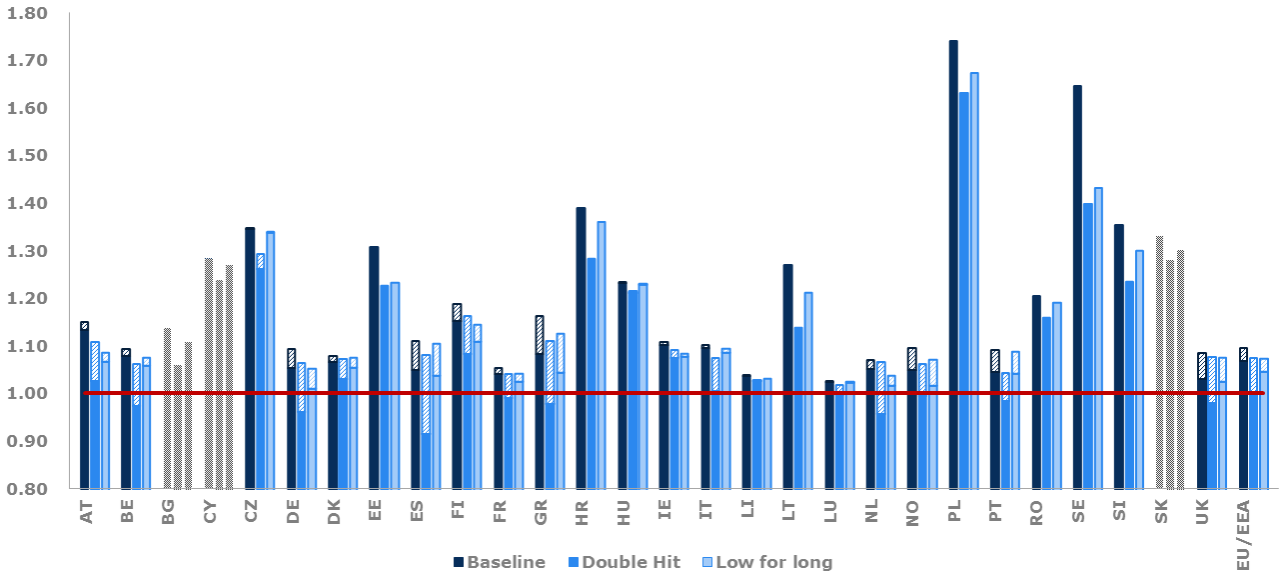
insurance undertakings see their AoL ratios decrease more under the double-hit scenario than in the low-for-long scenario.

Figure 30: Distribution in AoL ratios: pre and post stress



63. **All insurance undertakings showed an AoL ratio above 1 before any stress while after the application of the double-hit and low-for-long scenario respectively 2% and 1% of the undertakings showed an AoL ratio of below 1.** The undertakings with AoL ratio below 1 represent together respectively 1.4% and 0.9% of total assets. The share of undertakings with AoL ratio higher than 1.2 declined from 30% to 22% and 26% in the double-hit and low for long scenarios respectively double-hit (Figure 30).

Figure 31: Country AoL ratio pre and post stress. Shaded area shows the effect of the LTG and transitional measures[19]



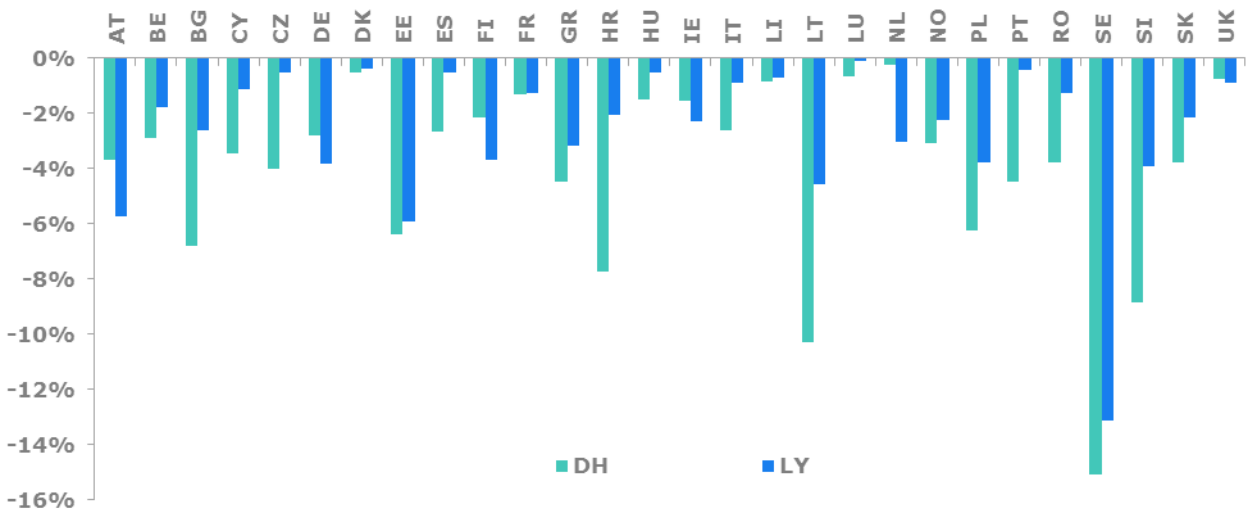
64. **The aggregate AoL ratio is above 100% both at pre stress as well as under the double-hit and low-for-long scenario.** The situation before and after the stresses varies among the different countries and the two stressed scenarios. Taking for example an impact of 5% of the AoL for illustrative purposes only, the following countries had a higher impact under the double-hit scenario: BG, EE, HR, LT, PL, SE and SI. All these countries, except BG, did not use any of the LTG measures (or transitionals) and this partly explains the relative large impact of the scenario on these countries. Regarding the low-for-long scenario, only 4 countries (AT, EE, LT and

[19] The impact of LTG measures are not shown for BG, CY and SK.

SE) show a decrease of more than 5% in AoL (Figure 31). Given that the UFR was used for discounting the liabilities under the low-for-long scenario, the point in time in which extrapolation starts playing also a role in the impact of this scenario. For SE, the relatively large impact of the low-for-long scenario can also be explained by the use of a last liquid point of 10 years instead of the most common of 20 years. In contrast, insurance companies in the UK deal with a last liquid point of 50 years, making them less affected by the reduction of the UFR in the low-for-long scenario.

65. Figure 31 also shows that the **impact of the LTG and transitional measures is the key in several countries to keep the AoL ratios above 100%** in the double-hit scenario. In the low-for-long scenario, on the other hand, the importance of the LTG and transitional measures post stress is much less pronounced than in the double-hit, and the weighted average AoL does not depend on these measures to stay above 100% in any of the countries. At undertaking level, 10% of the participating undertakings need the LTG and transitional measures to stay above 100% in the low-for-long scenario. This finding indicates that the LTG and transitional[20] measures seem to have a cushioning effect on the balance sheet of insurers in case of abrupt changes in market conditions. On the other hand, the impact of longer-term concerns, such as low interest rates, is to a much smaller degree affected by these measures.

Figure 32: Impact in AoL (% change)



66. Figure 32 shows that the overall **percentage change in AoL ratios is higher in the double-hit scenario than in the low-for-long scenario for most of the countries.**

[20] The rationale behind the application of the LTG and transitional measures is different despite both type of measures act to dampen crisis effects. Unlike the LTG measures, transitional measures are intended to be applied and progressively fade out within a given period of time regardless of adverse situations.

Figure 33: Impact (%) on assets and liabilities under double-hit

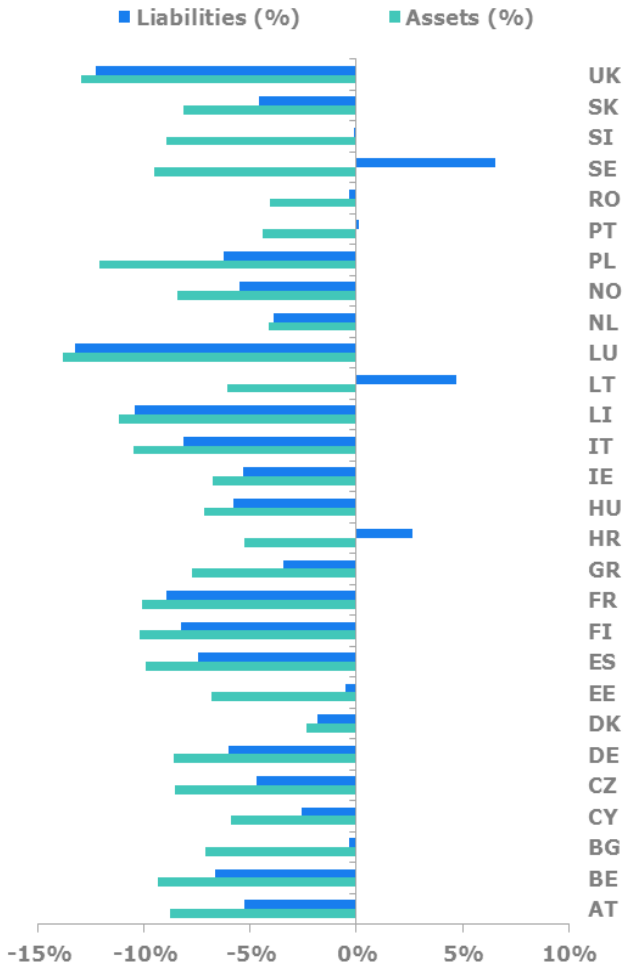
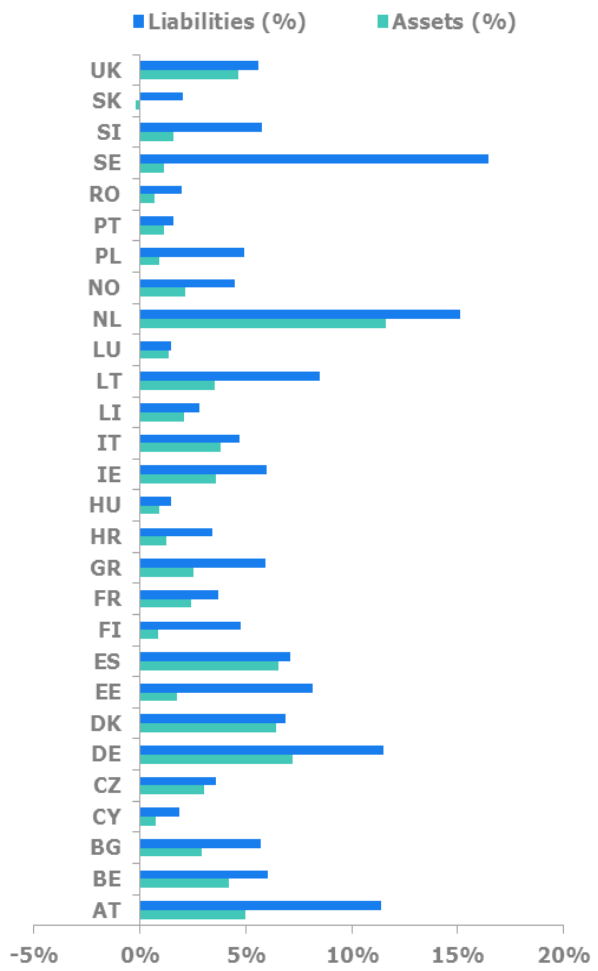


Figure 34: Impact (%) on assets and liabilities under low-for-long



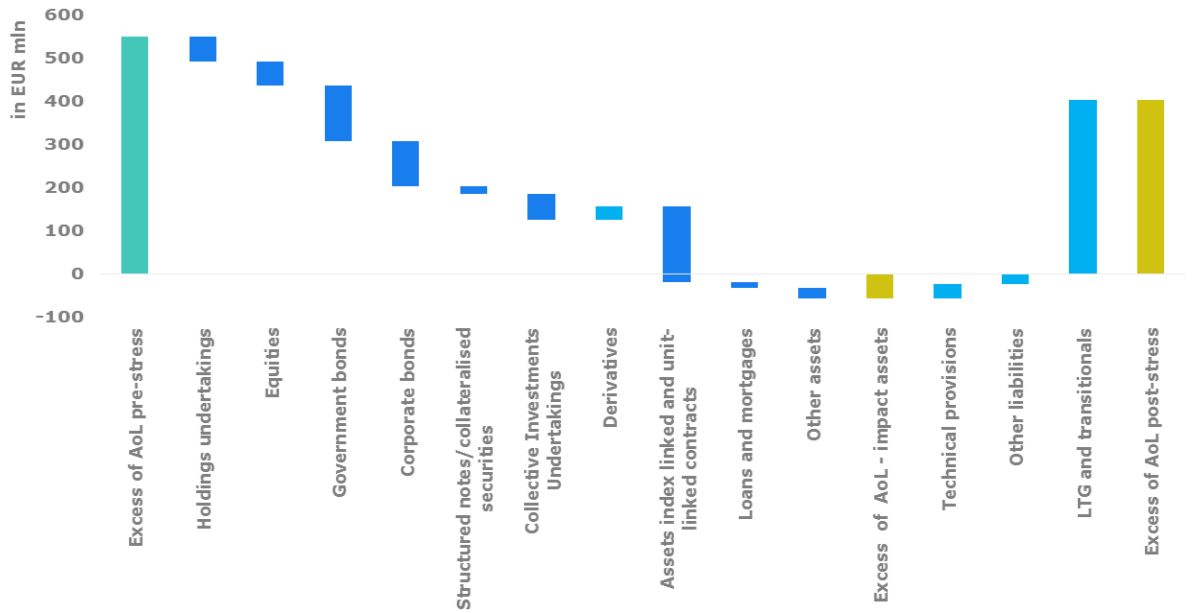
67. **In general the opposite impact can be observed in terms of changes in values of assets and liabilities after the double-hit and the low-for-long scenarios at country level.** Under the double-hit scenario, the value of assets decreases at country level, while – at least for the majority of them - also the value of their liabilities decreases to a lesser extent. The reduction of the liabilities under the double-hit scenario is in part explained by the fact that shocking the assets values down implies a reduction of the future benefit payments which are dependent on the performance of those assets, such as with profit participation and unit linked business. Liabilities are also reduced in this scenario when the reduction of the swap rates prescribed in it (and consequently the reduction of the basic risk free rate) is more than offset by the recalculated volatility adjustment (which increases under the double-hit scenario due to the enlarged spreads). This overcompensation leads to increased discount rates in the double-hit when the volatility adjustment is applied compared to the baseline, and so the actual value of the liabilities is lower. SE, LT, and HR show however an increase in the value of their liabilities due to the fact that these countries are not volatility adjustment users (Figure 33). Under the low-for-long scenario insurance undertakings experience an increase in their liabilities as well as in their assets (Figure 34). However, as the duration of the liabilities is generally longer than that of the assets, the increase in liabilities is larger than the increase in assets, thereby negatively impacting the AoL. AT, DE, NL and SE experience the largest increase in their liabilities (all more than 10%). The duration of the liabilities of the insurers in these countries are relatively high, thereby explaining the vulnerability of these countries to a low-for-long scenario.

3.1.1.1 Change in assets and liabilities

68. **Under the double-hit scenario the decrease in assets values is directly derived from the intensity of the diverse shocks prescribed** for the different assets held by undertakings and the overall exposure to those assets. The major decreases are then observed on the Government bonds, followed by the corporate bonds. The changes decomposed can be seen in Figure 35. Holdings in related undertakings, equity and collective investment undertakings also account for a sizeable share of the changes. The overall asset side is also substantially reduced by the reduction in the value of the assets held for unit linked business. The changes on the asset side, seen in isolation are therefore enough to move an excess of assets over liabilities into negative territory.

69. On the liability side, **the changes in technical provisions and other liabilities alone are not enough to offset the changes in the asset value**. However, as insurers are long-term investors, and the stresses tested in this scenario accounted for large changes in asset values, the LTG (combined with transitional measures in Figure 35 as the split is not available post stress) allow a relief on the liability side. This illustrates the intention behind the LTG measures in particular, allowing insurance companies to continue to operate under the assumption that the large asset impact would be of a somewhat temporary nature. From a financial stability point of view, a key finding would be that in this scenario, the LTG measures seem to work in the sense that they may avoid fire sales of assets in the insurance sector. Without the existence of the LTG measures, insurers would have experienced deterioration in their financial position, forcing them to de-risk through liquidating assets (which could occur if the liabilities were not adjusted to take account of the long-term nature of the life insurance business. However, in the case that these changes of asset values would prove to be sustained, the impact of the LTG measures would fade out.

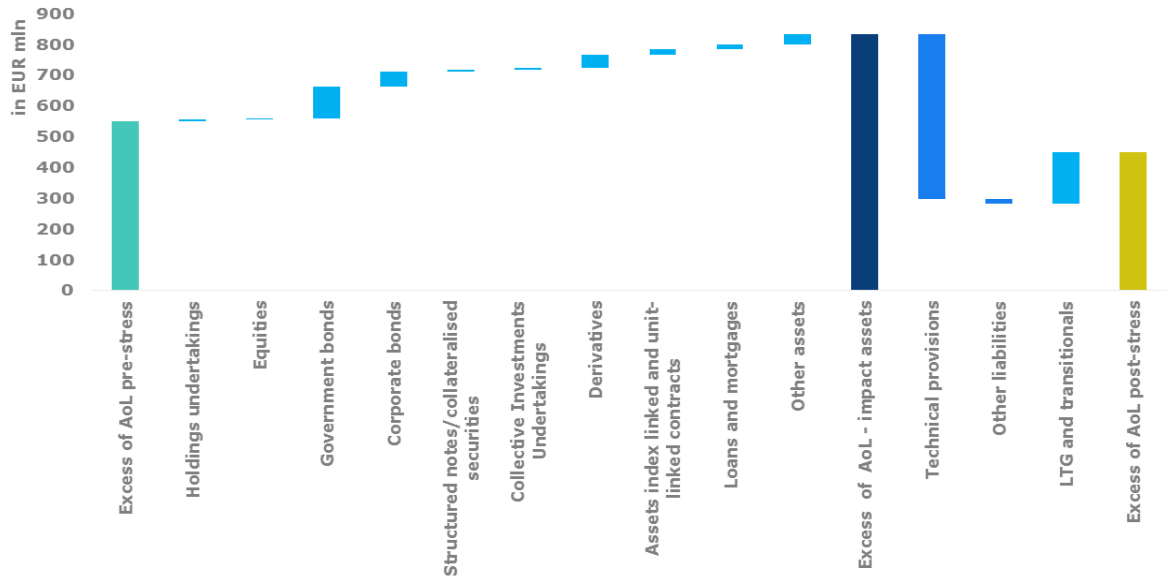
Figure 35: Changes decomposed – double-hit



70. In the low-for-long scenario **both the asset and the liabilities values increase with the lower interest rates** (Figure 36). However, the increase in liabilities outweighs the increase in asset values, and the result is a reduction in assets over liabilities. While some cushion is offered by the LTG and transitionals also in this scenario, the effect is much smaller than in the double-hit. It should be noted that even if neither the amount of the volatility adjustment nor the necessary technical information to compute the matching adjustment under the low-for-long scenario

were changed compared to the baseline situation, this does not imply that the impact of those measures on the technical provisions is nil or the same as in the baseline. This is in line with the intention of the volatility adjustment measure in particular - which was constructed to have an impact in a scenario with rapid and unexpected changes in market asset values, and not to support the insurance sector in a scenario with long-term challenges such as low interest rates.

Figure 36: Changes decomposed – low-for-long

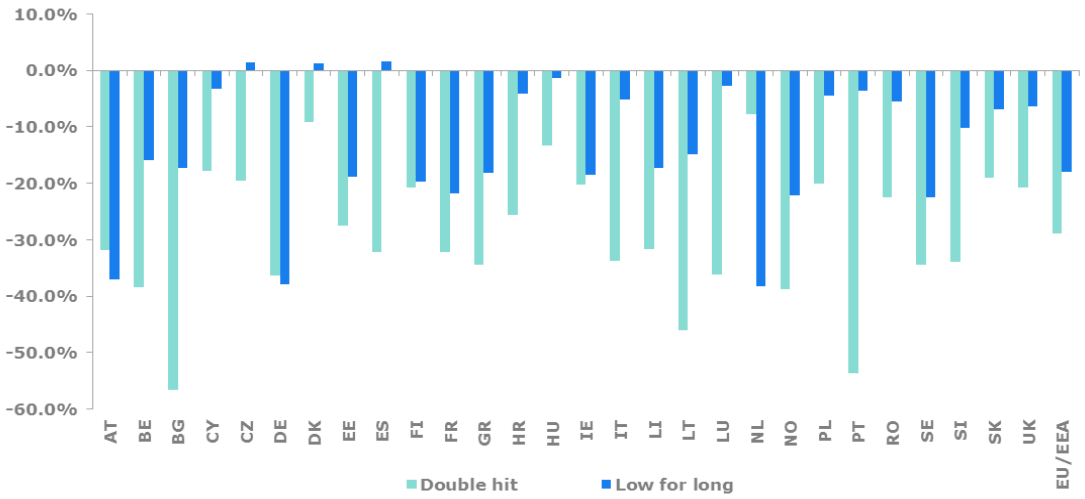


3.1.2. Impact on the excess of assets over liabilities

71. In the previous sections, the **impact of the scenarios has been considered in terms of the changes to assets divided by liabilities**, i.e. the AoL ratio.

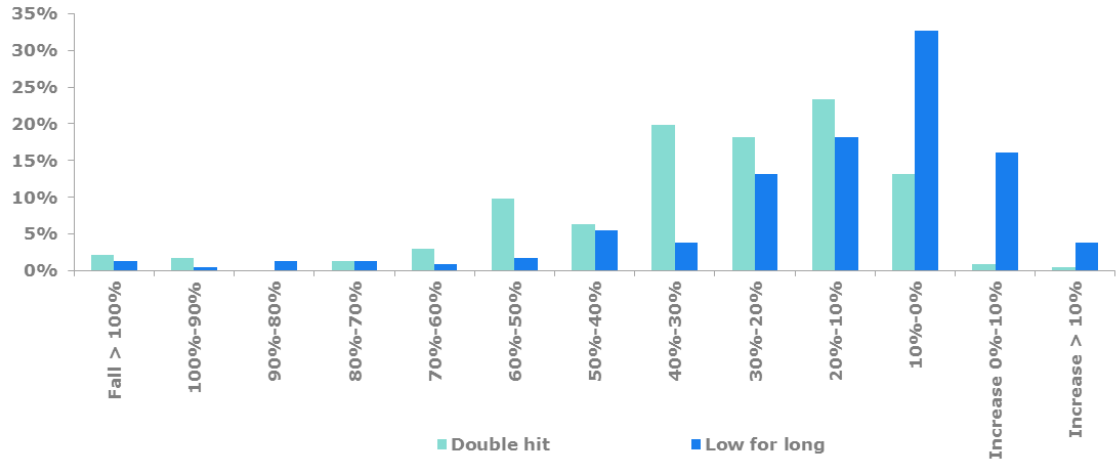
72. **A complementary view would be given by looking at the absolute and relative changes in the excess of assets over liabilities**. Looking at those changes, Figure 37 shows the aggregate changes in per cent per country. On an EU/EEA average, the fall in excess of assets over liabilities is 28.9% in the double-hit and 18% in the low-for-long scenario. The larger fall in the excess of assets over liabilities under the former compared than the latter scenario is generally the case across countries, but with a few notable exceptions. In NL, AT and DE, the low-for-long scenario had a larger impact than the double-hit scenario.

Figure 37: Changes in excess of assets over liabilities, in percent.



73. **In the double-hit, 104 companies, constituting more than 40% of the sample, lose more than 1/3 of their excess of assets over liabilities.** Figure 38 shows the distribution in the change in the excess of assets over liabilities among the participating undertakings. The figure shows that 42 companies would see more than half of their excess of assets over liabilities lost in this scenario, and 5 companies would lose all excess of assets over liabilities. In the low-for-long, the impact is somewhat milder, with 38 (16% of the sample) companies losing more than 1/3 of their excess of assets over liabilities. Sixteen companies would lose more than half and 3 companies would lose all their excess of assets over liabilities if this scenario were to materialize.

Figure 38: Distribution of changes in excess of assets over liabilities, in percent



74. **If LTG and transitional measures are not included, 72 companies would lose all or more of their positive excess of assets over liabilities in the double-hit scenario and 14 in the low-for-long scenario.** Moreover, 162 companies (69% of the sample) would lose more than 1/3 of their excess of assets over liabilities in the double-hit scenario, and more than half of the sample would lose more than half of their excess of assets over liabilities in this situation[21]. The corresponding figures for the low-for-long scenario would be 59 companies (a quarter of the sample) losing more than 1/3 of their excess of assets over liabilities and 35 companies losing more than half if LTG and transitional measures were excluded.

75. **The results presented here relate to the value of assets compared to the value of liabilities.** The interpretation of the AoL measure, for instance, can be seen as the answer to the question: are there enough assets overall to cover the promises made to policyholders. An AoL ratio above one (or positive excess of assets over liabilities) only gives an indication that, according to the underlying models, the liabilities are covered by assets. However, this is not a sufficient condition for an insurer to operate in the market because an undertaking also needs to cover regulatory capital requirements in order to take into consideration any future risks materialising or any deviation from modelled or assumed outcomes.

3.1.3. Duration and cash flow patterns analysis

3.1.3.1. Duration analysis

76. **The risk assessment of assets and liabilities can be done by means of duration estimation.** Macaulay duration was used in 2014 to assess the matching in terms of maturity between assets and liabilities, also under the low-for-long scenario

[21] Granted that all the loss of excess would be transferred to the own fund.

to assess how such matching evolved in new economic circumstances. This concept was not intended to assess the sensitivity of the best estimate liabilities to interest rates changes as it assumes fixed and positive cash flows (not depending on changes of the economic environment, e.g. interest rate movements). The results of the EIOPA stress test 2014 indicated a correlation between the mismatch of Macaulay duration of assets and liabilities and the vulnerability to a scenario which merely implied a shift downwards in the interest rate. For this edition EIOPA collected only liability cash flows and computed Macaulay durations with consistent results at country level as in 2014. Modified duration figures for fixed income assets are reported directly by the stress test participants (Table 6), but not compared with durations of liabilities, so no mismatches are computed by EIOPA, given the different data source and methodological approach taken to derive the duration.

77. **The different duration concepts have limitations and cannot be used indistinctly for every purpose.** The Macaulay estimator is designed for fixed-income assets and assumes fixed cash-flows are computed appropriately and can be interpreted as the average time of maturity of the underlying asset or liability cash flows. However, if the purpose is to assess the sensitivity of the best estimate to changes in the interest rates, assuming fixed cash flows for all liabilities is not always possible as some cash-flows actually do move when rates change, due to the existence of optionalities in the insurance contracts. For example, it is realistic to assume that policyholders' behaviour with respect to those optionalities changes if the circumstances which affect such behaviour change: some policyholder might for example lapse more or less as a reaction to a different scenario of interest rates. Another example of such optionality is the profit sharing strategy implemented by insurance companies: when interest rates change this strategy might be adapted leading to different cash flows relating to this profit sharing part depending on the interest rate environment projected.

78. When the sensitivity to changes in interest rates is at stake, then **the optionalities and the contingent nature of the liabilities are better kept with an effective duration estimator**. By its nature the effective duration is not necessarily valid in the case of larger yield movements, as it requires the calculation of the first order derivative of the present value of the liabilities. Unfortunately with the data at hand during the EU wide stress test, this could hardly be done with great precision. This exercise attempts to roughly approximate this metric, since the stressed interest rate in the low-for-long scenario is not a small shift up or down of the interest rate in the baseline - indeed it is a significant and non-parallel shift down. Actually a sensitivity analysis rather than a stress test, would allow better estimations of the effective duration.

79. Notwithstanding the limitations mentioned above, the current exercise made a first **attempt to take into account the optionalities embedded** in the insurance products in order to assess the interest rate sensitivity of the liabilities. Therefore, the concept of effective duration employing sequences of cash flows (under the baseline and low-for-long scenarios) was applied. The analysis of the cash flows projected under the baseline and under the low-for-long scenario, showed the lack of consistency in the key assumptions applied by the different participating insurance companies when moving from one scenario to the other. The lack of consistency is clear not only between different companies operating in the same market, but also even to a greater extent between companies operating in different countries. The aforementioned assumptions on aspects such as dynamic lapses' behaviours or management actions are the key in the best estimate calculation and hence in the solvency position of the stress test participants as their balance sheets are liability driven. Assuming that interest rate decrease will reduce significantly the undiscounted future cash flows representing the obligations towards policyholders, will indeed show a lower impact of

the low-for-long scenario and should consistently provide a better solvency picture. In contrast to the positive effect of this type of assumptions in terms of solvency and financial stability, these assumptions often imply reductions of the cash flows representing the obligations towards the policyholders. Thus supervisors take this topic into particular consideration especially from a consumer protection perspective.

80. **The main merit of this duration analysis is in illustrating how significantly the liabilities could vary under different scenarios and assumptions.** Further methodological aspects and the results of Macaulay duration and approximated effective duration of the liabilities are shown in Annex II of this report at country level. Given the wide variety of results and underlying situations when comparing both calculations, EIOPA decided to keep these results out of the main body of the report in the first year of implementation of the approximated effective duration.

Table 6: Duration of fixed income assets reported by stress test participants

	Modified duration	Share of bonds as % of investments
AT	6.61	70%
BE	7.61	84%
BG	7.50	74%
CY	2.73	64%
CZ	6.55	80%
DE	9.61	56%
DK	5.35	40%
EE	8.21	77%
ES	8.54	87%
FI	3.60	56%
FR	6.59	74%
GR	6.04	80%
HR	4.22	75%
HU	3.83	82%
IE	7.13	85%
IT	6.94	83%
LI	3.91	76%
LT	6.95	88%
LU	6.18	90%
NL	11.52	72%
NO	4.75	52%
PL	5.95	46%
PT	4.11	77%
RO	5.07	91%
SE	4.55	48%
SI	5.34	82%
SK	6.79	87%
UK	12.45	52%
EU/EEA	7.85	67%

81. Table 6 gives an **overview of the duration of bond positions** reported by the participants. Therefore, certain other fixed income asset positions like loans, mortgages and interest rate derivatives are not included in this table. The different data sources and the different methodologies applied to estimate the assets and liabilities durations makes it difficult to compare the asset durations as shown in Table 6 with the liability durations shown in Annex II. At the country level, the duration was computed as weighted average.

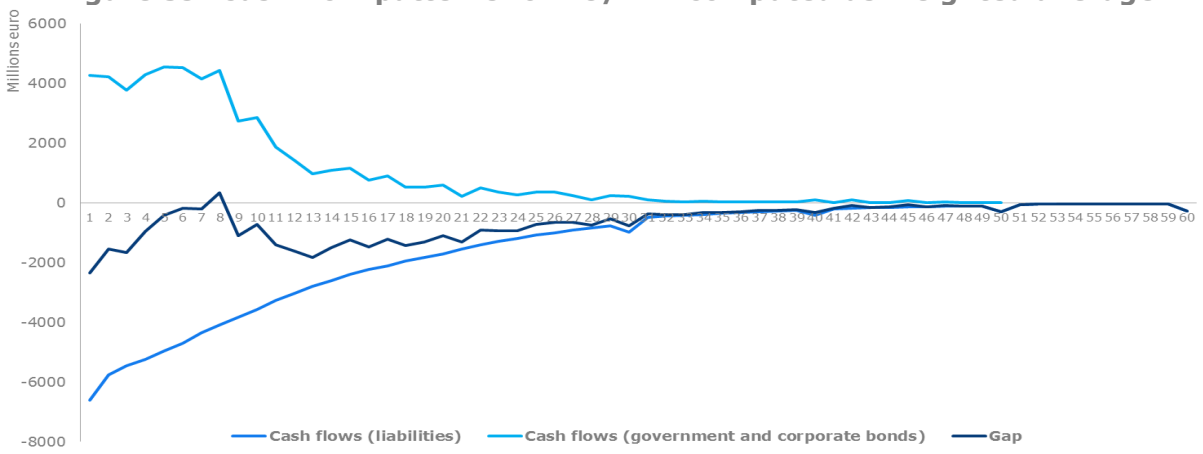
3.1.3.2. Analysis of cash flow patterns

82. **Cash flow patterns for the EU/EEA are approximated** by taking the weighted average from the reported liability cash flows and the estimated fixed-income asset cash flows as explained the paragraph below.

83. **Reporting the asset cash flows projection was not directly requested** from the undertakings participating in the 2016 exercise in order to avoid any misconception on the different roll-over methodologies that the companies could introduce in their projections. Instead, the cash flows were approximated centrally based on the reported market value of the assets breakdown by coupon buckets. For all the participating companies, each bucket was assimilated to a simple equivalent bond paying an annually fixed coupon. The face value of this equivalent bond was then approximated with a fixed spread (i.e. 50bps for government bonds and 100bps for corporate bonds) since the real spreads were not requested alongside this exercise. For each corresponding bucket, the estimated face value was projected, without any reinvestment, paying annually a coupon and the nominal value at the end. This methodology prioritises cross-company consistency over accuracy and provides an approximation of the run-off undiscounted cash flow starting with the fixed income portfolio as reported in the exercise.

84. **The comparison of asset and liability cash flow patterns is only used to derive a broad indication** of when the life insurance companies in Europe will, on average, need to make reinvestment decisions on the fixed income type of assets. Generally, it could be expected that most ALM strategies from insurers tend to keep a constant portion of liability cash flows matched with cash flows from fixed income assets. With that assumption in mind and considering that the asset cash flows in our analysis do not consider the roll-over of the assets held by the undertakings it can be inferred that the major decisions on how to reinvest the fixed-income portfolios could occur in year 4-8. This indication should be interpreted with care due to the averaging and rough approximations used at sectorial level. Therefore it is worth noting that conclusions at individual or national level cannot be extracted directly as the situation varies across companies and countries depending on the specific cash flow pattern of the assets and the liabilities effectively held. The results of the investigation into the overall evolution of the cash flow gaps over time are provided in Annex II. In any case a more granular analysis is required to conclude on the appropriateness of the individual ALM strategies.

Figure 39: Cash flow patterns for EU/EEA computed as weighted average



3.1.4. Key impact variables

3.1.4.1. Grouping criterion: Change in AoL ratio in percentage points

85. **The stress test sample was divided into 5 distinct groups per scenario in order to highlight the main drivers behind the different stress sensitivities** (i.e. companies may be in different groups depending on the scenario). Companies with the highest impact in terms of change in assets over liabilities (change in the

ratio, measured in percentage points) would be in Group 1, while companies with the lowest impact would be in Group 5. In particular, for each of the scenarios, the companies were assigned to one of 5 groups defined as the quintiles in the distribution of the change in assets over liability ratios.

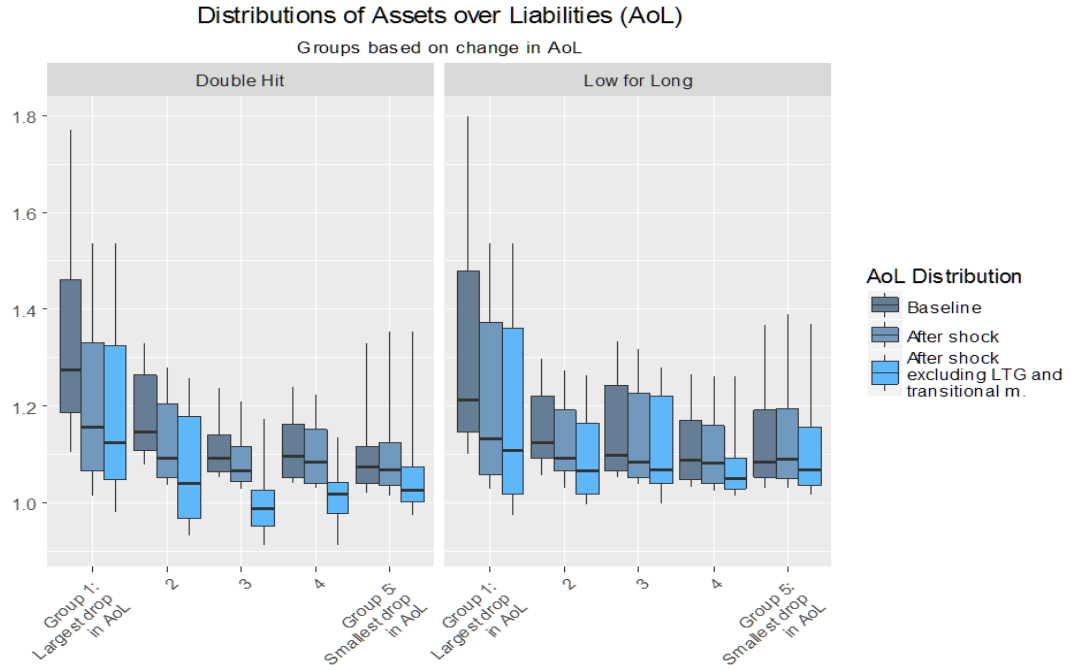
86. Table 7 shows the **cut-off points (quintiles) of the change in AoL that were used to form 5 equally-sized groups.** This grouping was done separately for each of the two scenarios. Figure 40 shows the distributions of the assets over liabilities in these 5 groups for both scenarios. Subsequently, Figure 41 and Figure 42 show, for each group, the distribution of key variables in the double-hit and low-for-long scenario respectively. The boxes represent the interquartile range, with the median marked inside the box. The whiskers (the lines) indicate the 10th and 90th percentile of the distribution.[22]

Table 7: Grouping criteria: change AoL ratio in percentage points

	Double-hit	Low-for-long
Group 1	Decrease more than 7.2 pp.	Decrease more than 4.6 pp.
Group 2	Decrease between 7.2 and 3.6 pp.	Decrease between 4.6 and 2.0 pp.
Group 3	Decrease between 3.6 and 1.8 pp.	Decrease between 2.0 and 1.1 pp.
Group 4	Decrease between 1.8 and 0.6 pp.	Decrease between 1.1 pp. and 0.3
Group 5	Decrease less than 0.6 pp.	Decrease less than 0.3 pp.

87. First, Figure 40 reveals that while the **companies in Group 1 and 2 were relatively more affected by the stress scenarios**, they had somewhat higher AoL ratios pre stress, and retained relatively higher AoL ratios also post stress. Moreover, in the double-hit scenario, the companies in Group 3 and 4 (with a relatively smaller impact in terms of changes to the AoL ratio) are particularly dependent on LTG and transitional measures to keep an AoL ratio above 1.

Figure 40: Distribution of assets over liabilities

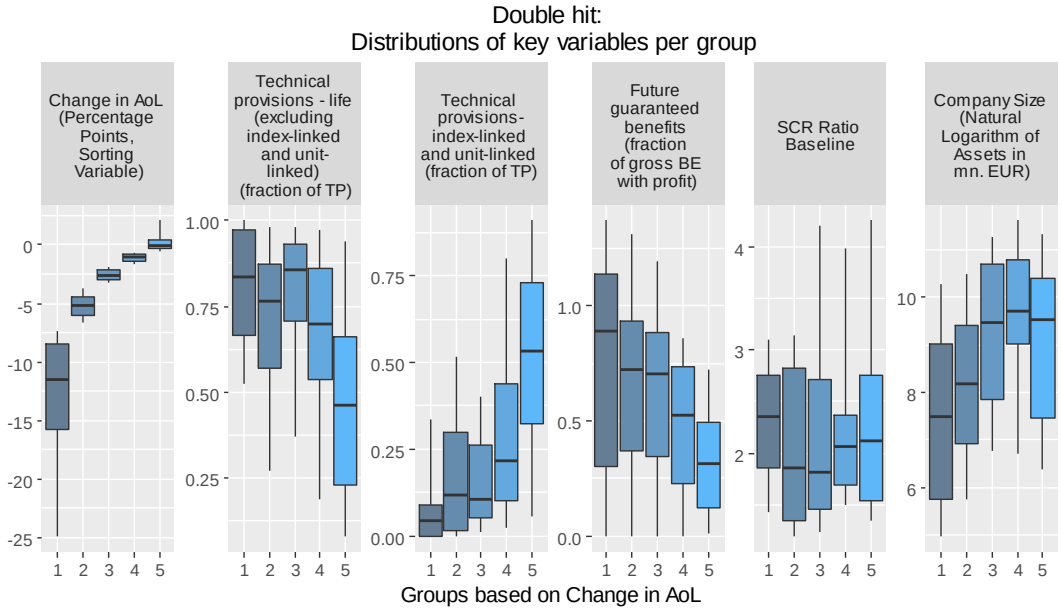


Note: Groups 1 to 5 by change in AoL (largest in Group 1). The boxes represent the interquartile range, with the median marked inside the box. The whiskers (lines) indicate the 10th and 90th percentile of the distribution.

[22] The figures only show a subset of variables investigated, which were selected based on explanatory power or their interpretability. Other variables were also considered, and several appear to be relevant correlates. Most notably, the share of deferred tax liabilities (DTL) confirmed its consideration as a diversification tool. The effect of national markets' specificities was also notable.

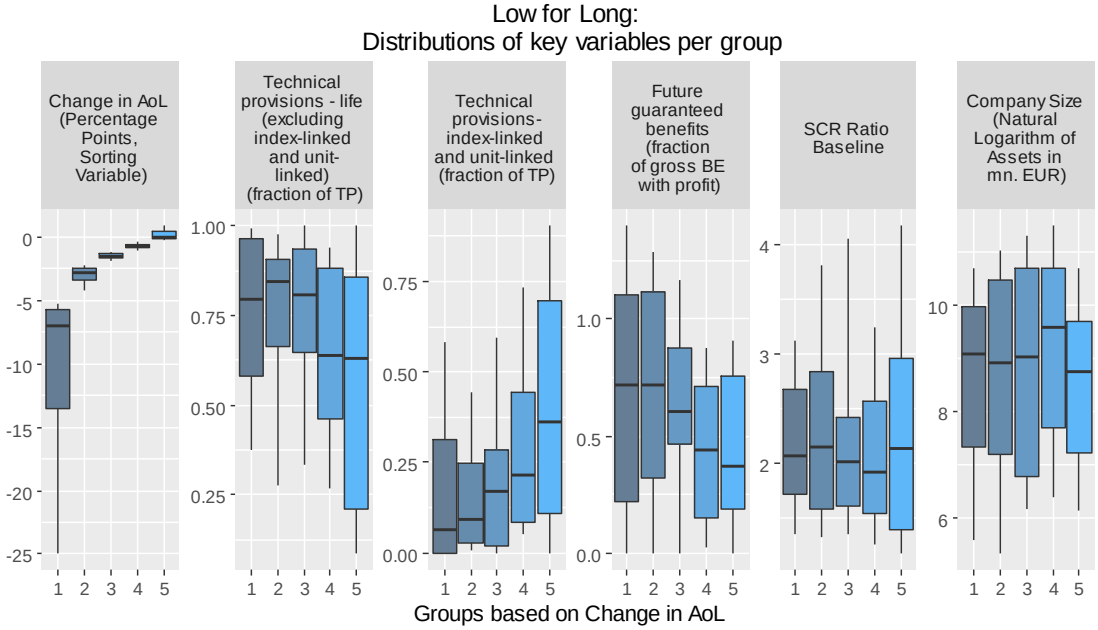
88. Moreover, the analysis showed that, **companies with a large share of unit-linked business were more likely to be in the least impacted groups** (especially Group 4 and 5) than companies with a large share of traditional life business. The reason is that, as policyholders take the risk of any asset price changes, the liabilities would shift and fully offset any decrease in asset value. This pattern was observed consistently across both scenarios on the liability as well as on the asset side. It is, however, worth noting that while the companies themselves are shielded from the immediate solvency effects of the stress due to the large share of unit linked business, policyholders would not be. Moreover, liquidity issues could also arise if a large number of policyholders were to surrender their policies at the same time.

Figure 41: Distribution of key variables per group, double-hit



Note: Groups 1 to 5 by change in AoL (largest in Group 1). The boxes represent the interquartile range, with the median marked inside the box. The whiskers (lines) indicate the 10th and 90th percentile of the distribution

Figure 42: Distribution of key variables per group, low-for-long



Note: Groups 1 to 5 by change in AoL (largest in Group 1). The boxes represent the interquartile range, with the median marked inside the box. The whiskers (lines) indicate the 10th and 90th percentile of the distribution

89. Taken at face value, **there seems to be evidence that the companies that are more vulnerable to adverse market scenarios (Group 1 in particular) are also those that have higher AoL ratios at the onset.** This could be the result of internal governance, market and/or regulatory pressures. It also reflects varying use of the LTG and transitional measures, but Group 1 is better capitalized in terms of AoL ratios also when LTG and transitionals are excluded).

90. However, when seen together with the pre stress SCR ratios in the low-for-long scenario – where the difference between the groups is smaller – the results seem to suggest **a clear role of the regulatory capital requirements being higher for companies which are exposed to the risk of such a scenario.** This finding is important as it illustrates that companies that are relatively more sensitive to changes in market conditions (as tested by the stress test), are not necessarily in any worse or riskier position than those in the other groups due to relatively higher levels of capitalization. Moreover, its sensitivity to stress scenarios also depends on the use of LTG and transitional measures.

91. **The share of future guaranteed benefits also clearly separated the groups**, especially in the double-hit, where the distribution shifted consistently and markedly higher in the groups with the companies that experienced the largest impact of the scenario.

3.1.4.2. Grouping criterion: Post stress AoL levels

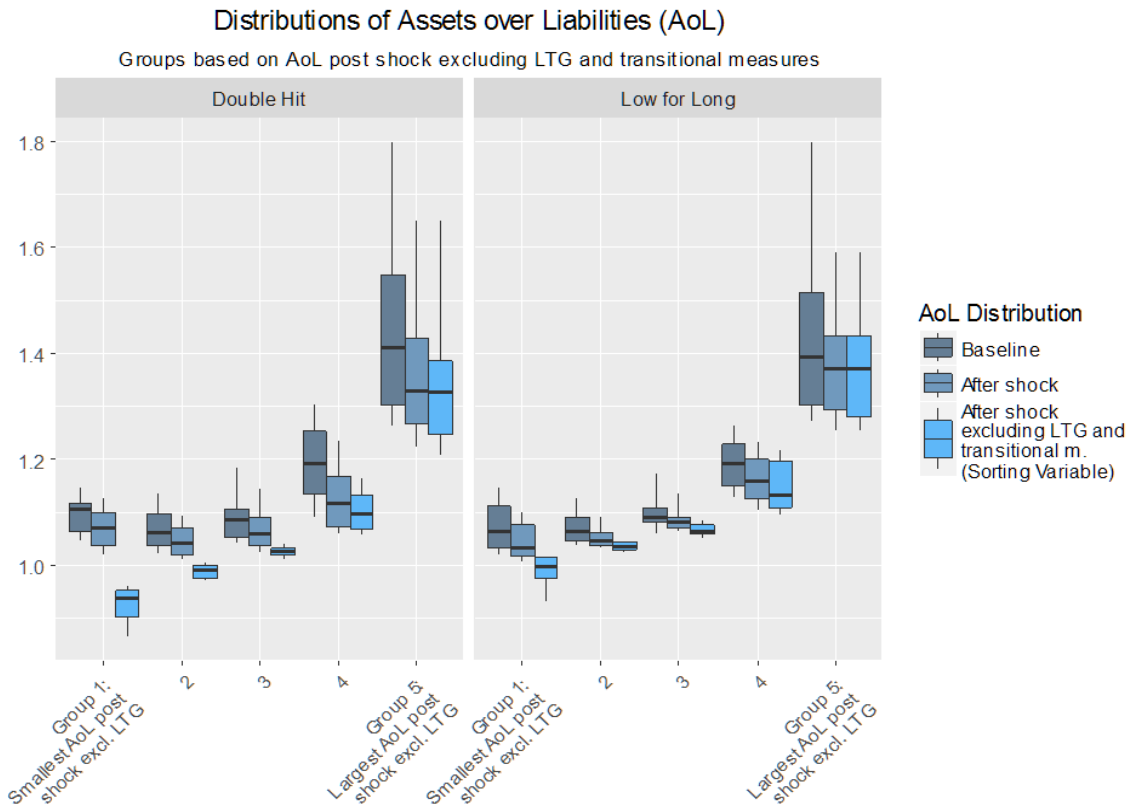
92. **Another view of potential vulnerabilities can be obtained by sorting the companies according to their post stress AoL ratios rather than by the change in AoL ratios.** This second criterion allows grouping the companies according to the situation after the shock regardless of the situation they were before. In assigning these groups, the impact of LTG and transitional measures have been excluded in order to illustrate the long-term economic impact of the applied stresses.

Table 8: Grouping criteria – post stress AoL levels (excl. LTG and transitionals)

	Double-hit	Low-for-long
Group 1	Lower than 0.97	Lower than 1.02
Group 2	Between 0.97 and 1.01	Between 1.02 and 1.04
Group 3	Between 1.01 and 1.05	Between 1.04 and 1.09
Group 4	Between 1.05 and 1.18	Between 1.09 and 1.23
Group 5	Above 1.18	Above 1.23

93. Figure 43 shows the **distributions of AoL ratios in the baseline and post stress in both scenarios.** The charts also show the distributions of AoL ratios post stress without LTG and transitional measures. The chart confirms the overall larger impact in the double-hit when LTG and transitional measures are excluded. For Groups 2, 3 and 4, the impact of the LTG is particularly striking: In the double-hit, these groups have very similar AoL levels when the measures are included, but excluding these measures, the AoL ratio is below 1 for Group 1 and 2.

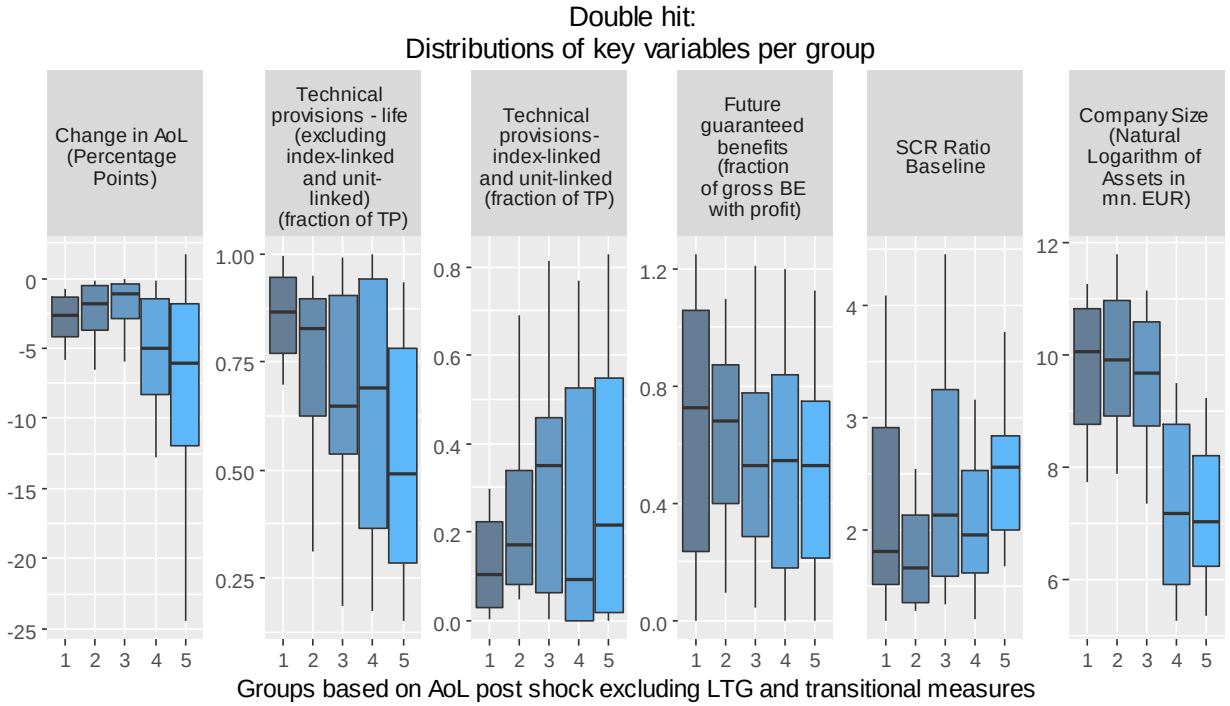
Figure 43: Distribution of assets over liabilities



Note: Groups 1 to 5 by AoL post shock (lowest in Group 1). The boxes represent the interquartile range, with the median marked inside the box. The whiskers (lines) indicate the 10th and 90th percentile of the distribution

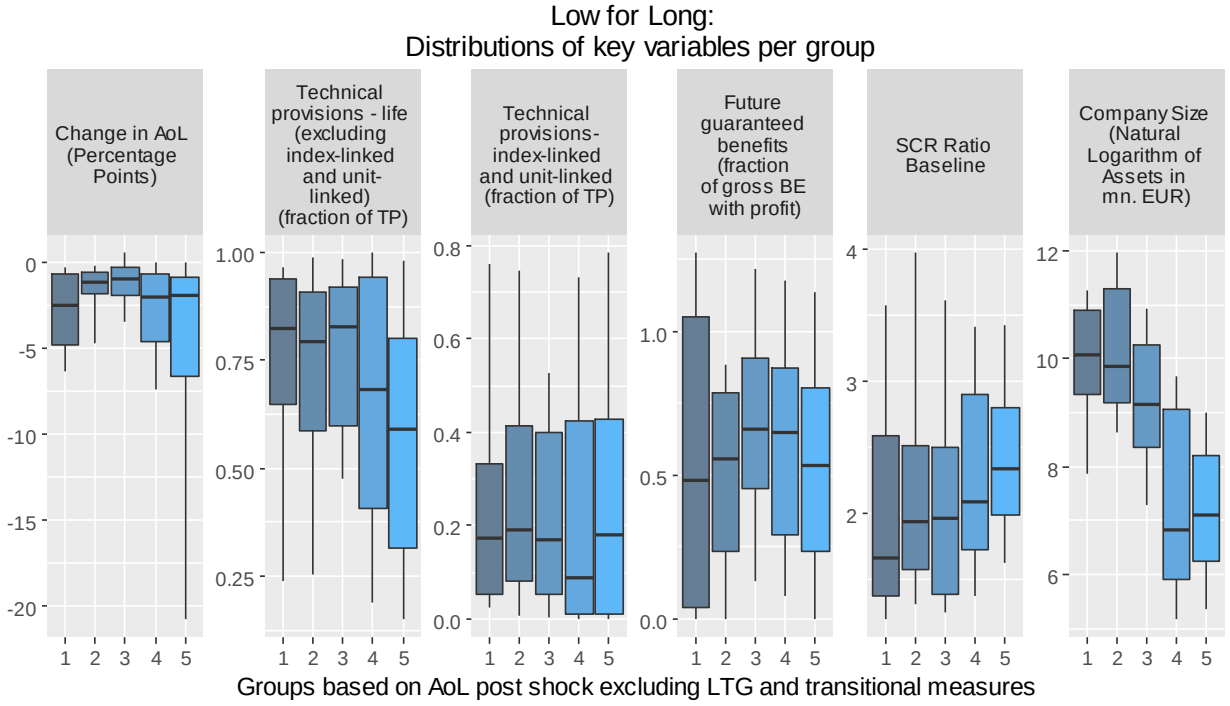
94. Figure 44 and Figure 45 show, for each group, the distribution of key variables in the double-hit and low-for-long scenario respectively. **Seen together, these figures indicate that larger undertakings (in terms of assets in the baseline) are much more likely than their smaller counterparts to be in the groups with the lowest post stress AoL ratio.** This is particularly visible in the double-hit scenario. These large companies are also the ones keeping the lowest assets over liabilities in the baseline. Importantly, however, while these companies are not the ones most affected by the stresses (in terms of change in AoL ratio), their relatively low levels of capitalization at the outset still makes them potentially vulnerable. Figure 46 shows that the companies in Group 1 are much more likely to be MA, and although to a lesser extent, VA users than the companies in the other groups.

Figure 44: Distribution of key variables per group, double-hit



Note: Groups 1 to 5 by AoL post shock (lowest in Group 1). The boxes represent the interquartile range, with the median marked inside the box. The whiskers (lines) indicate the 10th and 90th percentile of the distribution

Figure 45: Distribution of key variables per group, low-for-long

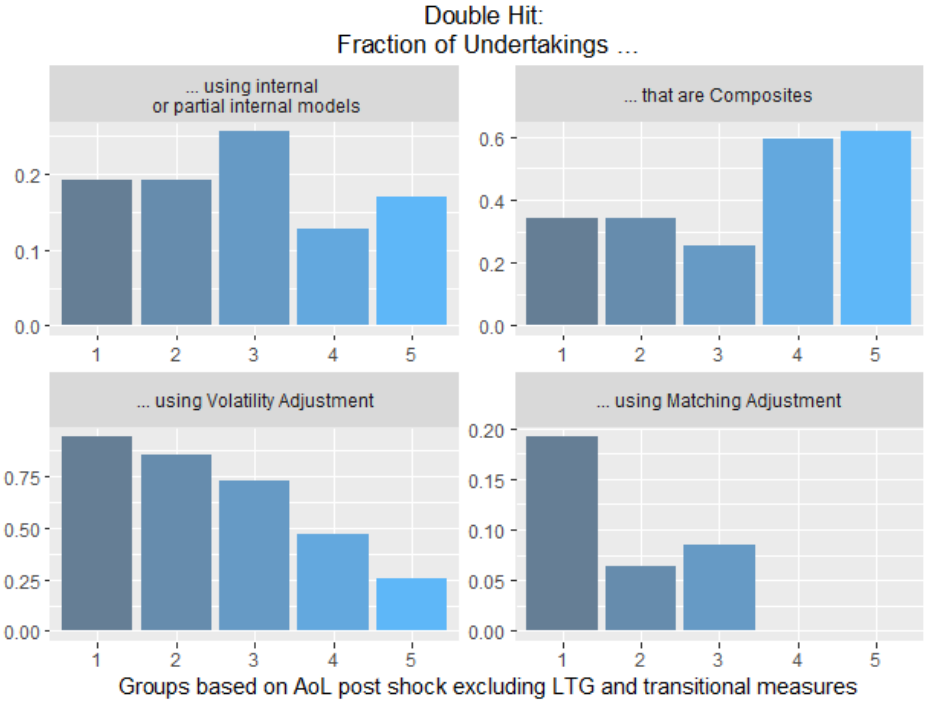


Note: Groups 1 to 5 by AoL post shock (lowest in Group 1). The boxes represent the interquartile range, with the median marked inside the box. The whiskers (lines) indicate the 10th and 90th percentile of the distribution

95. The companies also display a **marked difference in terms of size in the low-for-long scenario.** The median company in Group 1 is about 2.5 times the size of the median company in Group 3. In turn, the median company in group 3 is about eight times as large as the median company in Group 5. Interestingly, Figure 47 shows that Group 1 is also much less likely to use an internal model than Groups 2

or 3 (the other two groups with relative low post stress AoL levels). Their capitalization levels are also lower in terms of the SCR ratio (Group 1 starts out with an SCR median of 1.66, compared to 1.94 and 1.96 for the other two groups) and in terms of AoL pre stress. However, they are more likely to be using the VA or the MA.

Figure 46: Undertaking characteristics per group. Double-hit scenario



96. Furthermore, in the low-for-long scenario one can **detect a clear clustering of smaller undertakings in Group 4 and 5**, with a higher pre stress capitalization in terms of assets over liabilities and a larger sensitivity to the shock, but also with a higher post stress capitalization. These groups are more likely to be composites using the standard formula for SCR calculation and are less likely to employ the VA or MA (Figure 47).

Figure 47: Undertaking characteristics per group, low-for-long scenario

3.1.5. Derivatives analysis

97. The 2016 stress test exercise also aimed at investigating the **effect of derivatives on the SCR interest rate sensitivity and refinancing risk** to complete the cash flow analysis. The derivative assessment was not compulsory in most member states, and only 5 member states (FI, FR, NL, DK and IE) explicitly asked their insurance undertakings to participate in the derivative analysis. However, as some insurance undertakings from other member states participated on a voluntary basis, in total around 40 undertakings participated. The data is therefore relatively limited for this first assessment of derivatives.

98. The assessment of the possible refinancing risk over time focused on looking at the SCR **with and without hedging of interest rates** and on future points in time (12, 24 and 36 months) combined with the interest rate sensitivity of the undertakings. The narrative lies within the risk of being in a position where refinancing the hedging is not possible, e.g. if derivative markets freeze due to missing counterparties, and the interest rate sensitivity on SCR. Starting with the average SCR in the baseline scenario, the calculated SCR without derivatives, that expire within the next 12 - 24 months, the average SCR will increase by less than 5 percent. If the SCR is calculated without derivatives that expire within the next 36 months, the average SCR will increase by exactly 5 percent. This indicates that the refinancing risk in relation to derivative hedging is managed to a degree where the sensitivity on the SCR is limited.

99. The overall purpose of the assessment was to better understand whether other sources of diversification, for instance the use of derivatives, can help to **reduce the vulnerability associated with the duration gap and the SCR interest rate sensitivity**.

100. **The impact of derivative hedging varies among insurance companies**. Moreover, due to the limited data available, no general conclusions could be drawn.[23] However, the use of derivatives did decrease the interest rate sensitivity for some undertakings, for instance in Denmark and the Netherlands (on average, the Danish undertakings experienced an interest rate sensitivity when using derivatives which was about half of the sensitivity without using derivatives).

101. **The use of derivatives could expose undertakings to other risks, such as derivative counterparty risk.** In systemic risk events, it is not certain that all derivative contracts could be fulfilled as expected, as counterparties may face liquidity or solvency issues themselves. A way of managing the exposure towards counterparty risk is the daily exchange of margin and collateral. However, the counterparty risk and the impact of counterparties not fulfilling their obligations was outside the scope of this exercise and the stress test scenarios did not explicitly assess financial risks related to the use of derivatives.

3.2. Analysis of second round effects

102. **The financial crisis has shown that the way financial institutions respond to shocks can amplify the underlying shock that hits the financial system.** An understanding of how individual institutions might respond to a particular stress may therefore help to identify potential macro-prudential risk. Despite the importance these so-called 'second round' effects, these are often not picked up in stress tests, which usually focus mainly on immediate financial effects.

[23] A wide variety in the impact of derivatives among insurers in a country could possibly also explain the almost zero impact on aggregate of derivatives in France.

103. **The macro-prudential importance of second round effect should not be ignored.** Participants were therefore requested to complete a qualitative questionnaire on second-round effects.[24] The purpose of this questionnaire was to detect collective actions by insurers which may amplify or cause additional risks when considered on an aggregate level. For example, while the selling of assets may be a rational response to a stress for an individual insurer, such a strategy – if pursued by many – could amplify the original stress and lead to spill-overs to other financial sectors.

104. More concretely, the stress test participants were asked about:

i. their reactions in case of a double-hit scenario if the shocks would persist over a couple of years,

ii. actions to maintain profitability over the medium term,

iii. their ability to move the market (i.e. substantially move prices) if they had to unwind their positions within six months; and

iv. their projections for the impact of the scenario on selected key variables (e.g. lapse rates, policy holders' behaviour, management policies etc.).

105. Further details for each question respectively are described below together with first conclusions.

i) Insurance companies' reactions if the double-hit scenario would persist over a couple of years

106. **The participants were given a number of possible strategies and options to describe their reactions**; multiple selections were possible. The most frequently indicated choices in ascending order were: i) an attempt to increase capital levels, in particular by means of dividend retention (70% of companies who answered this question indicated this reaction), ii) a change in the product mix and in particular a greater focus on unit-linked products (59% of respondents), iii) restructuring the risk on the liability side by reducing profit-sharing (57%) and reviewing the guaranteed interest rate policy (56%), and iv) restructuring the risk on the asset side by purchasing in particular sovereign bonds (45%) and investment grade (BBB and above) financial sector (22%) and non-financial sector corporate bonds (27%). Respondents did not state whether the restructuring would be automatically done nor whether it would imply either the use of cash available to buy sovereign bonds or selling other assets for that, so fire sells of other assets to buy sovereign bonds cannot be assumed. At the same, time 24% of the respondents signalled their intention to sell non-investment grade financial sector and non-financial sector corporate bonds.

107. As the latter are more risky yet higher yielding, an opposite move would have seemed more intuitive to regain profitability. One explanation for this behaviour could be a "flight to safety" or "flight to quality" move as a longer-term reaction to the double-hit.

ii) Insurance companies' actions to maintain profitability over the medium term

108. The second question asked focused specifically on **actions aimed at maintaining profitability over the medium term.** Most insurers indicated that they would primarily aim to reduce costs, especially administrative costs (79% of

[24] The majority of the stress test participants completed the qualitative questionnaire. The overall participation differed per question and ranged from 224 respondents to 235.

respondents) and commissions respectively (59%). Furthermore, a large share of respondents flagged their interest to adjust the product mix (70%) and lower the guaranteed interest rate (57%).

109. On the other hand, there was **relatively little to almost no appetite in corporate restructuring and M&As** (27% of the companies indicated their intention to do so) and/or to expand their business outside Europe (only 3% of respondents considered this).

iii) Insurance companies' ability to move the market (i.e. substantially move prices) if they had to unwind their positions within six months

110. This question differentiated between a number of different asset classes (please see table below).

Table 9: Market impact per asset class. Number of respondents that signalled large or significant impact

Asset class	Large impact	Significant impact
Sovereign bonds	11	36
Financial sector bonds, of which:		
Investment grade financial sector bonds (BBB and up)	5	28
Non-investment grade financial sector bonds (below BBB)	2	18
Non-financial corporate bonds, of which:		
Investment grade corporate bonds (BBB and up)	5	19
Non-investment grade corporate bonds (below BBB)	3	15
Mutual funds	3	9
Equity	2	16
Real estate	2	18
Direct loans	1	6

111. The overview documents that **a number of insurers estimated their presence as so large that unwinding their portfolio would have a "large" or "significant" impact on the markets.** This is most pronounced with regard to sovereign bonds 11 and 36 insurers respectively estimated their presence as so large that unwinding their portfolio would have a "large" or "significant" impact on the markets.

112. **A number of insurers indicated that they hold significant positions in different assets classes,** most notably sovereign bonds. If forced to sell these within 6 months, this may have a large impact on the markets.

113. However, the answers to the qualitative questionnaire **did not confirm large scale asset sales as an intended strategy to regain profitability.** On the contrary, almost half of the respondents signalled the intention to increase their holdings of sovereign bonds.

114. Nevertheless, this intended action in turn could also – if it materialised– have **significant impact on the market for sovereign bonds**. In order to further assess the actual impact of this collective action, more detailed quantitative information about estimated volumes and values of such purchases, which was outside the scope of this survey, would be needed.

iv) Insurance companies' projections for the impact of the scenario on selected key variables

115. The final question concerned the companies' **long-term projections on key variables**, should the "double-hit scenario" persist over several years. These parameters comprised lapse rates, changes in policy holder behaviour (annuity take up, demand for lump sum pay-outs and deferral of retirement), future premiums paid on existing business, expected premiums on new business and guaranteed interest rates.

116. To sum up, the majority of respondents indicated that **the "double-hit" scenario would not lead them to revisit any of the key parameters above.** These findings seem somewhat at odds with a collective preference indicated in response to an earlier question. To recall, when asked about measures to restore profitability, a large share of respondents flagged an adjustment in guaranteed interest rates as a likely choice. An explanation for this could be that lowering guarantees would remain a direct response to the double-hit and not lead to long-term adjustments.

4. Conclusions and next steps

4.1. Main conclusions

117. In the first year of application of the Solvency II regime, **this stress test was focused on the financial risks which were viewed as the biggest threat to the stability of the European insurance market**, and with a large coverage of the market segment most vulnerable to these risks (solo companies offering life products with any kind of interest rate guarantees).

118. **The EIOPA Stress Test was designed as a vulnerability analysis and not a pass or fail exercise**. It does not attempt to assess capital requirements for the industry and no recalculation of SCR or MCR post stress was required. Impact is therefore mainly considered in terms of (changes in) assets over liabilities ratios and changes in the excess of assets over liabilities.

119. **In aggregate, for all countries the participating insurance undertakings show an excess of assets over liabilities in the baseline.** The overall SCR ratio for the sample is 196% and the overall MCR ratio is 533%. Only two companies reported an SCR ratio below 100% in the baseline scenario accounting for 0.02% of the total assets in the sample. This compares somewhat favourably with the 2014 exercise. Despite the severe European crisis that has lasted since 2008, is seems that the insurance sector has been able to increase their reserves between those two exercises, at least in terms of regulatory capital requirements.

120. The two stress scenarios imply approximately a **2% point reduction of the average assets over liabilities ratio at aggregate level**.

121. **In the double-hit, this translates in to a decline of the total assets of almost 610 billion euro**. As liabilities only decline by 450 billion euro, this scenario has a negative impact on the balance sheet of insurers of close to 160 billion euro, translating into an impact of 28.9% of total excess of assets over liabilities.

122. **In the event of the low-for-long scenario, the impact for the insurance sector would represent a fall in excess of assets over liabilities of about 100 billion euro**, a decline of 18%. This negative impact stems from an increase in liabilities worth more than 380 billion euro. The increase in asset values (about 280 billion) is not sufficient to cover this decline.

4.2. Description of vulnerabilities

123. Overall, the results seem to indicate that the **companies that are more affected by an adverse market scenario are also those that have a higher AoL ratio at the onset.** This illustrates that companies that are relatively more sensitive to changes in market conditions, not necessarily are in any worse or riskier position than their peers. The risk baring capacity of any individual company is a combination of capitalisation and balance sheet sensitivity to stress.

124. **This is particularly the case for smaller undertakings:** While these companies seemed to be most affected by the stressed scenarios, they are overall better capitalized both in terms of SCR ratio, but also in terms of AoL pre stress.

125. The analysis also showed **that undertakings with a large share of unit-linked business were generally less impacted.** While this would be expected from the design of the stress test, it is worth noting that while the companies themselves are shielded from the immediate solvency effects of the stress due to large share of unit linked business, policy holders would not be. Large losses on unit-linked policies

might also have more long-term effects on the desirability of these products and on the viability of business-models with a large focus on unit-linked products. Pure unit-linked business is a competitive market where insurers face competition from other sectors as well. Asset Management firms, exchange traded funds and other developments such as "FinTech" are also likely to impact and transform this market. Moreover, liquidity issues could also arise if a large number of policyholders were to surrender their policies at the same time. Therefore, while the solvency position of insurers was somewhat shielded by unit-linked business, this type of business may introduce other risks, which were not in scope of the stress test.

4.3. Next steps

126. **The exercise has highlighted the vulnerability of the insurance sector to the low interest rate environment.** A noteworthy number of undertakings may be expected to face challenges meeting their SCR, particularly in the case of the double-hit scenario. The impact exhibited in the prolonged low yield scenario is of similar magnitude, but with an increased likelihood and different time horizon. The likelihood that this scenario materialises exerts further pressure on the viability of specific business models, particularly those offering long-term guarantees.

127. **EIOPA is therefore publishing a set of general Recommendations in relation to the vulnerabilities identified and the prospective impact on the financial stability of the EU Insurance sector.** The Recommendations are addressed to National Supervisory Authorities and cover three main areas:

- Risk management and business model sustainability
- The modelling of lapses and best estimates
- The impact on group solvency and group support

128. On the basis of these Recommendations, **EIOPA will continue to work closely with national competent authorities** to further enhance the cooperation and coordination of risk analysis and supervisory actions at the European level.

ANNEX I - Scenarios description

I. Content

1. The annex provides a thorough description of the two stressed scenarios prescribed in the EIOPA Insurance Stress Test 2016 exercise, namely the Low-for-Long scenario (LY) and the Double-Hit scenario (DH).

2. In details, the document discloses the process that led to the definition of the scenarios, the description of the main constituents of the LY and DH, namely the rationale, the design and the calibration of the shocks. The annex concludes with a high level comparison with the scenarios provided in previous EIOPA Stress Test exercises; the 2014 Insurance Stress Test and the 2015 IORPs Stress Test – these are included for informative purposes only. The annex provides a simple comparison between the parameters of the scenarios of these different stress test exercises. Direct conclusions based on the differences in the results should be avoided given that substantial differences exist in the design, timing and the circumstances around the different exercises and in particular the differences in the participating samples.

3. The shocks that are included in both scenarios of the 2016 insurance stress test should be interpreted as one-off, instantaneous and permanent shifts in asset prices and swap rates relative to their end-2015 levels. In order to avoid any conclusive inference on the solvency of the undertakings under the stressed scenario and in line with its nature of a non-pass/fail exercise no exact figures on the probability of the proposed scenarios are disclosed.

II. Process

4. In view of the challenging macroeconomic environment affecting particularly certain life insurance business and as a trade-off between EIOPA's duty towards financial stability, the stress test exercise has been designed from the beginning as a "focused exercise" in terms of scope and relevant scenarios. When designing the exercise, the aim was to limit the burden on insurance undertakings due to the context of the implementation of the Solvency II regime for the first time in 2016.

5. Considering this, EIOPA opted for concentrating i) on a specific set of market risk factors deemed as the most relevant for the European Insurance Market at solo level and ii) to subsequently design only 2 specific scenarios.

6. By the end of 2015, when the guidelines for the scenarios were defined, the common understanding amongst regulators, practitioners and academics was that the main threat to the financial services industry in general and to the insurance industry in particular was represented by the low growth environment, hence market driven circumstances accompanied by a persistency of the already low risk free rates. Subsequently this time EIOPA prioritised testing the resilience of the European insurance industry to market risks and to the low yield environment rather than testing the resilience to insurance risks.

7. To that aim EIOPA defined the following 2 scenarios:

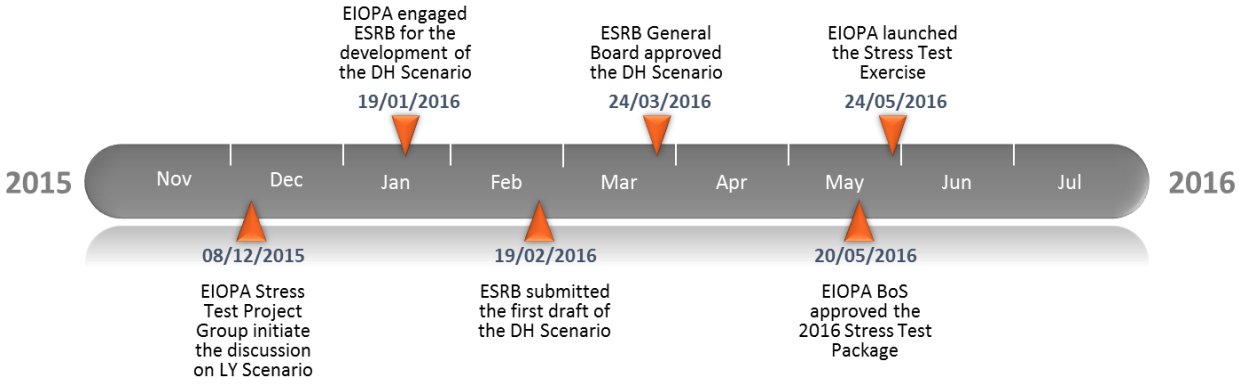
8. Low-for-long specifically designed to test the sensitivity of the insurance undertakings to a prolonged low yield environment;

9. Double-hit combining a drop in the risk free rates with a set of shocks to the main assets held by insurers.

10. The development of the 2 scenarios started in December 2015 and ended in mid-March 2016 (Figure A I.1). Due to the early definition of the scenarios late-

calibration adjustments were foreseen to react to sudden changes in the markets. However, it goes without saying that, given the bottom-up nature of the exercise, late events that occurred after the launching in May 2016 such as the outcome of the Brexit referendum, could obviously not be taken into account in the scenario definition.

Figure A I.1: Scenario Definition Process – Timeline



Note: the timeline reports only the major milestones of the process

11. Tests on the consistency and on the meaningfulness of the scenarios were performed, especially in the aftermath of the Brexit referendum and the subsequent shocks registered in the financial markets. These analyses confirmed the robustness of the initially defined stresses and calibration; as a matter of fact the prescribed shocks still represent a "stressed scenario" compared to the reality. The shocks observed in the financial market on the 24th and 25th of June 2016 represent an indirect endorsement of the shocks encompassed in the 2 scenarios that had initially been deemed as too severe.

III. Low-for-long scenario (LY)

12. The LY scenario was developed internally by EIOPA.

13. Life insurance is considered a long-term liability-driven business particularly exposed to fluctuation in the interest rates

III.1 Narrative

14. The LY scenario aims at assessing the resilience of life insurance undertakings to a prolonged low interest rate market. This scenario assesses the impact of a long-lasting low yield scenario with low rates for all maturities.

15. It is based on a situation of secular stagnation with savers facing a lack of long-term investment opportunities and permanently low productivity growth associated with low inflation levels and a scarcity of available risk free assets.

16. Economic stagnation and subsequent conventional and non-conventional monetary policy intervention drive down yields at all maturities with effects particularly concentrated in the mid-long-term. The absence of growth and monetary intervention by the ECB leads to interest rates sufficient to meet the inflation target but still far from the current projection.

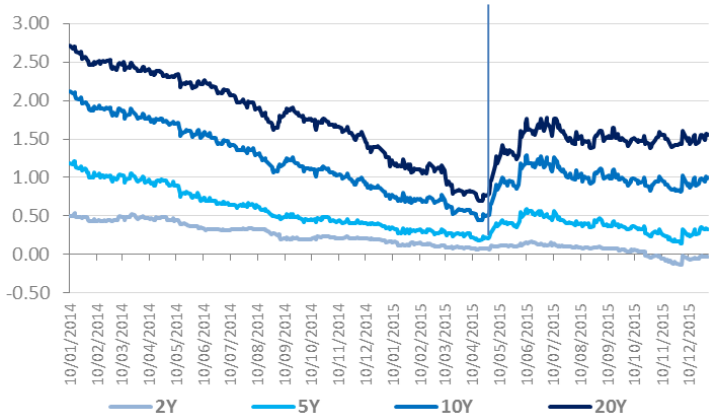
III.2 Design and calibration

17. EIOPA designed a set of specific low-yield curves for the different European currencies starting from the Euro, based on the standard Smith-Wilson approach utilized to define the EIOPA reference Risk Free rate curve.

18. The liquid part of the curve is based on the lowest interest rates observed for the 2, 5, 10 and 20 year maturities for the Euro Area in the past 2 years. More specifically the curve originates form the lowest rate registered for different maturities of the EUR-SWAP curve in the defined time-frame (Figure A I.2), namely the data registered on 20th April 2015. An additional shock materialized in a parallel down-shift for maturities from 1Y to 20Y was applied.

19. Given the decreasing trend of the risk free rates experienced during the scenario definition, the reference observed point was supposed to be updated in case, at any point in time before the official launch of the execution phase, the observed rates were too close to those prescribed in the adverse LY scenario. In particular, EIOPA monitored until the 24th May 2016 whether the average of the EUR-SWAP spot rate for maturity 2Y, 5Y, 10Y and 20Y would have fallen by 10bp under the value observed on 20th April 2015. However, there was no need to update the scenario as the rates registered in the observation window did not trigger the adjustment of the reference point.

Figure A I.2: EUR-SWAP Rate (%)



Source: Bloomberg

20. Due to the low-for–long nature of the scenario, the extrapolated part of the curve is projected utilizing a reduced ultimate forward rate, consistent with the narrative of the scenario. Specifically the UFR was set at 2.0% from the standard 4.2% currently utilized in EIOPA to derive the Risk Free rate curve.

21. The stressed Euro curve serves as a starting point for the computation of the curves for other currencies. Specifically, a derived multiplier of the euro curve is used to define the 'shifts' which need to be applied to the basic risk free curve of that currency to get to the 'stressed' curve.

22. Each maturity of the term structure of the baseline scenario for each currency is stressed by the necessary amount to meet the following equation:

$$\frac{(1+EUR_{Stress})^{-t}}{(1+EUR_{Baseline})^{-t}} = \frac{\left(1+CURRENCY_{Stress}\right)^{-t}}{(1+CURRENCY_{Baseline})^{-t}} \Rightarrow \frac{(1+EUR_{Stress})_t}{(1+EUR_{Baseline})_t} = \frac{\left(1+CURRENCY_{Stress}\right)_t}{(1+CURRENCY_{Baseline})_t}$$

23. This means that the relative change of the current value of the same cash flow (or the best estimate of an insurance contract) will be the same for all currencies.

The approach needed to be slightly tailored to derive the UK curve in order to avoid unjustified distortions in the discount curve. The adjustment was needed due to the term structure for the GBP that has the Last Liquid Point set at Y50; hence, stresses coming from the reduction of the UFR shall be applied from Y51 onwards and not from Y21 as for the Euro curve. To that aim the LY GBP curve that neutralizes the effect of the reduction of the UFR for maturities between Y20 and Y50 by i) applying the above

described proportional approach from Y1 to Y20; ii) introducing a specific exogenous shock from Y21 to Y50 and iii) computing a new set of spot rates derived from the forward rates (FW_t^B for the baseline and FW_t^{LY} for the low-yield scenario) computed according to the following equation from Y51 onward:

$$\frac{FW_t^B}{UFR^B} = \frac{FW_t^{LY}}{UFR^{LY}}$$

24. As the designed scenario does not introduce changes in the spreads on the Risk Free Rate, the Credit Risk Adjustment and Volatility adjustment is kept unchanged with respect to the baseline.

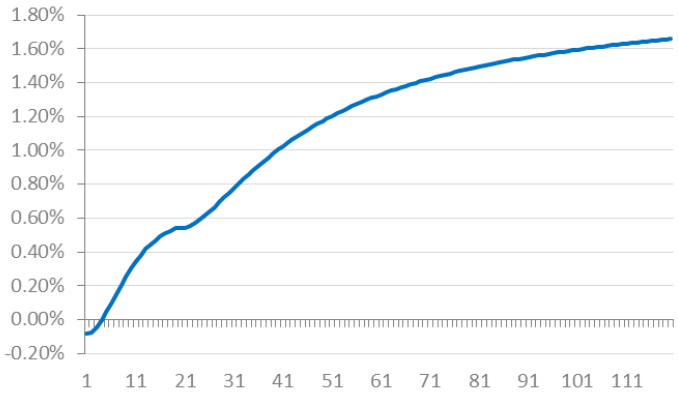
25. Finally the Volatility Adjusted curves for the LY scenario were computed via Smith-Wilson by applying to the stressed spot rate of the liquid part of the curve the volatility adjustment and keeping stressed UFR and last liquid points unchanged.

26. A specific approach was utilized for the VA-adjusted CHF curve. The UFR of the CHF curve without VA obtained via the proportional approach from the Euro curve displayed a forward rate for maturity 120Y far below the stressed UFR applied in the LY scenario. In order to phase-out the effect of the volatility adjustment for longer maturities, the observed forward rate at Y120 was utilized as UFR when computing the VA-adjusted LY curve for the CHF.

III.3 Actual shocks

27. The stressed curve is generated via Smith-Wilson according to the following parameters: i) last liquid point (LLP) set at 20Y, ii) the ultimate forward rate (UFR) set at 2.0% and iii) a shock of 15 basis points for each maturity (including 10 bps of the credit risk adjustment) is displayed in Figure A I. 3.

Figure A I. 3 EUR term structure for the LY scenario (%)



Source: EIOPA elaboration on Bloomberg data

28. LY curves for the other currencies are provided in the "Technical Information" file retrievable at https://eiopa.europa.eu/Pages/Financial-stability-and-crisis-prevention/Stress-test-2016.aspx .

IV. Double-hit scenario

29. The DH scenario has been developed by EIOPA in cooperation with the ESRB.

30. The scenario reflects the ESRB's assessment of prevailing systemic risks to the financial system. A further increase in risk premia, which may potentially be triggered by emerging market stress, persistently low commodity prices or low nominal economic growth, constitutes a key source of systemic risk for the EU financial system. A possible rise in concerns over public debt sustainability remains an

important high-impact risk. These risks may materialise jointly and reinforce each other.

31. The key vulnerability of the European insurance sector identified by EIOPA and contained in this scenario is a "double-hit", impacting both sides of insurers' balance sheets. On the assets side, as insurers are large investors in government and corporate bonds, equity and real estate they are particularly vulnerable to the risk of an abrupt fall in global asset prices. Such a fall could result from rising concerns about sovereign debt sustainability and a reassessment of risk premia. On the liabilities side, insurers are vulnerable to prolonged low risk-free interest rate levels, especially if these decouple from yields on investment-grade debt securities low risk-free interest rates. Low risk free rates increase the value of their long-term liabilities while compressing margins between guaranteed returns on life policies and matching long-term low risk investments.

IV.1 Narrative

32. The scenario is assumed to be initiated by an abrupt reversal in global risk premia and term premia. The required rate of return for holding long-term fixed income assets would increase sharply. The corresponding decline in bond prices would be amplified by market illiquidity and additional supply coming into the secondary bond markets from shadow banking entities. These entities, which have been growing rapidly in recent years, would face increased redemptions and would be forced to dispose of investments. At the same time, concerns about the creditworthiness of some EU sovereigns would be reignited, introducing some differentiation in the impact on bond yields of EU countries. Yields on non-financial corporate and bank debt would increase too, following the generalised increase in risk premia. In the banking sector, shocks to credit spreads would be aggravated by fundamental concerns about prospective mark-to-market losses on fixed-income assets. AAA-rated corporate bond yields would barely increase, but the impact on credit spreads would be more pronounced for weaker issuers. As prospects for future earnings by the European corporate sector would deteriorate, driven primarily by a higher cost of finance and lower expected aggregate demand, stock prices would fall. Finally, excess liquidity created by sales of financial assets would be invested in very short-term assets, pushing money market rates down and reducing forward interest rates. This would result in a fall in swap rates, which reflect expected future short-term interest rates.[25]

IV.2 Design and calibration

33. Shocks are derived via a non-parametric conditional expected shortfall approach.

34. The structure of the DH scenario encompasses shocks to assets in the direction of a reduction of their market value and a simultaneous increase in the value of the liabilities driven by a drop in the risk free rates.

35. Historically risk free rates and high-quality government bonds showed a close relationship; therefore the materialization of the DH scenario requires breaking this tight relation reducing the internal consistency of the scenario and ruling out any safe-haven effects historically observed in high-quality government bonds in the EU.

36. To that aim the DH scenario requires two simultaneous triggering events: i) a fall in the swap rates and ii) a rapid increase in yields on sovereign bonds. Shocks to sovereign bonds are reflected in other financial market by an increase in the corporate

[25] Source ESRB (2016): Scenario for the European Insurance and Occupational Pensions Authority's EU-wide insurance stress test in 2016.

bond yields, a drop in values of stocks, a drop in the prices of other asset classes and a drop in the value of commercial and residential real estates.

37. On the shocks defined by ESRB, EIOPA developed the full set of stressed parameters to be applied in the DH scenario as follow.

Risk free rate curves (Figure A I. 4)

38. The shocks to Euro swap rates provided by ESRB were utilized by EIOPA to compute the stressed risk free rate curve for Euro by applying the standard Smith-Wilson approach i) on the provided stressed maturities for the liquid part of the curve and ii) keeping the last liquid point and the Ultimate Forward rate unchanged with respect to the baseline scenario, namely 20Y and 4.2% respectively.

39. Stressed curves for other currencies were derived by applying the standard proportional approach described in III.2.

40. As for the LY scenario, curves are provided also adjusted for volatility. The calculation of the risk free rate curves with VA follow the same process applied in the LY scenario. As the DH scenario encompasses changes in credit spreads EIOPA provided a set of VA figures recalculated according to the standard Solvency II approach.[26]

Shocks to Sovereign Bond Yields (Figure A I. 5)

41. ESRB scenario provided the shocks to sovereign bond yields for 6 maturities. This served as a base for extending the shocks to additional maturities / countries. More specifically i) the gaps in table 1 of the ESRB document were filled via proportional shocks with respect to the EU average and ii) shocks for other maturities were computed via cubic spline interpolation. The list of countries was complemented with Estonia (shocks were approximated by the EU average due to lack of liquid sovereign debt instruments) and Norway (shocks were approximated by computing the average of the shocks applied for different maturities to two neighbour countries' sovereign bonds). Shocks to other maturities can be retrieved in the Stress Test 2016 Technical Information.

42. The provided shocks are part of the comprehensive scenario that includes shocks to the swap curve; hence they have to be applied with reference to the stressed SWAP curve.

Shocks to Corporate Bond Yields (Figure A I. 6)

43. Shocks to corporate bonds are specified for securities issued by financial and non-financial companies divided by credit rating. Therefore corporate bonds shall be shocked globally regardless of the country of issuance.

Shocks Stock prices (Figure A I. 7)

44. The set of shocks to stock prices provided by the ESRB was complemented by EIOPA by adding figures for Estonia (shocks were not calibrated owing to a lack of liquid sovereign debt instruments) and Norway according to the following approximations:

i) The shock to stock prices in Estonia is proxied with the European Union average.
ii) The shock to stock prices in Norway is proxied by computing the average of the shocks applied to stock prices in two neighbour countries.

[26] Information on the methodology applied to derive the VA can be retrieved in "Technical documentation of the methodology to derive EIOPA's risk-free interest rate term structures" available at: https://eiopa.europa.eu/Publications/Standards/Technical%20Documentation%20%2830%20May%202016%29.pdf

45. Equity of companies listed in one stock exchange shall be stressed with the provided shock of the country where the company is listed. In case one company has equity listed in more than one stock exchange, the average EU shock to equity shall be applied. Equity of non-listed companies shall be treated by applying the average EU shock. Additionally, equity held as strategic participation shall be shocked according to the shock to EU private equity as displayed in Figure A I. 9.

Shocks commercial and residential property prices (Figure A I. 8)

46. The set of shocks provided by the ESRB was complemented by EIOPA by adding figures for Lichtenstein and Norway according to the following approximations:

i) Shocks to property prices in Lichtenstein are proxied with the shocks applied to residential property prices in Luxemburg;
ii) Shocks to property prices in Norway are proxied by computing the average of the shocks applied to residential property prices in two neighbour countries.

47. The shocks to commercial properties, not included in the document "Scenario for the European Insurance and Occupational Pensions Authority's EU-wide insurance stress test in 2016", were provided separately by ECB staff and are consistent with the ESRB macro-financial scenario. The shocks to commercial properties are triggered by the propagation of the shocks to sovereign bonds hence they are the fully consistent with the DH scenario.

Shocks to other asset classes (Figure A I. 9)

48. Shocks are provided for private equity, hedge funds, commodities and real estate investment trusts (REITs) according to their geographical location.

IV.3 Actual shocks

49. Following the approach described in par. IV.2 Design and Calibration the derived shocks are reported here. The full set of shocks is displayed in the Insurance Stress Test 2016 Technical Specifications and Stress Test 2016 technical information. Both documents are available at: https://eiopa.europa.eu/Pages/Financial-stability-and-crisis-prevention/Stress-test-2016.aspx.

Figure A I. 4: Shocks to EURO-SWAP rates

	1Y	2Y	3Y	5Y	7Y	10Y	20Y
Shocks (bp)	-60	-65	-77	-71	-72	-61	-61

Source: ESRB.

50. The document Stress Test 2016 Technical Information available at https://eiopa.europa.eu/Pages/Financial-stability-and-crisis-prevention/Stress-test-2016.aspx reports the complete term structure of the risk free rate for all currencies with and without volatility adjustments.

Figure A I. 5: Shocks to sovereign bond yields in EU Countries (bp)

	2Y	5Y	10Y	15Y	20Y	30Y
Austria	40	81	102	97	87	90
Belgium	40	86	116	105	106	100
Bulgaria	43	80	111	99	96	86
Croatia	68	119	155	138	135	120
Cyprus	45	91	132	118	115	102
Czech Republic	53	86	100	98	96	85
Denmark	41	82	94	101	85	76
Estonia	52	100	121	110	98	89
Finland	39	88	102	101	92	49
France	37	89	112	104	102	104
Germany	33	74	92	95	79	73
Greece	204	370	487	303	298	258
Hungary	105	133	170	154	150	133
Ireland	55	86	108	126	123	109
Italy	103	154	166	148	146	136
Latvia	45	117	136	121	118	105
Lithuania	56	127	135	120	117	104
Luxembourg	40	72	95	85	82	73
Malta	56	105	139	124	121	107
Netherlands	36	89	99	94	91	81
Norway	41	78	86	86	89	71
Poland	58	133	142	131	142	116
Portugal	102	165	197	150	127	123
Romania	86	123	162	144	141	125
Slovakia	58	85	95	78	76	68
Slovenia	73	117	146	130	127	113
Spain	91	151	167	156	164	145
Sweden	42	73	78	79	88	81
United Kingdom	46	94	94	95	73	61
European Union	52	100	121	110	98	89

Source: ESRB and EIOPA.

51. The document Stress Test 2016 Technical Information available at https://eiopa.europa.eu/Pages/Financial-stability-and-crisis-prevention/Stress-test-2016.aspx reports the shocks to sovereign bonds for the complete set of maturities.

Figure A I. 6: Shocks to corporate bond yields in EU Countries (bp)

	AAA	AA	A	BBB	BB	B<=	unrated
Non-Financials	24	120	135	214	260	323	350
Financials	16	116	198	372	432	484	516
Financials Covered	20	72	115	162	207	230	247

Source: ESRB.

Figure A I. 7: Shocks stock prices EU Countries (% drop of end-2015 market value)

Austria	-35.8	Latvia	-17.1
Belgium	-30.6	Lichtenstein	
Bulgaria	-20.9	Lithuania	-30.1
Croatia	-20.4	Luxembourg	-27.1
Cyprus	-27.6	Malta	-22.3
Czech Republic	-27.0	Netherlands	-34.1
Denmark	-30.9	Norway**	-32.0
Estonia*	-33.4	Poland	-26.3
Finland	-31.0	Portugal	-31.3
France	-35.6	Romania	-25.1
Germany	-34.1	Slovakia	-22.0
Greece	-34.2	Slovenia	-24.2
Hungary	-25.1	Spain	-35.8
Ireland	-31.3	Sweden	-28.4
Italy	-36.5	United Kingdom	-32.9
European Union		-33.4	

Source: ESRB and EIOPA.

Figure A I. 8: Shocks to property prices in EU countries (% drop of end-2015 market value)

Residential				Commercial			
Austria	-7.4	Latvia	-9.8	Austria	-6.4	Latvia	-7.5
Belgium	-2.6	Lichtenstein	-10.8	Belgium	-1.4	Lichtenstein	-7.6
Bulgaria	-4.4	Lithuania	-13.1	Bulgaria	-2.2	Lithuania	-8.2
Croatia	-14.6	Luxembourg	-10.8	Croatia	-2.5	Luxembourg	-7.6
Cyprus	-2.4	Malta	-4.0	Cyprus	-1.4	Malta	-5.8
Czech Republic	-1.4	Netherlands	-6.7	Czech Republic	-2.1	Netherlands	-11.4
Denmark	-5.8	Norway	-4.6	Denmark	-11.1	Norway	-3.7
Estonia	-8.9	Poland	-7.5	Estonia	-5.2	Poland	-3.0
Finland	-4.7	Portugal	-2.5	Finland	-3.2	Portugal	-2.4
France	-5.3	Romania	-7.0	France	-4.4	Romania	-5.7
Germany	-2.3	Slovakia	-9.8	Germany	-3.4	Slovakia	-5.6
Greece	-4.0	Slovenia	-1.9	Greece	-6.5	Slovenia	-0.4
Hungary	-4.2	Spain	-9.0	Hungary	-2.7	Spain	-6.6
Ireland	-8.9	Sweden	-4.6	Ireland	-9.6	Sweden	-4.2
Italy	-3.2	United Kingdom	-14.2	Italy	-6.6	United Kingdom	-14.7
European Union		-6.7		European Union		-6.0	

Source: ESRB and EIOPA.

Figure A I. 9: Shocks to other asset classes (% drop of end-2015 market value)

	Private equity	Hedge Funds	REIT	Commodities
Global	-23.3	-4.8	-22.4	-16.2
EU	-23.5	-2.3	-26.2	-6.8

Source: ESRB.

ANNEX II – Methodological aspects of the duration and cash flow patterns analysis

I. Methodological aspects and results of the duration analysis

1. As discussed in section 3.1.3 of the main body of the 2016 stress test report the liability cash flows reported by the participating undertakings were used to compute the Macaulay duration as in the 2014 exercise and also, for the first time, an approximation of the effective duration, both only for the insurance liabilities.

2. On the asset side, EIOPA did neither compute Macaulay, nor effective duration. Participating undertakings were actually required to disclose the modified duration of their fixed income asset portfolio (government and corporate bonds). Besides, these reported modified durations are used as a weighted average aggregated at country level while other fixed income asset positions like loans, mortgages and interest rate derivatives therefore not comprised in the summation. The results are presented in the report in Table 5 and they are deliberately not compared by EIOPA with liability durations, given the different source and methodology used to derive them.

3. In contrast to Macaulay duration, the concept of effective duration is not meant to give a view on the average maturity of the liabilities but aims at estimating the sensitivity to the interest rate. In this fashion, its use on the best estimate liabilities using a first order linear approximation of the internal rate of return ("IRR") takes into account potential changes in the cash flow patterns when moving from the baseline to the low-for long scenario. This approximation can be further decomposed according to the following formula:

$$D^{eff} = -\frac{\Delta \mathrm{PV}}{\Delta IRR} \cdot \frac{1}{PV^{base}} = -\frac{PV^{base} - PV^{ly}}{PV^{base}} \cdot \frac{1}{IRR^{base} - IRR^{ly}}$$

4. If the underlying cash flows sequence is fixed alongside both scenarios, Macaulay duration calculated for the baseline and effective duration computed in the previous paragraph should be in a comparable range. While Macaulay duration is a weighted average time until maturity (usually measured in years) the effective duration introduced above is a sensitivity measure where the best estimate liability is considered as a function of the internal rate of return (i.e. the percentage change in value with respect to IRR). It is calculated with the scenario specific cash flows net (i.e. outgoing minus incoming) which, when discounted with the relevant risk free rate, equal the corresponding best estimate liabilities. As a consequence, the interpretation of this indicator is restricted to the scenario under consideration (i.e. low-for long) and cannot be directly used to draw conclusions about other scenarios (e.g. interest rate up movement or other yield curve shifts).

5. The effective duration concept used in this exercise is only a rough approximation since the low-for-long ("LY") situation is far from the baseline one[27]. Moreover, the information value of such a metric is crucially dependent on the economic plausibility of the cash flow projection methodology under the considered scenarios.

6. The Table A II. 1 gives an overview of the duration of liabilities of the sample of the participating undertakings.

[27] An accurate estimation would require 5 or 10bp instead of approx. 100bp.

Table A II. 1: Duration of TP life for all lines of business

	Approx. effective duration	Macauly duration (liabilities)	Share of TP cash flows as % of liabilities
AT	9.96	15.77	80%
BE	7.65	10.99	77%
BG	15.44	15.33	106%
CY	4.55	8.03	56%
CZ	5.01	9.46	56%
DE	8.67	21.40	92%
DK	16.73	17.59	61%
EE	2.85	11.36	85%
ES	10.89	10.10	86%
FI	5.76	12.40	89%
FR	4.55	13.36	91%
GR	10.03	9.78	76%
HR	7.36	9.31	62%
HU	2.39	8.38	70%
IE	12.27	10.83	39%
IT	4.46	9.49	85%
LI	N/A	8.59	32%
LT	11.69	14.02	81%
LU	2.38	11.78	69%
NL	14.67	16.40	84%
NO	4.17	15.51	94%
PL	7.08	10.67	58%
PT	4.47	5.23	89%
RO	5.06	11.71	29%
SE	18.55	16.57	82%
SI	8.71	13.17	71%
SK	N/A	11.33	61%
UK	4.59	10.57	60%
EU/EEA	8.23	13.97	80%

7. The data sources, methodologies and assumptions applied in order to determine the values in Table A II. 1 are thoroughly described in the following paragraphs to ensure an appropriate understanding of the limitations which should be observed when interpreting these results:

- The calculations are performed by EIOPA using as input the liabilities net cash flows reported in the stress test template:
    - the Macaulay duration was computed based on the net cash flow for the baseline. This measure can be interpreted as a weighted average time until maturity of the insurance obligations.
    - the effective duration was approximated with the simplistic calculation explained above and can be interpreted as a sensitivity of the best estimate liability with respect to a change in internal rate of return. It is important to keep in mind that the change in internal rate of return can be driven by two factors: changes in discount rates and changes in net cash flows. The current exercise raised questions on the consistent modelling applied to determine the changes in the liabilities cash flows under the low-for-long scenarios.
- One column is added to the table in order to give an overview of the degree of representativeness by detailing the percentage of liabilities for which the cash flow pattern was disclosed and which, as such, could be used as a basis for the duration calculation of the technical provisions.

8. The differences observed between the two duration columns represent the difference in the two approaches explained above and as such they give an idea of the magnitude and direction of the impact of the optionalities on the resulting duration, which differ substantially at participating companies' level and even among countries.

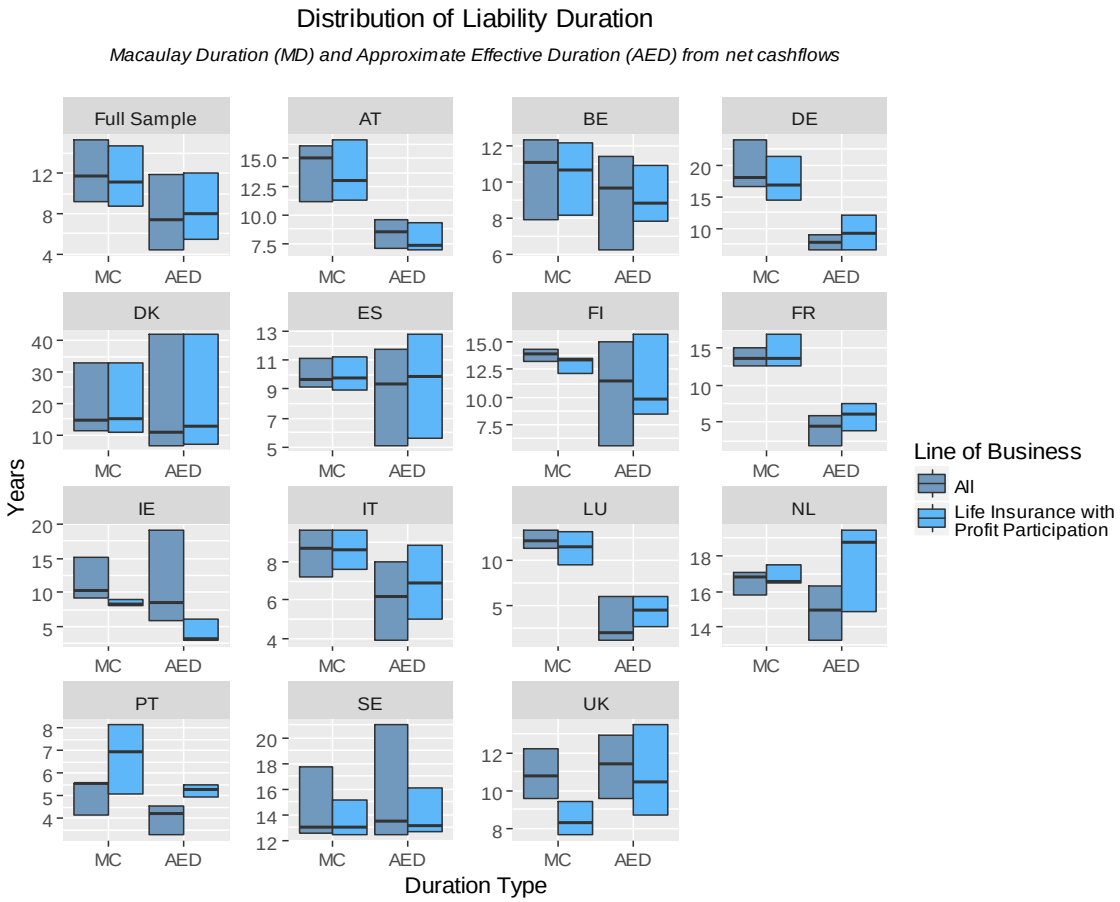
- Macaulay duration can be used to characterize the different business models in Europe with respect to the time dimension, i.e. whether it is more long-term or short-term character. Some countries with higher Macaulay average duration experience a higher increase in the liabilities under the low-for-long scenario (see for example AT, DE, NL, SE in Figure 34 in the report)
- Effective duration can serve as a sensitivity measure for the changes of best estimate values in the low-for long scenario compared to the baseline.

9. At least for the following list of countries, the participants have assumed in the cash flow projections a concrete realisation of the optionalities with an important impact on the resulting duration in terms of decreasing duration: AT, DE, FR, LU and NO. For some other countries there is a minor effect in the opposite direction probably caused by changing lapse behaviour. As the impact is often material, it is important for supervisors to check the reliability of the optionality assumptions embedded within the best estimate calculations moving from one scenario to the other.

10. Figure A II. 1 shows at country level the Macaulay duration (the two boxes on the right hand side) and the approximated effective duration (the two boxes on the left hand side). These results are shown for all lines of business as well as for life with profits business only for the 15 biggest EU markets[28] whenever the sample contains more than 3 companies. The bar represents the median while the box is delimiting the 25th and 75th Percentile. The first chart named "ALL" is the distribution across all companies in the sample (also from countries that are not included in the individual country panels).

[28] In terms of the criteria used to select stress test participants, i.e. life technical provisions excluding health and unit linked business.

Figure A II. 1: Duration of TP for all lines of business and life insurance with profit participation



II. Analysis of the cash flow patterns

11. In particular cash flow patterns in this section are approximated by taking the reported liability cash flows and the estimated cash flows stemming from fixed-income corporate and government bonds as explained in section 3.1.3. of the report. The cash flows stemming from any type of assets other than fixed-income corporate and government bonds are not considered in this analysis.

12. The assets and liabilities cash flows can also be used to investigate the following elements:

- The discounted available net cash flows (assets-liabilities) per country[29]. Dividing the discounted sum of net cash flows over the present value of the liability cash flows results in percentages. These are computed over all maturities, and for different maturity buckets to show the evolution over time.
- The percentage of cash flows over total assets and total liabilities for the cash flows taken into account in the calculation.

13. The differences between those approximated assets cash flows and those cash flows reported for the liabilities were first discounted using the RFR curve. Then they were analysed both at a global perspective and for some maturities potentially grouped (see Table A II. 2 below), using the corresponding present value. The difference was then called "Shortfall" or "Excess". This analysis aims at replicating a

[29] The discounting curve used is the EIOPA basic risk free curve.

very simple run-off strategy: the assets are run-off in such a way that even if a gain in the projection were to be isolated it would not be exploited and reinvested until the end of the projection and simply as cash money. The percentage of the business covered by the analysis is given as a percentage of the total amount of the liabilities.

14. This study cannot be compared to a standard Asset-Liability Management analysis which would only make sense at company level involving an accurate estimation of the actual cash flow projections. In such a case, one would need to introduce company specific reinvestment strategies and future management actions to be considered in every simulation on a sample path by sample path basis. From a validation perspective, the credibility of the evolution of such hypotheses in a stressed situation could be difficult to ensure. Those programmed future management actions should then be reviewed on a case by case basis: appropriate behaviour of policyholders – e.g. dynamic lapses modelling - regarding their incentives, adequation of the investment strategy with the asset cash flow patterns.

Table A II. 2: Cash flow gaps

Country	Shortfall/ Excess	Shortfall/Excess by 5 Years	1 year	2 years	3 years	4-5 years	6-10 years	11-15 years	16-20 years	21-30 years	31-40 years	41 years&more	Cash Flows of liabilities/Total liabilities	Cash Flows of Fixed Assets/Total assets
AT	-22.54%	0.36%	-0.79%	1.26%	0.78%	-0.89%	7.02%	-2.53%	-6.01%	-10.22%	-6.68%	-4.48%	61.58%	53.48%
BE	-8.62%	-5.82%	-2.97%	-0.41%	-1.60%	-0.84%	3.27%	2.05%	0.68%	-4.73%	-2.96%	-1.11%	70.22%	64.20%
BG	-5.96%	6.71%	-1.27%	0.38%	3.86%	3.74%	4.30%	-6.80%	-5.68%	-4.39%	-0.09%	-0.01%	87.56%	77.03%
CY	-53.30%	-11.23%	-3.15%	2.42%	-2.39%	-8.12%	-17.97%	-16.53%	-4.79%	-2.32%	-0.40%	-0.05%	35.72%	27.17%
CZ	35.45%	27.47%	1.10%	9.55%	5.27%	11.55%	18.23%	-4.86%	-5.75%	-0.13%	-0.85%	1.34%	76.12%	56.48%
DE	-27.86%	6.25%	-0.01%	2.06%	1.48%	2.72%	3.23%	-3.82%	-3.86%	-9.95%	-10.70%	-9.02%	66.33%	60.59%
DK	-44.24%	5.73%	0.52%	1.29%	1.28%	2.64%	-4.12%	-10.76%	-9.93%	-11.61%	-6.72%	-6.83%	33.99%	31.49%
EE	-32.42%	-3.98%	-2.11%	-0.59%	0.26%	-1.54%	-6.77%	-5.31%	-4.25%	-7.06%	-3.32%	-1.74%	57.28%	43.76%
ES	-11.01%	-10.85%	-8.10%	-0.72%	-1.78%	-0.24%	3.68%	2.20%	-2.31%	-1.34%	-2.10%	-0.30%	76.93%	69.23%
FI	-71.49%	-13.16%	-5.09%	-2.51%	-1.98%	-3.58%	-15.39%	-15.18%	-11.05%	-12.17%	-3.49%	-1.04%	25.35%	21.34%
FR	-35.36%	-5.33%	-2.10%	-1.23%	-1.45%	-0.56%	2.24%	-6.74%	-7.77%	-11.66%	-3.92%	-2.17%	59.01%	55.98%
GR	-19.02%	-5.28%	-2.86%	-3.71%	-1.34%	2.63%	0.77%	-2.12%	-5.32%	-4.50%	-1.83%	-0.73%	61.78%	53.14%
HR	18.68%	42.74%	4.83%	7.79%	8.90%	21.23%	4.88%	-12.33%	-9.60%	-6.66%	-0.31%	-0.04%	73.63%	53.00%
HU	-33.22%	0.17%	-0.78%	1.32%	-2.13%	1.76%	-10.59%	-10.41%	-6.55%	-4.46%	-1.08%	-0.29%	46.98%	38.05%
IE	-26.16%	-6.17%	-4.22%	-0.18%	-0.63%	-1.15%	-2.88%	-4.56%	-6.08%	-2.93%	-1.78%	-1.76%	26.46%	23.80%
IT	-23.80%	-14.01%	-4.39%	-3.44%	-3.56%	-2.62%	0.58%	-2.22%	-4.62%	-1.69%	-0.72%	-1.11%	64.91%	58.84%
LI	-78.47%	-32.09%	-10.02%	-8.02%	-6.22%	-7.83%	-18.44%	-13.22%	-8.08%	-5.60%	-1.40%	0.36%	6.83%	6.58%
LT	11.80%	32.60%	11.99%	7.73%	9.08%	3.80%	5.27%	-6.99%	-9.26%	-6.53%	-2.78%	-0.51%	90.39%	71.18%
LU	-71.31%	-26.90%	-6.19%	-6.56%	-5.22%	-8.93%	-11.08%	-9.61%	-8.19%	-11.69%	-2.92%	-0.92%	19.86%	19.37%
NL	-54.74%	-10.27%	-2.07%	-1.90%	-2.11%	-4.19%	-8.32%	-10.35%	-9.48%	-8.06%	-5.52%	-2.73%	37.81%	35.33%
NO	-50.74%	-0.11%	1.25%	-0.81%	-0.59%	0.04%	-1.34%	-11.71%	-11.83%	-16.00%	-7.00%	-2.74%	46.50%	42.43%
PL	-13.97%	-1.15%	-13.94%	9.18%	0.96%	2.65%	10.61%	-2.85%	-8.77%	-7.16%	-3.07%	-1.58%	49.82%	28.62%
PT	-42.59%	-32.77%	-8.59%	-6.75%	-6.08%	-11.34%	-4.38%	-2.59%	-1.93%	-0.79%	-0.09%	-0.04%	51.20%	46.91%
RO	67.71%	81.59%	26.94%	28.54%	8.79%	17.32%	18.86%	-13.52%	-12.14%	-6.47%	-0.52%	-0.09%	48.87%	40.57%
SE	-17.74%	37.78%	6.01%	10.47%	8.10%	13.19%	-5.40%	-12.28%	-12.13%	-15.28%	-7.42%	-3.01%	67.62%	41.04%
SI	15.73%	37.84%	6.82%	4.96%	5.10%	20.96%	12.19%	-7.11%	-10.60%	-12.81%	-2.86%	-0.92%	81.82%	60.43%
SK	20.87%	21.13%	-12.21%	7.30%	6.68%	19.36%	14.31%	2.23%	-6.41%	-7.36%	-2.76%	-0.26%	73.90%	55.35%
UK	-56.04%	-20.52%	-5.30%	-4.56%	-4.07%	-6.59%	-14.51%	-10.47%	-6.86%	-3.63%	-0.65%	0.59%	26.32%	24.26%

15. Overall, it is not surprising to see that the table mainly shows cash flow shortfalls as, on average, only 44% of the investment portfolio is represented by these cash flows. A few countries show an overall excess i.e. CZ, HR, LT, RO, SI and SK, whereas others show significant shortfalls taking into account the percentage of assets and liabilities actually modelled.

16. When investigating the evolution of the cash flow gaps over the first 10 years, the biggest shortfalls are noticed at year 1 of the projections which is in line with the observation that this shortfall is often covered by assets and other liquid investments not taken into account in the asset cash flow projections. The most important gap is observed around the maturities 11-20 years. The latter observation seems especially valid for countries such as CY, FI, RO, LI, HR, SE, NO, DK, UK, HU and NL where reinvestment risk is not necessarily an overall problem, but could have an impact. At least this observation seems to point to an important need for the roll-over of investments based on the current cash flow pattern. If this pattern remains broadly unchanged, one can expect several companies in these countries to be particularly exposed to a low yield environment if this persists for another decade.

ANNEX III - Participants list

NAME OF PARTICIPANT	COUNTRY OF INCORPORATION	CLASSIFICATION
UNIQA Österreich Versicherungen AG	AT	Undertaking pursuing both life and non-life insurance activity
Sparkassen Versicherung AG Vienna Insurance Group	AT	Undertaking pursuing both life and non-life insurance activity
Generali Versicherung AG	AT	Undertaking pursuing both life and non-life insurance activity
Raiffeisen Versicherung AG	AT	Undertaking pursuing both life and non-life insurance activity
Salzburger Landes-Versicherung AG	AT	Undertaking pursuing both life and non-life insurance activity
ERGO Versicherung AG	AT	Undertaking pursuing both life and non-life insurance activity
Allianz Elementar Lebensversicherung	AT	Life undertakings
WIENER STÄDTISCHE Versicherung AG Vienna Insurance Group	AT	Undertaking pursuing both life and non-life insurance activity
Wüstenrot Versicherungs-AG	AT	Undertaking pursuing both life and non-life insurance activity
KBC Insurance NV	BE	Undertaking pursuing both life and non-life insurance activity
BELFIUS INSURANCE NV	BE	Undertaking pursuing both life and non-life insurance activity
AXA BELGIUM	BE	Undertaking pursuing both life and non-life insurance activity
P&V Assurances SCRL	BE	Undertaking pursuing both life and non-life insurance activity
AG Insurance	BE	Undertaking pursuing both life and non-life insurance activity
Allianz Benelux N.V.	BE	Undertaking pursuing both life and non-life insurance activity
Ethias SA	BE	Undertaking pursuing both life and non-life insurance activity
Argenta Assuranties	BE	Undertaking pursuing both life and non-life insurance activity
NN Insurance Belgium	BE	Life undertakings
Allianz Bulgaria Life	BG	Life undertakings
BULSTRAD LIFE VIENNA INSURANCE GROUP Joint Stock Company	BG	Life undertakings
GRAWE Bulgaria Life JSC	BG	Life undertakings
TUMICO	BG	Life undertakings

ALTIUS INSURANCE LTD	CY	Undertaking pursuing both life and non-life insurance activity
CNP Cyprialife LTD	CY	Undertaking pursuing both life and non-life insurance activity
Ethniki Insurance (Cyprus) Limited	CY	Life undertakings
Medlife Insurance Ltd	CY	Life undertakings
Universal Life Insurance Public Company Limited	CY	Undertaking pursuing both life and non-life insurance activity
Allianz pojišťovna a.s.	CZ	Undertaking pursuing both life and non-life insurance activity
AXA životní pojišťovna a.s.	CZ	Undertaking pursuing both life and non-life insurance activity
Česká pojišťovna a.s.	CZ	Undertaking pursuing both life and non-life insurance activity
Česká podnikatelská pojišťovna, a.s., Vienna Insurance Group	CZ	Undertaking pursuing both life and non-life insurance activity
ČSOB pojišťovna a.s.	CZ	Undertaking pursuing both life and non-life insurance activity
Generali Pojišťovna a.s.	CZ	Undertaking pursuing both life and non-life insurance activity
Komerční pojišťovna, a. s.	CZ	Undertaking pursuing both life and non-life insurance activity
Kooperativa pojišťovna, a.s., Vienna Insurance Group	CZ	Undertaking pursuing both life and non-life insurance activity
Pojišťovna České Spořitelny, a.s., Vienna Insurance Group	CZ	Undertaking pursuing both life and non-life insurance activity
UNIQA pojišťovna a.s.	CZ	Undertaking pursuing both life and non-life insurance activity
AachenMünchener Lebensversicherung AG	DE	Life undertakings
Württembergische Lebensversicherung AG	DE	Life undertakings
Allianz Lebensversicherungs-AG	DE	Life undertakings
ALTE LEIPZIGER Lebensversicherung a.G.	DE	Life undertakings
Bayern-Versicherung Lebensversicherung Aktiengesellschaft	DE	Life undertakings
AXA Lebensversicherung AG, Köln	DE	Life undertakings
Cosmos Lebensversicherungs Aktiengesellschaft	DE	Life undertakings
Debeka Lebensversicherungsverein a.G.	DE	Life undertakings
HDI Lebensversicherung AG	DE	Life undertakings
IDUNA Vereinigte Lebensversicherung aG	DE	Life undertakings
Provinzial Nordwest Lebensversicherung AG	DE	Life undertakings
SV SparkassenVersicherung Lebensversicherung	DE	Life undertakings

AG		
Volkswohl Bund Lebensversicherung a.G.	DE	Life undertakings
Zurich Deutscher Herold Lebensversicherung AG	DE	Life undertakings
Generali Lebensversicherung Aktiengesellschaft	DE	Life undertakings
Victoria Lebensversicherung AG	DE	Life undertakings
R+V Lebensversicherung Aktiengesellschaft	DE	Life undertakings
neue leben Lebensversicherung AG	DE	Life undertakings
ERGO Lebensversicherung AG	DE	Life undertakings
Hannoversche Lebensversicherung AG	DE	Life undertakings
AP Pension Livsforsikringsaktieselskab	DK	Life undertakings
Danica Pension, Livsforsikringsaktieselskab	DK	Life undertakings
Lærernes Pension, Forsikringsaktieselskab	DK	Life undertakings
Nordea Life & Pension Denmark	DK	Life undertakings
PenSam Liv	DK	Life undertakings
PFA Pension	DK	Undertaking pursuing both life and non-life insurance activity
Pensionskassen for Socialrådgivere, Socialpædagoger og Kontorpersonale	DK	Life undertakings
Pensionskassen for Sundhedsfaglige	DK	Life undertakings
Pensionskassen for Sygeplejersker og Lægesekretærer	DK	Life undertakings
Sampension KP Livsforsikring A/S	DK	Life undertakings
SEB Pensionsforsikring A/S	DK	Life undertakings
Topdanmark Livsforsikring A/S	DK	Undertaking pursuing both life and non-life insurance activity
Compensa Life Vienna Insurance Group SE	EE	Undertaking pursuing both life and non-life insurance activity
SEB Elu- ja Pensionikindlustus	EE	Undertaking pursuing both life and non-life insurance activity
Swedbank Life Insurance SE	EE	Life undertakings
CAJA DE SEGUROS REUNIDOS, S.A.	ES	Undertaking pursuing both life and non-life insurance activity
Santander Seguros y Reaseguros Compañía Aseguradora S.A.	ES	Undertaking pursuing both life and non-life insurance activity
Generali España, Sociedad Anónima de Seguros y Reaseguros	ES	Undertaking pursuing both life and non-life insurance activity
Allianz Compañía de Seguros	ES	Undertaking pursuing both life and non-life insurance activity
IBERCAJA VIDA, CÍA SEGUROS Y REASEGUROS S.A.U.	ES	Undertaking pursuing both life and non-life insurance activity

SEGUROS CATALANA OCCIDENTE, SOCIEDAD ANONIMA DE SEGUROS Y REASEGUROS	ES	Undertaking pursuing both life and non-life insurance activity
BBVA SEGUROS SA DE SEGUROS Y REASEGUROS	ES	Undertaking pursuing both life and non-life insurance activity
MAPFRE VIDA SOCIEDAD ANONIMA DE SEGUROS Y REASEGUROS	ES	Undertaking pursuing both life and non-life insurance activity
BANSABADELL VIDA DE SEGUROS Y REASEGUROS, S.A.	ES	Life undertakings
RGA RURAL VIDA, S.A. de Seguros y Reaseguros	ES	Life undertakings
VIDACAIXA S.A.U. DE SEGUROS Y REASEGUROS	ES	Undertaking pursuing both life and non-life insurance activity
Mediterráneo Vida, S.A. de Seguros y Reaseguros	ES	Life undertakings
AXA Aurora Vida	ES	Life undertakings
AXA Vida	ES	Life undertakings
NATIONALE-NEDERLANDEN VIDA, COMPAÑIA DE SEGUROS Y REASEGUROS SOCIEDAD ANONIMA ESPAÑOLA	ES	Life undertakings
BANKIA MAPFRE VIDA, S.A	ES	Undertaking pursuing both life and non-life insurance activity
MUTUALIDAD GENERAL DE LA ABOGACIA, MUTUALIDAD DE PREVISION SOCIAL A PRIMA FIJA	ES	Undertaking pursuing both life and non-life insurance activity
LähiTapiola keskinäinen henkivakuutusyhtiö	FI	Life undertakings
Mandatum Life Insurance Company Limited	FI	Life undertakings
Nordea Life Assurance Finland Ltd	FI	Life undertakings
OP Life Assurance Company Ltd	FI	Life undertakings
Fennia Life Insurance Company Ltd	FI	Life undertakings
If P&C Insurance Company Ltd.	FI	Non-Life undertaking
Fennia Mutual Insurance Company	FI	Non-Life undertaking
LähiTapiola Keskinäinen Vakuutusyhtiö	FI	Non-Life undertaking
OP Insurance Ltd	FI	Non-Life undertaking
ASSURANCES DU CREDIT MUTUEL VIE SA	FR	Life undertakings
CNP Assurances	FR	Undertaking pursuing both life and non-life insurance activity
Allianz Vie S.A.	FR	Undertaking pursuing both life and non-life insurance activity
PREDICA	FR	Life undertakings
LA MONDIALE	FR	Life undertakings
La France Mutualiste	FR	Life undertakings

BPCE VIE	FR	Undertaking pursuing both life and non-life insurance activity
AXA France VIE	FR	Undertaking pursuing both life and non-life insurance activity
Groupama Gan Vie	FR	Life undertakings
Malakoff Médéric Prévoyance	FR	Undertaking pursuing both life and non-life insurance activity
QUATREM	FR	Undertaking pursuing both life and non-life insurance activity
SURAVENIR	FR	Undertaking pursuing both life and non-life insurance activity
Generali Vie S.A.	FR	Life undertakings
LA MONDIALE PARTENAIRE	FR	Life undertakings
SOGECAP	FR	Life undertakings
Cardif Assurance Vie	FR	Undertaking pursuing both life and non-life insurance activity
Aviva Vie	FR	Life undertakings
Eurolife ERB Life Insurance S.A.	GR	Life undertakings
GROUPAMA PHOENIX HELLENIC INSURANCE COMPANY S.A.	GR	Undertaking pursuing both life and non-life insurance activity
NN Hellenic Life Insurance Co. S.A.	GR	Undertaking pursuing both life and non-life insurance activity
Allianz Hellas SA	GR	Undertaking pursuing both life and non-life insurance activity
"The Ethniki" Hellenic General Insurance Company S.A.	GR	Undertaking pursuing both life and non-life insurance activity
Interamerican Hellenic Life Insurance Company SA	GR	Undertaking pursuing both life and non-life insurance activity
Alphalife AAEZ	GR	Life undertakings
METLIFE LIFE INSURANCE S.A.	GR	Undertaking pursuing both life and non-life insurance activity
Allianz Zagreb d.d.	HR	Undertaking pursuing both life and non-life insurance activity
Croatia osiguranje d.d.	HR	Undertaking pursuing both life and non-life insurance activity
Grawe Hrvatska d.d.	HR	Undertaking pursuing both life and non-life insurance activity
Merkur osiguranje d.d.	HR	Undertaking pursuing both life and non-life insurance activity
UNIQA osiguranje d.d.	HR	Undertaking pursuing both life and non-life insurance activity
Wiener osiguranje Vienna Insurance Group d.d.	HR	Undertaking pursuing both life and non-life insurance activity

Aegon Magyarország Általános Biztósító Zrt.	HU	Undertaking pursuing both life and non-life insurance activity
Allianz Hungária Biztosító	HU	Undertaking pursuing both life and non-life insurance activity
Generali Biztosító Zrt.	HU	Undertaking pursuing both life and non-life insurance activity
GRAWE Életbiztosító Zrt.	HU	Life undertakings
Groupama Biztosító Zártkörűen Működő Rt.	HU	Undertaking pursuing both life and non-life insurance activity
NN Biztosító Zrt.	HU	Undertaking pursuing both life and non-life insurance activity
Magyar Posta Életbiztosító Zrt.	HU	Life undertakings
SIGNAL Biztosító Zrt.	HU	Undertaking pursuing both life and non-life insurance activity
UNION Biztosító	HU	Undertaking pursuing both life and non-life insurance activity
UNIQA Biztosító Zrt.	HU	Undertaking pursuing both life and non-life insurance activity
Aegon Ireland plc	IE	Life undertakings
Allianz Global Life	IE	Life undertakings
AXA Life Europe	IE	Life undertakings
Canada Life Assurance Europe Limited	IE	Life undertakings
Canada Life International Re Limited	IE	Life undertakings
Friends First Life Assurance Company Limited	IE	Life undertakings
Hannover Re (Ireland)	IE	Undertaking pursuing both life and non-life insurance activity
Hawthorn Life	IE	Life undertakings
Irish Life Assurance PLC	IE	Life undertakings
MetLife Europe Limited	IE	Undertaking pursuing both life and non-life insurance activity
New Ireland Assurance	IE	Life undertakings
RGA International Reinsurance Company Limited	IE	Life undertakings
SCOR GLOBAL LIFE REINSURANCE IRELAND LTD	IE	Undertaking pursuing both life and non-life insurance activity
Zurich Life Assurance plc	IE	Life undertakings
Generali Italia S.p.A.	IT	Undertaking pursuing both life and non-life insurance activity
Zurich Investments Life S.p.A.	IT	Life undertakings
UnipolSai Assicurazioni S.p.A.	IT	Undertaking pursuing both life and non-life insurance activity

ITAS Vita S.p.a.	IT	Life undertakings
Intesa Sanpaolo Vita	IT	Life undertakings
UNIQA Previdenza S.p.A.	IT	Life undertakings
Crédit Agricole Vita S.p.A.	IT	Life undertakings
CreditRas Vita S.p.A.	IT	Life undertakings
BNP Paribas Cardif Vita S.p.A.	IT	Life undertakings
CNP UNICREDIT VITA	IT	Life undertakings
PosteVita SpA	IT	Life undertakings
BancAssurance Popolari S.p.A.	IT	Life undertakings
Genertellife	IT	Life undertakings
BERICA VITA S.P.A.	IT	Life undertakings
Allianz S.p.A.	IT	Undertaking pursuing both life and non-life insurance activity
Alleanza Assicurazioni S.p.A.	IT	Undertaking pursuing both life and non-life insurance activity
Baloise Life (Leichtenstein) AG	LI	Life undertakings
Fortuna Lebens-Versicherung AG	LI	Life undertakings
LV 1871 Private Assurance AG	LI	Life undertakings
PKRück Lebensversicherungsgesellschaft für die betriebliche Vorsorge AG	LI	Life undertakings
PrismaLife AG	LI	Life undertakings
Swiss Life (Liechtenstein) AG	LI	Life undertakings
Gyvybės draudimo UAB BONUM PUBLICUM (Life insurance JSC BONUM PUBLICUM)	LT	Life undertakings
ERGO Life Insurance	LT	Undertaking pursuing both life and non-life insurance activity
PZU Lietuva gyvybės draudimas	LT	Undertaking pursuing both life and non-life insurance activity
LA MONDIALE EUROPARTNER	LU	Life undertakings
Foyer Vie	LU	Life undertakings
CARDIF LUX VIE S.A	LU	Life undertakings
NN Life Luxembourg S.A.	LU	Life undertakings
CALI Europe	LU	Life undertakings
SOGELIFE S.A.	LU	Life undertakings
Swiss Life (Luxembourg) SA	LU	Life undertakings
SEB Dzivibas apdrosinasana	LV	Undertaking pursuing both life and non-life insurance activity

MSV Life P.L.C.	MT	Life undertakings
HSBC Life Assurance (Malta) Limited	MT	Life undertakings
Delta Lloyd Levensverzekering NV	NL	Life undertakings
Nationale-Nederlanden Levensverzekering Mij N.V.	NL	Life undertakings
ASR Levensverzekering N.V.	NL	Life undertakings
Aegon Levensverzekering N.V.	NL	Life undertakings
Achmea Pensioen & Levensverzekeringen N.V.	NL	Life undertakings
SRLEV N.V.	NL	Life undertakings
DNB Livsforsikring AS	NO	Undertaking pursuing both life and non-life insurance activity
Kommunal Landspensjonskasse gjensidig forsikringsselskap	NO	Life undertakings
Storebrand Livsforsikring AS	NO	Undertaking pursuing both life and non-life insurance activity
Powszechny Zakład Ubezpieczeń Spółka Akcyjna	PL	Non-Life undertaking
MetLife TUnZiR S.A	PL	Life undertakings
Aviva Towarzystwo Ubezpieczeń na Życie S.A.	PL	Life undertakings
Powszechny Zakład Ubezpieczeń na Życie Spółka Akcyjna	PL	Life undertakings
Nationale Nederlanden Towarzystwo Ubezpieczeń na Życie S.A.	PL	Life undertakings
Fidelidade - Companhia de Seguros, S.A.	PT	Undertaking pursuing both life and non-life insurance activity
Ocidental - Companhia Portuguesa de Seguros de Vida, S.A.	PT	Life undertakings
BPI Vida e Pensões - Companhia de Seguros, S.A.	PT	Life undertakings
GNB - Companhia de Seguros de Vida S.A.	PT	Life undertakings
Crédito Agrícola Vida, Companhia de Seguros S.A.	PT	Life undertakings
ASIGURAREA ROMANEASCA - ASIROM VIENNA INSURANCE GROUP S.A.	RO	Undertaking pursuing both life and non-life insurance activity
GRAWE ROMANIA ASIGURARE SA	RO	Undertaking pursuing both life and non-life insurance activity
NN Asigurari de Viata SA	RO	Life undertakings
AMF Pensionsförsäkring AB	SE	Life undertakings
Alecta pensionsförsäkring ömsesidigt	SE	Life undertakings
Folksam ömsesidig Livförsäkring	SE	Undertaking pursuing both life and non-life insurance activity

Länsförsäkringar Liv	SE	Life undertakings
Livförsäkringsbolaget Skandia, ömsesidigt	SE	Life undertakings
GRAWE Zavarovalnica d.d.	SI	Undertaking pursuing both life and non-life insurance activity
Merkur zavarovalnica d.d., Ljubljana	SI	Undertaking pursuing both life and non-life insurance activity
NLB Vita d.d. Ljubljana	SI	Undertaking pursuing both life and non-life insurance activity
Zavarovalnica Maribor d.d.	SI	Undertaking pursuing both life and non-life insurance activity
Triglav insurance company, plc	SI	Undertaking pursuing both life and non-life insurance activity
Allianz-Slovenská poist'ovna, a.s.	SK	Undertaking pursuing both life and non-life insurance activity
Generali Poistovna a.s.	SK	Undertaking pursuing both life and non-life insurance activity
KOMUNÁLNA poisťovňa, a.s. Vienna Insurance Group	SK	Undertaking pursuing both life and non-life insurance activity
KOOPERATIVA poisťovňa, a.s. Vienna Insurance Group	SK	Undertaking pursuing both life and non-life insurance activity
NN Life Slovakia (Poist'ovna)	SK	Life undertakings
Wüstenrot poisťovňa, a.s.	SK	Undertaking pursuing both life and non-life insurance activity
Canada Life Limited	UK	Life undertakings
Phoenix Life Limited	UK	Life undertakings
Legal & General Assurance Society	UK	Undertaking pursuing both life and non-life insurance activity
The Royal London Mutual Insurance Society Limited	UK	Life undertakings
Prudential UK	UK	Life undertakings
Scottish Widows Limited	UK	Life undertakings
Aviva Life & Pensions UK Limited	UK	Life undertakings
Friends Life Limited	UK	Life undertakings
Aviva Annuity UK Limited	UK	Life undertakings
Standard Life Assurance Limited	UK	Life undertakings

LIST OF FIGURES AND TABLES

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Annex I

Annex II