IORPs Stress Test Report 2015

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Executive Summary

Introduction

1. This report provides the result of the first EU-wide stress test exercise of Institutions for Occupational Retirement Provisions (IORPs). EIOPA is mandated by its founding Regulation to assess the resilience of the financial sector to adverse market developments. EIOPA carried out the stress test in 17 countries (AT, BE, CY, DE, DK, ES, IE, IS, IT, LU, NL, NO, PT, SE, SI, SK, UK) during 2015, based on 2014 year-end data[1].

2. The occupational pension sector in Europe is characterised by a huge heterogeneity across countries, both in terms of the different relative share of private and public pensions, and in terms of regulatory frameworks. Differences in national regulatory frameworks occur especially with respect to the valuation of liabilities, different IORPs' funding requirements and the available security mechanisms.

3. The stress test is conducted against the background of a macroeconomic environment and demographic development that already in itself poses significant challenges to the European occupational pensions sector.

4. The stress test goal is the identification of risks and vulnerabilities for the delivery of safe and sustainable pensions and the potential financial stability consequences, under a set of severe stress scenarios.

5. The exercise aims at covering the full picture of the Occupational Pensions, including defined benefit, defined contribution and hybrid pension schemes. Due to their different nature and features, the stress test consists of two parts, specific to the characteristics of defined benefit (DB) and defined contribution (DC), the latter labelled as a satellite module.

6. The stress test scenarios have been developed in close cooperation with the European Systemic Risk Board (ESRB).

7. A common market-based and risk-sensitive methodology, together with current national prudential standards, has been included in this exercise to allow for EU-wide consistent comparisons as well as for the derivation of financial stability conclusions at EU level.

Participation

8. Participation in the exercise was sufficiently representative of the European IORPs sector to be able to draw inferences of a potential systemic nature.

9. DB IORPs dominate the European occupational pension market by volume. For almost all countries participating in the DB exercise, market coverage of over 50% in terms of total assets was achieved. For the DC satellite, most of the countries are represented by IORPs covering more than 50% in terms of total assets or alternatively in terms of number of plan members.

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[1] In case that audited data end of 2014 was not available, IORPs were allowed to provide best estimate (see IORPs Stress test 2015 Specification, paragraph 3.3, pp 10).

Defined Benefit & Hybrid Pension Schemes

10. The pre-stress situation as well as the impact of two instantaneous adverse market scenarios and also one instantaneous longevity shock scenario was assessed for DB schemes. This assessment was based on the National Balance Sheet (NBS) as well as on a Common Methodology.

Baseline scenario

11. In the *National Balance Sheet* the overall balance of assets over liabilities for the sample shows a market-wide EUR 78bn pre-stress deficit which mainly results from deficits in a few countries (the aggregate assets over liabilities ratio is 95%). This result is characterised by a high degree of heterogeneity among countries. Indeed, valuation methods for the National Balance Sheet are country specific, being based for assets either on market or book values and for liabilities on discount rates varying between risk-free rates (RFR) and expected returns on assets. Also different prudential mechanisms are in place to deal with the funding deficits.

12. When applying the *Common Methodology*, results are more comparable, as harmonised (market-consistent) valuation methods are used, although this methodology is not in place in any Member State. Furthermore, the Common Methodology allows for a cross country comparison as it recognises sponsor support, pension protection scheme and benefit adjustment mechanisms, imposing a balancing of the deficit situations. For the purpose of the stress test and to allow for an aggregate deficit estimation, the market value of the assets excluding the sponsor support and pension protection scheme is first compared with the market value of the liabilities before any benefit reduction is considered. The result of this comparison is an aggregate assets over liabilities ratio of 76% and an aggregated deficit of assets over liabilities of EUR 428bn. This is driven mainly by the effect of the application of a risk-free discount rate in the calculation of liabilities. When the values of sponsor support, pension protection scheme and benefit reductions are taken into account, for the stress test sample there is a surplus of EUR 98bn. It should be noted that where the results for an IORP showed liabilities (where relevant including ex-post benefit reductions) greater than assets, including sponsor support and pension protection scheme, EIOPA decided to treat the deficit as representing a benefit reduction. As a consequence, there are no deficits results and the aggregate total is a surplus.

13. For the correct interpretation of the above figures, it is important to consider the nature of pension liabilities. While the market-consistent valuation methods give a more realistic view of the prospective liabilities, it is important to consider that payments and outflows of pension liabilities are very long-term in nature, allowing for substantial recovery periods and adjustment mechanisms.

Market stress scenarios

14. The DB stress test comprises the following scenarios:

- Adverse market scenario 1: aims at capturing the impact of a negative demand shock triggered by a drop in equity markets in the European Union affecting other assets classes, and, at the same time, assuming no 'safe haven' status for sovereigns.

- Adverse market scenario 2: entails an abrupt decline of prices across a broad spectrum of asset classes although generally lower than in adverse market scenario 1, and on top of that assumes a materialization of geopolitical risks which leads to a negative supply shock to the oil market and other commodities.

15. Both scenarios impact IORPs in two ways. First of all, IORPs are vulnerable to a drop in asset prices. Additionally, a decrease in interest rates would, directly lead to an increase in the market-consistent value of technical provisions. Due to the corresponding spread widening, interest rate sensitive assets would not offset this increase and hence the position of DB IORP schemes would be impaired further.

16. In the *National Balance Sheet,* the aggregate stressed results for DB schemes suggest an aggregate deficit of assets over liabilities of EUR 373bn and EUR 346bn corresponding to an aggregate ratio of 75% and 78% for scenarios 1 and 2 respectively. The high deficits in certain schemes could exert pressure on sponsors' balance sheets. IORPs with a large relative share of equities and property in their investment portfolio are most severely impacted by the stress scenarios.

17. Under the *Common Methodology*, the aggregate deficit of assets (excluding sponsor support and pension protection scheme) over liabilities (excluding benefit reductions) is EUR 755bn and EUR 773bn corresponding to an aggregate ratio of 59% and 61% for scenarios 1 and 2 respectively. The impact is measured as a decline of total assets and an increase of liabilities, excluding any benefit reductions. The application of the Common Methodology exhibits a more severe scenario impact but also reveals higher sensitivity to scenario 2.

18. Scenario 2, even with smaller stress on the investment side, is more severe due to the higher impact of lower interest rates to the market value of the liabilities. This is not visible under the current National Balance Sheet regime.

19. If benefit reductions and sponsor support are required to supplement this increase in deficits, this would imply a doubling of both benefit reductions and sponsor support as a share of total assets for both scenarios as compared to pre-stress, potentially putting strain on the real economy. Again it is important to highlight the possibility and existence of recovery periods and the time element of realising pension liabilities. Potential rebound of markets going forward would alleviate the impact assumed in the instantaneous stress scenarios.

Longevity shock scenario

20. The impact of a longevity shock in the form of an instantaneous permanent decrease of 20% in mortality rates was evaluated as a separate scenario. The results for both the National Balance Sheet and the Common Methodology show that the effect of the longevity scenario on the IORPs liabilities, although not negligible, is relatively limited for all countries when compared to the two adverse market scenarios affecting both sides of the balance sheet. This reflects the relative strength of the investment and longevity change stress assumptions.

Defined Contribution satellite module

21. DC plans are sensitive to the current low interest rate environment. Low interest rates can result in lower returns on assets in the accumulation phase. This could potentially affect adequacy of pensions if it leads to lower income in retirement.

22. The satellite module for DC schemes assesses the resilience of future retirement income of three representative plan members (35, 20 and 5 years before the expected retirement date) to adverse scenarios. The data collected through the satellite module show that around a quarter of DC members fall within the representative member category who are 35 or more years away from retirement, and approximately half of the DC members are more than 25 years away from retirement.

23. The module considers two asset price shock scenarios, two low return scenarios and an increased longevity scenario. In DC schemes, risks are borne by the plan members, which means that the IORP's balance sheet will by definition be in equilibrium. The results are assessed in comparison to a baseline scenario that includes assumptions prescribed by EIOPA. The goal is not to make pension projections but only to construct a benchmark in order to assess the impact of adverse scenarios.

24. Both the asset price shock scenarios and the low return scenarios included a decline in nominal interest rates that was first accompanied by a simultaneous decrease in future inflation, which dampened the negative effects on replacement rates of the representative plan members. The impact on replacement rates is most severe in scenarios when lower interest rates were accompanied by a rise in future inflation, which reduces the purchasing power of already lower retirement income. Finally, the replacement rates of younger plan members were most exposed to the low return scenarios with a structural reduction in interest rates and the equity risk premium.

25. Plan members close to retirement were shown to be particularly sensitive to price falls of assets, like equities, real estate and alternative investments. Investments in such non-fixed income assets result in higher expected returns and higher expected retirement income, but they also expose plan members to more risk. Hence life-cycle strategies tend to concentrate this risk at the early stages of the life-cycle when plan members have more scope to recoup negative shocks materialising. Plan members close to retirement were also exposed to a decline in interest rates. Lower interest rates will make it more expensive to convert accumulated wealth in an annuity or result in lower investment income on assets used for programmed withdrawals.

26. Some IORPs tend to hedge this interest rate risk by increasing the duration of fixed income assets over the life-cycle. The exercise illustrated that these duration-matching strategies may not always be successful. The asset price shock scenarios assumed strong increases in credit spreads on government and corporate bonds exceeding the decline in the risk-free rate which reduces the effectiveness of the hedging. As a result, the value of fixed-income portfolios declined with the decrease being more material for long-duration bonds. In the low return scenarios these duration-hedging strategies were effective, as the yields on government and corporate bonds moved in tandem with the risk-free interest rate.

27. Similar conclusions can be drawn for (the few) IORPs that hedge inflation risk through inflation-linked bonds. Such strategies are designed to work when real yields move in line with real risk-free rates, but a sudden rise in the credit spreads on inflation-linked bonds will reduce its effectiveness.

Second Round effects

28. A conclusion which may be drawn from the conducted analysis covering second round effects on financial markets is that there is likely to be a variety of responses from IORPs to the adverse scenarios considered in the stress test. Although, most of the IORPs who responded to the quantitative and qualitative questionnaire (as part of the stress test) follow a passive buy-and-hold investment strategy, this is rather a minority in terms of pension assets. Those IORPs who represent majority of pension assets expect to rebalance allocations to assets that have suffered the steepest price falls, most notably listed equities. Hence, as sellers of government and corporate bonds and buyers of non-fixed income assets, they might support the stabilisation of those segments which would be hit the hardest in the adverse market scenarios.

Conclusions

29. This first IORPs stress test provides relevant information regarding the impact of shocks on both DB and DC pension plans, revealing certain risks and vulnerabilities on the DB side for the delivery of safe and sustainable pensions. At the same time, it also shows that further work is necessary to get a more in-depth understanding of the outcomes and identified risks, and the subsequent measures to be taken.

30. First, in the DB analysis, the current level of heterogeneity is very high among countries. To be able to compare the stress test results and assess the impact of shocks on financial stability at EU level it is fundamental to include in these exercises a harmonised approach towards valuation of assets and liabilities that is more realistic and sensitive to market movements.

31. Second, many DB & Hybrid IORPs present deficits in terms of the excess of assets over liabilities even in a pre-stress situation, measured at NBS. The amount of those deficits varies among different EU Member States. The importance in relation to the size of the economies is substantial, at least for a few countries, although the impact may be dampened by the long term nature of liabilities and ability for IORPs to use security mechanisms and spread deficit recovery over a number of years.

32. The results of the severe stress scenarios applied show a significant increase in the deficits of assets over liabilities, revealing a number of risks and vulnerabilities that deserve proper attention from IORPS and supervisors. At the same time it is important to realise that the absorption of these shocks depends heavily on the time element for realising liabilities and the mitigation and recovery mechanisms in place. Further work is needed in order to have a deeper understanding of the impact on financial markets and the real economy of the aforementioned reality, especially concerning the consequences of the extra pressure put on sponsors to increase their future contributions.

33. Thirdly, the two shock scenarios in the DC part will affect the member profiles with a fall in assets prices and declining interest rates. The time to retirement is a key driver of the impact: the closer to retirement, the higher is the accumulated pension wealth and the lesser is the time to recover after the shock. In essence, these plan members will be the most sensitive to the fall in asset prices. However, the decline in interest rates also results in lower investment returns on assets, which has the largest impact on representative members farthest away from retirement, as it affects a larger part of their life-cycle. In fact, young plan members are more heavily impacted than the plan member closest to retirement in all countries in the two low return scenarios.

1. Background

1.1. Introduction

34. The aim of the 2015 IORPs[2] stress test is to test the resilience of defined benefit (DB) and hybrid pension schemes against adverse market scenarios and increases in life expectancy. A satellite module on defined contribution (DC) schemes was also run, aiming at assessing the impact of stress test scenarios on the expected benefits of members. The stress test and the satellite module represent a cooperative effort involving IORPs, National Competent Authorities (NCA), EIOPA and the ESRB/ECB.

35. The 2015 IORPs stress test constitutes the first European-wide exercise, including all European Economic Area countries with material IORP sectors and covering all types of IORPs. EIOPA wants to thank all the IORPs participating in the exercise who have worked together with the NCA for their contribution, enhancing transparency of the occupational pension's landscape in Europe. The stress test has been designed for the countries where the IORP sector exceeds EUR 500mn in assets. The following Member States fall within this scope[3]: AT, BE, CY, DE, DK, ES, FI[4], IE, IT, LU, NL, NO, PT, SE, SI, SK and the UK. IS volunteered to participate.

36. IORPs in the European Union (EU) operate defined/hybrid benefits schemes and defined contribution schemes. In the first type of scheme, financial market and longevity risks are shared to different degrees by the sponsor, members and beneficiaries, pension protection schemes and the IORPs. The level of risk sharing differs across Member States. These provide employees with a defined level of pension, subject to market developments and how the risks are shared across the stated parties. In the second type of scheme, IORP members purely bear these risks at least in the accumulation phase. IORPs are regulated by the IORP Directive[5], which lays down minimum rules at the EU level with regard to the valuation of liabilities and funding requirements. These are often supplemented at the national level. As a result, IORPs are subject to different national prudential requirements.

37. The exercise consists of two parts with two different approaches, one part for IORPs providing Defined Benefits and Hybrid schemes (DB) and the other part for IORPs providing Defined Contribution (DC) schemes only. The latter has been labelled as a satellite module, in order to flag the different nature of this part of the stress test exercise. The exercise is based on 2014 year-end data[6].

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[2] Institutions for Occupational Retirement Provision.

[3] French IORPs are almost entirely borne by the State, and voluntary occupational pension schemes are still only a small part of the market. For this reason, even though FR is one of the major European economies, the threshold was not reached in this country.

[4] FIN-FSA decided not to participate in this first stress test in view of the minor importance of the IORP sector compared to their statutory system both under their supervision and because most IORPs do not take any new members (except for one small undertaking).

[5] Directive 2003/41/EC on the Activities and Supervision of Institutions for Occupational Retirement Provision (IORPs).

[6] In case that audited year-end 2014 data were not available, IORPs were allowed to provide best estimate (see IORPs Stress test 2015 Specifications, paragraph 3.3, pp 10).
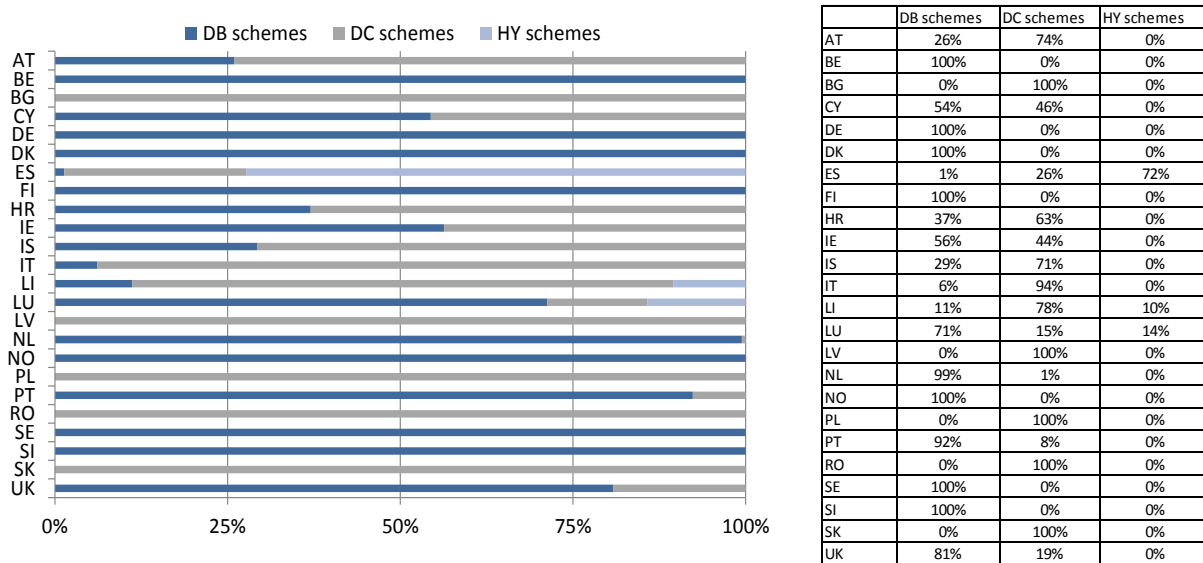
38. The EIOPA regulation[7] distinguishes two possible objectives of such stress tests, assessing:

a) the resilience of financial institutions to adverse market developments;

b) the potential for systemic risk that may be posed by financial institutions to increase in situations of stress.

39. **The current macroeconomic environment generates increasing challenges for the European IORP sector.** Interest rates have substantially declined over the last years. Even though they are currently above their minimum levels from mid-April 2015, they still remain at very low levels keeping pressure on IORPs' liabilities calculated using market values. Moreover, geopolitical risks together with recent turbulences in international stock markets and their spill-over effects might trigger a reassessment of risk premiums. Such a scenario assuming risk-free interest rates remaining at the current low level would have a negative impact on many IORPs.

40. As a consequence of the low interest rate environment and the increase in longevity risk, DB schemes have struggled to obtain returns in line with those needed to fund the promised benefits, without adjusting the contribution rates payable or the benefit levels. A trend towards DC schemes has been observed for many years in many countries; this can be explained by sponsors wanting to limit the cost of providing pension benefits and exposure to risks in general. The same trend is observed towards hybrid schemes that combine elements of both DB and DC schemes. As shown in Figure 1, there is a substantial heterogeneity between the share of DB and DC schemes across European countries[8].

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[7] See article 21 of the Regulation (EU) N. 1094/2010 of the European Parliament and of the Council of 24 November 2010 establishing a European Supervisory Authority (European Insurance and Occupational Pensions Authority), amending Decision No 716/2009/EC and repealing Commission Decision 2009/79/EC

[8] In the case of ES and due to the specific features of Hybrid schemes, this category has been considered to be treated like DC (50%) and DB (22.3%) in the stress test. In the case of BE, all IORPs were considered as DB plans for the exercise based on the EIOPA general definition for DB/DC schemes (i.e.: all plans that provide any type of guarantee are considered as DB plans). This was also to remain consistent with the definitions of DB/DC IORPs in the Investment Behaviour exercise of December 2014.

Figure 1 : DB/DC/Hybrid schemes per country

(in % of total assets, end 2014)

	DB schemes	DC schemes	HY schemes
AT	26%	74%	0%
BE	100%	0%	0%
BG	0%	100%	0%
CY	54%	46%	0%
DE	100%	0%	0%
DK	100%	0%	0%
ES	1%	26%	72%
FI	100%	0%	0%
HR	37%	63%	0%
IE	56%	44%	0%
IS	29%	71%	0%
IT	6%	94%	0%
LI	11%	78%	10%
LU	71%	15%	14%
LV	0%	100%	0%
NL	99%	1%	0%
NO	100%	0%	0%
PL	0%	100%	0%
PT	92%	8%	0%
RO	0%	100%	0%
SE	100%	0%	0%
SI	100%	0%	0%
SK	0%	100%	0%
UK	81%	19%	0%

Source: EIOPA Pension Statistics Database and data received for the stress test.

Note: Value for the DB in the UK contains also hybrid schemes. The DC figure does not include contract based schemes as these are not IORPS.

41. According to article 31.2 of its founding regulation, EIOPA "*should develop common methodologies for assessing the effect of economic scenarios on an institution's financial position*"[9]. As such, EIOPA has decided to run its 2015 IORPs stress test exercise both on the basis of current national prudential standards and on the so called Holistic Balance Sheet[10], which is the Common Methodology that has been developed. This Common Methodology has been included in this exercise to enable comparison of IORPs across Member States on a like-for like basis, by applying common valuation bases and allowing for more consistent EU-wide comparisons. No decisions have been taken at a European level regarding the use of the Holistic Balance Sheet, which is still subject to further EIOPA work.

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[9] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:331:0048:0083:EN:PDF
[10] https://eiopa.europa.eu/Publications/Reports/7._EIOPA-14-108-IORP_II_in_a_Nutshell_What_is_the_Holistic_Balance_Sheet.pdf

42. To further ensure that a common methodology was applied, EIOPA provided the participating DC IORPs with a model for the calculation of the expected replacement rates of the typical plan members under different scenarios. The assumptions and methodologies of this model are explained in Section 4 of the stress test technical specifications[11] and a spreadsheet tool was included in the stress test package. Therefore the IORPs providing pure DC plans were asked to provide a number of input variables for the calculation tool. These variables are e.g. concerning the features of the plan members, information on current investments and costs and charges, the asset allocation during the accumulation phase and the pay-out method that is most representative for the scheme. The stylized model, even if it does not take into account all specificities, may provide IORPs with insights in the outcomes for their DC schemes. Those potential specificities were requested to be reported through the qualitative questionnaire as well as any important features of DC schemes, like the use of derivative hedges, by contacting with the relevant national supervisor.

1.2. Participation, data quality and guidance for the correct interpretation of the results

43. **For the majority of countries participating in the stress test exercise, the market coverage over 50% in terms of total assets was achieved (Figure 2).** The average market coverage was above 40% for the total IORP sector in the participating countries.

44. A total of 140 IORPs[12] participated in the DB/Hybrid module of the stress test, of which almost half were from the UK. In terms of assets, these IORPs covered 47% of the total DB IORP sector considering the participating Member States. In almost all Member States the market coverage in terms of total assets of the corresponding DB IORP sector is above 50% (Figure 3).

45. The DC satellite module of the stress test integrated results from 64 IORPs which altogether hold 17% of the total assets of the DC IORP sector in the participating Member States. IORPs participating in the DC module were asked to provide results for three representative members rather than for the entire membership. Therefore, in order to achieve a representative sample, NCAs selected IORPs covering more than 50% in terms of total assets or alternatively in terms of number of members (Figure 4).

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[11] https://eiopa.europa.eu/Publications/Surveys/EIOPA-BoS-15-072v2-Specifications_IORP_Stress_Test_2015.pdf

[12] The Irish sample was modelled and counted as one single IORP.

46. Despite the relatively high participation of IORPs in the stress test exercise, some differences in methodology are mentioned here under as they might impact the comparability of the results for the IORPs sector. All NCAs were required to provide EIOPA with the individual submissions from participating IORPs in the prescribed templates including the outcome of their own calculations (i.e. "bottom–up" approach). However, The Pensions Regulator in the UK (TPR) followed the above approach only for two IORPs in their DB sample. While for the others, representing 35% of assets in the total sample, TPR completed the EIOPA spreadsheets on their behalf, i.e. based on the results of its own model and using data held by TPR to supplement the data effectively supplied by the IORPs which constituted only a subset of the data required by the prescribed templates (i.e. a mixed "bottom-up and "top–down" approach). For the qualitative questionnaire, UK IORPs were given the opportunity to complete the full questionnaires. TPR undertook to answer questions which related to areas or data where it held the required information, with IORPs requested to complete the additional questions. In the case of the Irish Pensions Authority, instead of submitting individual data from the participating IORPs in their market, a template aggregating the results of a number of IORPs was submitted to EIOPA. The IORPs modelled by the Irish Pensions Authority in a single template represent 4% of the whole DB sample in terms of total assets for all participating countries in the exercise.

Figure 2: Market coverage for all schemes (in % of total assets of the overall IORP sector)
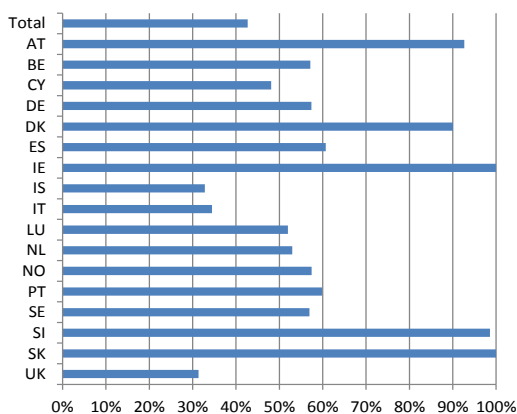
Source: EIOPA

Notes:

a. *The 'Total' corresponds to the ratio between the sum of the total assets of the IORPs participating in the stress test and the sum of the total assets of the participating Member States' IORP sector.*

b. *Swedish coverage was calculated in relation to the total assets of IORPs supervised by Finansinspektionen and not to the total assets of the IORP sector.*

c. *Irish coverage represents aggregated sectoral data, instead of individual IORPs submissions.*

Figure 3: Market coverage for DB/hybrid schemes (in % of total assets of the DB/hybrid IORP sector)
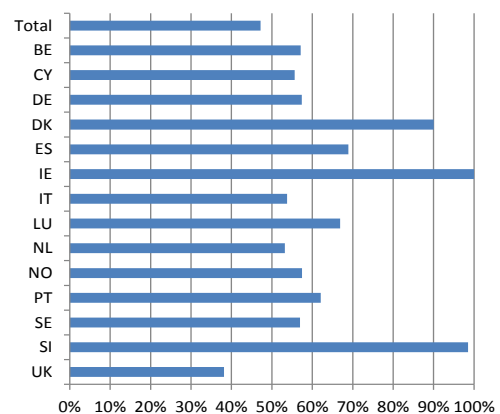
Source: EIOPA

Notes:

a. *The 'Total' corresponds to the ratio between the sum of the total assets of the IORPs participating in the DB/Hybrid module of the stress test and the sum of the total assets of the participating Member States' DB/Hybrid IORP sector.*

b. *Swedish coverage was calculated in relation to the total assets of IORPs supervised by Finansinspektionen and not to the total assets of the IORP sector.*

c. *Irish coverage represents aggregated sectoral data, instead of individual IORPs submissions.*

Figure 4: Market coverage for DC schemes

(in % of total assets and total number of members of the DC IORP sector)
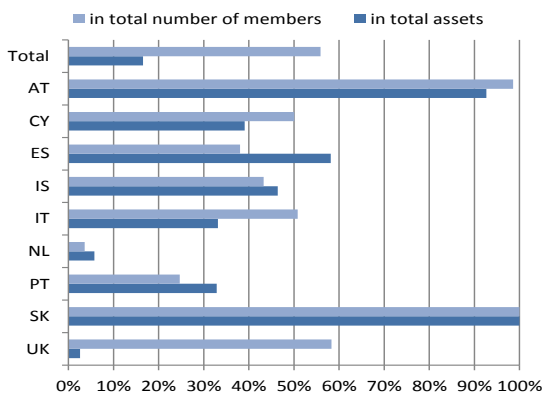
Notes: 'Total' corresponds to the ratio between the sum of the total assets/members of the IORPs participating in the DC satellite module and the sum of the total assets/members of the national DC IORP sectors.

2.   DB and Hybrid IORPs

2.1. DB/hybrid IORP sample description

47. **With assets under management of EUR 2.9trn, DB and Hybrid IORPs dominate the European occupational pension market (EUR 3.5trn).** The UK and the NL account for the majority of the European DB and HY occupational pension sector. The different relevance across countries is mainly a consequence of the relative sizes of the populations' share of private and public provision of pensions and also the legal requirements that are in place for employers to offer or provide occupational pension benefits via IORPs. Annex 1: "*Introduction to the DB/hybrid IORP sector*" provides a comprehensive description of the sector with a particular focus on the underlying framework that is a necessary input for the correct interpretation of the scenarios impact.

48. Figure 5 below provides an overview of the contribution of the selected sample in each Member State to the sample of IORPs that have undertaken the stress test exercise, in terms of total assets on the NBS.

Figure 5: Contribution of IORPs participating in each Member State to the total DB stress test sample.

(in % of total assets, NBS)
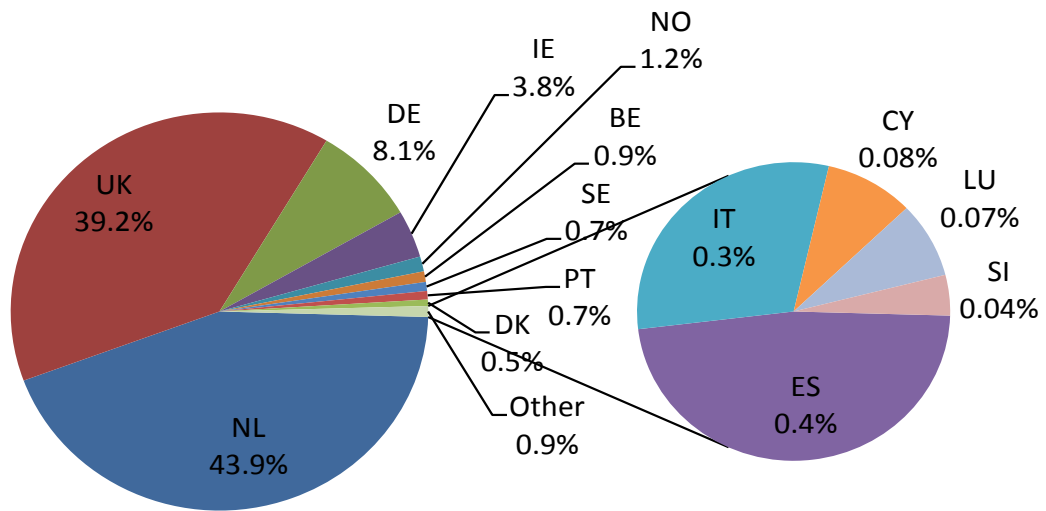
Source: EIOPA, 2014

49. The number of DB/Hybrid participating IORPs (140 in total – see footnote 12) was above 10 in three Member States (with one Member State contributing close to 60 participating IORPs), between 5 and 10 in six Member States and below 5 in the others. When selecting the sample of IORPs most NCAs targeted large IORPs since the coverage target was based on total assets under management and to avoid overburdening the smaller ones with complexity of the exercise. Representativeness of the sample is considered satisfactory in most Member States in relation to their national DB/Hybrid sector but not all samples reflect the relevant features of all types of pension schemes and security and benefit adjustment mechanisms existing in the respective market. For example, the UK sample is based on the largest schemes only which are likely to have more sophisticated investment strategies, may have more hedging instruments in place and larger sponsor support with a lower probability of default than small and medium IORPs. Also, the valuation of sponsor support is specific to each IORP and will vary considerably across the whole UK spectrum. Hence, the results for this sample should be interpreted accordingly within this context.

2.2. Baseline scenario (pre-stress situation)

2.2.1.   National balance sheet

50. **In order to understand the differences in results for different Member States under the NBS, it is important to mention that minimum harmonisation requirements of the IORP Directive allows for different national approaches regarding the valuation of assets and liabilities and different funding requirements on IORPs.** Further details on these differences are included in Annex 1.

51. **In aggregate terms, the overall balance of assets over liabilities for the participating sample had a EUR 78bn deficit, with the aggregate assets over liabilities ratio of 95% based on NBS**. Participating IORPs reported EUR 1.361trn in assets and EUR 1.439trn in liabilities. Whilst Europe-wide IORPs funding shows a deficit, a high degree of heterogeneity among countries could be seen. The country assets over liabilities ratios range widely in the baseline situation with SE, LU and BE showing surpluses about 40% while overall pre-stress deficit positions for CY, the UK and IE (Figure 6).

52. **Before any stress, 63 out of the 140 DB/Hybrid participating IORPs (see footnote 12) were in a deficit position.** With a wide dispersion in the specific situation among the participating schemes, almost half of them (45%) were in a deficit position in the baseline (Figure 7). Recovery plans will be in place to remove deficit situations.

Figure 6: Aggregate assets over total liabilities based on NBS in baseline, in %
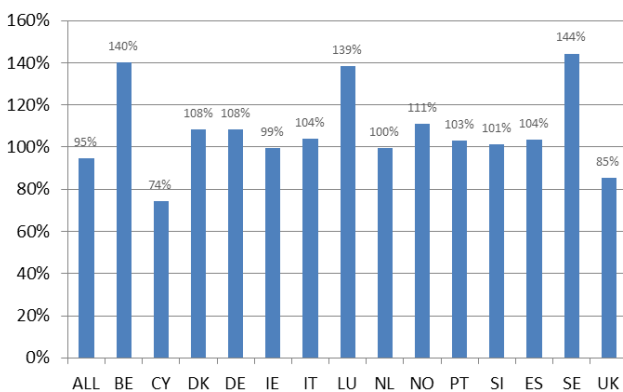
Figure 7: Distribution of pre-stress assets over liability ratios, in %
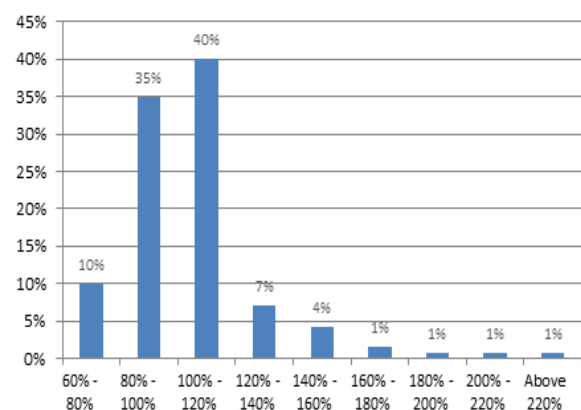
Source: EIOPA

Source: EIOPA

53. **The baseline funding ratios, defined as the ratio of eligible assets over national funding requirement, are quite heterogeneous in the baseline and non-comparable across countries given the different funding requirements across them** (Figure 8). In some cases such as CY, LU and the UK, it is required to meet the liabilities, while in others, the national regime imposes funding requirements beyond meeting the liabilities such as the NL and NO (see Annex 1). Figure 9 below shows the amounts of surplus and deficit for each national sample.

Figure 8: Funding ratio (eligible assets over national funding requirement), in %
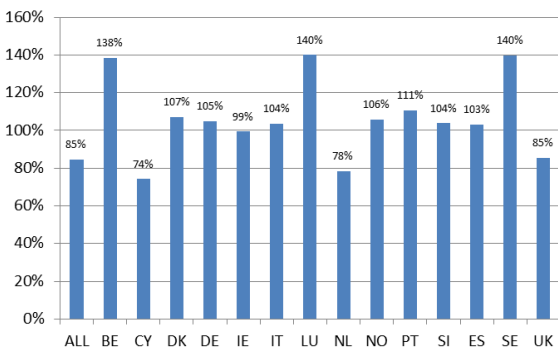
Figure 9: Surplus or deficit of eligible assets over national funding requirement in baseline, as % of liabilities
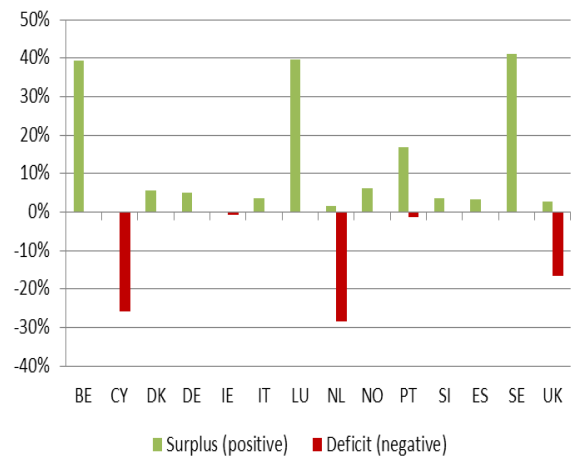
Source: EIOPA

Source: EIOPA

Note: The chart shows separately the aggregate surpluses or deficits over the national funding requirement (i.e. all IORPs with surpluses summed, and all IORPs with deficits summed).

2.2.2. Common Methodology

54. **The Common Methodology allows a cross country comparison as it recognises sponsor support, pension protection scheme (PPS) and benefit adjustment mechanism, in particular using the balancing item approach which imposes a balancing of the deficit situations.** However it should be noted that the Common Methodology is not in place for European IORPs and national funding requirements are not based on it. According to the Common Methodology, all participants valued the technical provisions discounting at the risk free rate (RFR)[13], and took account of any available benefit adjustment mechanisms, sponsor support and Pension Protection Schemes (PPS).

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[13] This corresponds to 'Level A' from the technical specifications.

55. Where results reported for an IORP showed excess of liabilities over assets EIOPA has decided to treat these deficit positions as resulting in a reduction in member benefits, since under the stress test specifications all other security mechanisms have been allowed for. Therefore, given that the other alternatives, such as sponsor support and PPS were at the hand of the participating IORPs to the extent possible, *ex-post* benefit reductions have been used to balance the Common Methodology for those reporting deficit of assets over liabilities. This is the case for IE, and to a much lesser extent, for some Portuguese participating IORPs. In the NL, *ex-post* benefit reductions have also been calculated by IORPs on the basis of the national framework which allows these reductions as a measure of last resort. In practice, Member States may make use of other mechanisms in order for the deficit to be eliminated - for example, allowing a recovery plan that takes account of future asset returns or mechanisms to improve the sponsor support to the IORP. Concerning the latter an example is the pledging of sponsor assets to the scheme or the commitment of wider group support to the scheme. For IORPs in other Member States, where investment assets do not fully cover scheme liabilities, *ex-post* benefit reductions do not apply. The reason for this is that the sponsors of the participating IORPs are either strong enough to satisfy the relevant conditions for sponsor support to balance the Common Methodology or have applied benefit reductions upon sponsor default. Benefit reductions are explored further in section 2.2.4 on the Liability Profile.

56. Given that deficits are always balanced within the framework used in the Common Methodology, only aggregate surpluses are technically possible. The latter is for the stress test sample EUR 98bn with a balance sheet ratio of 106%. Surpluses are shown in BE, DK, DE, ES, IT, LU, the NL, NO, SI and SE, whilst CY, IE, PT and the UK show a balanced balance sheet using the Common Methodology (Figure 10*)*.

Figure 10: Aggregate assets over liabilities on Common Methodology in baseline using the balancing item approach

Figure 11: Aggregate assets (excl. sponsor support) over liabilities (before benefit reductions) on Common Methodology in baseline
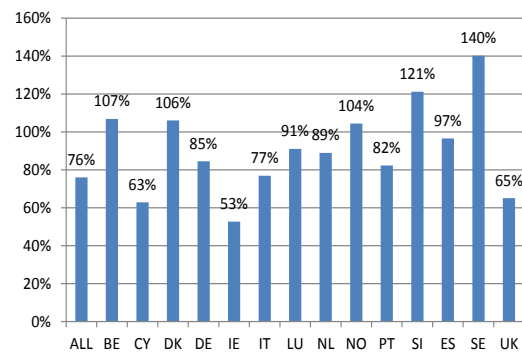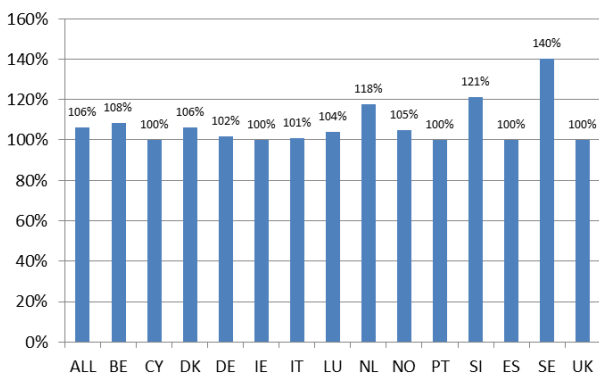
Source: EIOPA

Source: EIOPA

57. **The Common Methodology implies an aggregated deficit of assets excluding the sponsor support and PPS over liabilities before any benefit reduction of EUR 428bn (the aggregate ratio being 76%).** For the purpose of the stress test and in order to allow for an aggregate deficit determined by using a common methodology to be visible, the market value of the assets excluding the sponsor support is compared with the market value of the liabilities before any benefit reduction is considered (Figure 11 above).

58. Even in the event that funding requirements were fixed at 100% of the liabilities as determined by the common methodology, it cannot be concluded that an aggregated shortfall of EUR 428bn exists for the stress test sample that needs to be funded immediately. In the hypothetical scenario (in which the excess of assets over liabilities of certain IORPs could be used to offset the deficit of other IORPs), this would be the aggregated amount that the participating IORPS would need to allocate into adjusting and security mechanisms. Since the compensation is not possible the EUR 428bn is still a prudent estimation of the total amount required to rebalance the unfunded IORPs in the stress test sample. This can be done either by quantifying the present value of the adjustments needed in the benefits or by quantifying the support required from sponsor's balance sheets in the years to come until the benefits have to be paid.

2.2.3.   Asset profile

59. **There are differences in the valuation of the asset side in the Common Methodology (where the investment portfolio has to be valued on a market consistent basis) and the NBS (where the valuation method is country specific and can be based on market or book values).** Most of the countries have used market values for the valuation of the investment portfolio also in the NBS. Participants were asked to apply a look-through approach to investment funds, which has resulted in a more transparent breakdown of the assets in the Common Methodology.

2.2.3.1.   National balance sheet

60. **Unlike for the Common Methodology, sponsor support and pension protection scheme are not explicitly valued in the NBS in most countries.** This means that such information and the assessment of those mechanisms are off balance sheet items.

61. **At total sample level the asset side is mostly composed of investments (88%), followed by a share of about 11% for other assets, i.e. mainly Liability driven investment (LDI) related assets in the UK. (Re) Insurance recoverables account for the remaining 0.9%.** The decomposition of the asset side differs from one country to another (Figure 12). While 11 countries have a share of other assets lower than 10%; only CY (52%) and the UK (26%) have larger shares of other assets. In ES for instance, insurance recoverables play an important role (58%), whereas for most of the other countries it is close to zero.

Figure 12: Decomposition of the asset side[14]
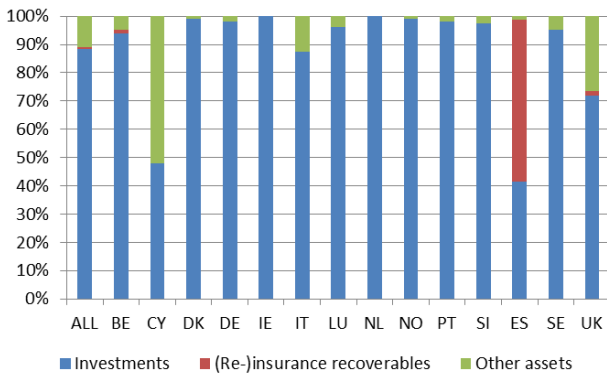
Source: EIOPA

2.2.3.2. Common Methodology

62. **The Common Methodology allows IORPs to consider all security and benefit adjustment mechanisms available provided they are adequately valued.** Therefore, sponsor support and pension protection scheme are treated as assets in the Common Methodology. Consequently, the total amount of baseline assets in the stress test sample was expected to be higher in the Common Methodology than in the NBS**.** Figure 13 below illustrates the decomposition of the asset side in percentage for the total of the sample and per country. Regarding the total average, it shows that the majority of assets fall in the category Investments (70%). Furthermore, the share of sponsor support represents 20%. The share of PPS on the other hand is very small as this mechanism exists in two countries (DE and the UK) only. Moreover, it has only a small expected financial value in these countries with regards to the specifications and IORPs in this exercise. The share of other assets represents about 9% of total assets. Finally, the share of the value in recoverables from (re)insurance contracts represents about 1% of total assets.

63. **The decomposition of the asset side differs considerably across countries**. Whereas the share of sponsor support is 0% in DK, SE, SI and NO, it is 35% in the UK. In addition, BE reports a negative aggregate value of sponsor support (2.5% of total assets). This is the result of the funding surplus, and can be interpreted as a debt towards the sponsor. According to Belgian social and labour law, Belgian sponsors cannot claim these assets from the IORP, but they have the ability to reduce future contributions below the actual cost of new accruals. Recoverables from (re)insurance play only an important role in ES (60% of total assets). The share of other assets range from 0% in the NL and IE to 33% in CY.

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[14] Charts and tables showing all assets include also assets held for pure DC parts of the hybrid scheme unless explicitly noted otherwise.

Figure 13: Decomposition of the asset side in %
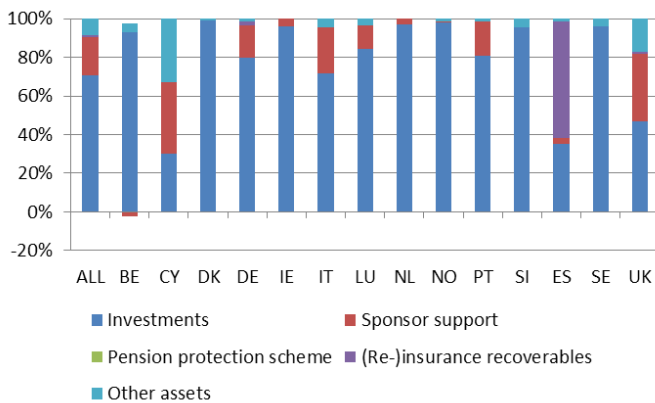
Source: EIOPA

64. **The decomposition of investments in percentage for the sample in total and on a country basis illustrates that the asset allocation of investments measured in market values is quite different among countries (Figure 14)[15].** Investments in property and equities range from 11% in DK to 51% in the NL. Investments in equities range from 7% in DK to 43% in the UK. Equity is in all countries mainly composed by listed equity. Investments in government or corporate bonds vary from 35% in the NL to 79% in LU. IORPs in DE, LU and SI have the most conservative asset allocation with relatively large holdings of bond investments (>70%). The position "other" contains primarily LDI assets, structured notes, collateralised securities, loans and mortgages, derivatives, private equity, commodities, and hedge funds and range from 1% in NO to 38% in DK.[16]

Figure 14: Investment split, Common Methodology, in %[17]
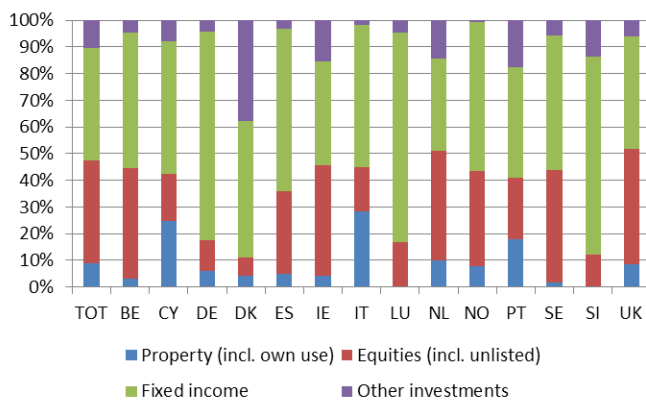
Source: EIOPA

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[15] The investments are reported on a market consistent basis.

[16] In DK, the category "Other" includes covered bonds where the underlying asset is (collateralised) mortgage loans issued by mortgage banks.

[17] Charts showing investment splits exclude investments held for DC parts of hybrid schemes unless explicitly noted otherwise.

65. **Looking at the composition of fixed income assets for the whole sample and on a country basis, it is clear that the vast majority of bond investments for the sample are either government bonds (54%) or corporate bonds (44%) (Figure 15).** On the one side, government bonds are mostly composed of EU-government bonds, and only 6% of all bonds are non EU-government bonds. On the other side, corporate bonds consist of financial and non-financial corporate bonds in roughly equal parts. Financial corporate bonds consist of covered bonds (12% of total bonds) and non-covered bonds (8% of total bonds). Finally, structured notes and collateralised securities represent a very small part of the whole bonds (2%).

Figure 15: Decomposition of fixed income assets in %
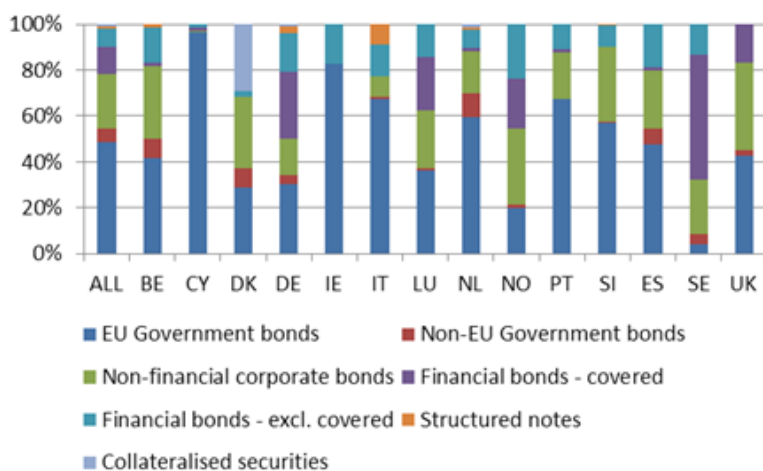
Source: EIOPA

66. **The composition of the bond exposure is quite different across countries. The share of EU government bonds ranges from 4% in SE to 97% in CY.** Furthermore, the share of non-EU government bonds is rather small in all countries (0% in CY and up to 10% in the NL). The share of financial corporate bonds varies from 3% in CY and DK to 68% in SE. Non-financial corporate bonds range from 0% in IE to 38% in the UK. In nine countries, IORPs did not indicate an exposure of structured notes. The highest share of structured note is in IT (9%). In almost all countries but DK, the share of collateralised securities is very small (29% in DK).

2.2.4.   Liability profile

2.2.4.1.   National balance sheet

67.   **Aggregate Gross Technical Provisions in the DB/Hybrid sample is EUR 1.44trn under the baseline scenario.** Figure 16 shows the split in gross technical provisions by country. It can be seen that ES is the only country where the liabilities for the defined contribution part in the hybrids schemes represent a significant share of total liabilities. The difference between Gross and Net technical provisions is an insignificant EUR 2.9mn of insurance recoverables at a sample level, it is mostly composed by DE. Most part of the total liabilities (99.6% out of EUR 1.44trn) consists of net technical provisions. The remaining 0.4% is classified as "other liabilities", which at total sample level is insignificant, albeit not for DK where "other liabilities" have a much larger share. The liability values under current national regimes can only be disaggregated to a limited extent.

Figure 16: Split of gross technical provisions by country, in %, NBS
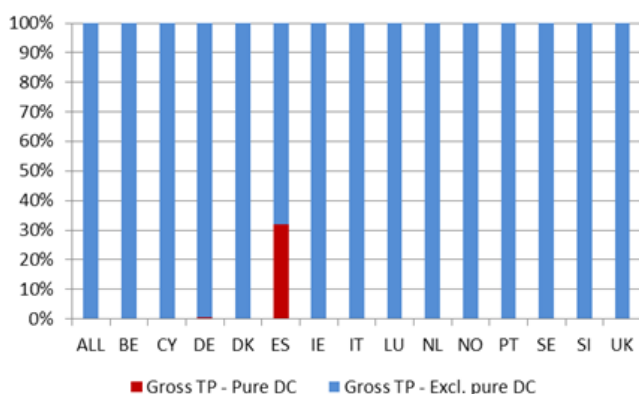
Source: EIOPA

2.2.4.2.   Common Methodology

68.   **Total liabilities of the balance sheet used for the Common Methodology amount to EUR 1.596trn after netting off benefit reductions, which are treated as a negative liability rather than an asset according to the exercise specifications.** Using the Common Methodology framework, the largest component of total liabilities is "unconditional benefits". These are benefits that are in principle guaranteed under all circumstances and could be reduced only in very extreme circumstances[18]. The unconditional benefits can exceed the total liabilities due to the aforementioned inclusion of benefit reductions within total liabilities and in fact amount to EUR 1.62trn (i.e. 101.4% of the total liabilities). Unconditional benefits represent 92% of total benefits at sample level, as this is the typical treatment of member benefits in most countries.

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[18] Unconditional benefits also include guaranteed indexation to inflation and/or salary increases.

69. Non-unconditional benefits consist of pure conditional benefits, mixed benefits and pure discretionary benefits. Pure conditional benefits consist of benefits which are granted based on certain "objective" conditions without a realistic discretionary power of the IORP to deviate from that policy. "Mixed benefits" are benefits based on "objective conditions" as part of a "subjective" decision making process. The EUR 76bn pure conditional benefits represent 5% of total liabilities or 4% of the total benefits. The vast majority (96%) of these benefits exist in DE IORPs, whilst this type of benefits also exist in NO and IT. Mixed benefits of EUR 69bn represent 4% of both total liabilities and total benefits. 92% of these are found in Dutch IORPs, with the remainder in DE IORPs. The amount of pure discretionary benefits (not including pure DC liabilities) is insignificant in the total sample.

70. The aggregate sample in the Common Methodology liability profile is reduced by 12% of benefit reductions, 97% of which is *ex-post* benefit reductions which have been applied to any negative Excess of Assets over Liabilities (EAL) or shortfall in the baseline scenario. 76% of this figure relates to Dutch benefits; in the NL, benefits can be reduced in this manner as part of a recovery plan or where the IORP is required to restore its funding ratio where there is a funding shortage for 5 consecutive years. The *ex-post* benefit reduction mechanism can only be used when all other mechanisms have been exhausted, i.e. as an ultimate remedy. The remainder relates to IE IORPs, due to several schemes starting the stress test in a deficit position and a lack of security mechanisms available, and, to a much lesser extent, to some Portuguese participating IORPs. Reductions upon sponsor default apply in several regimes, such as the UK and BE[19], but total under EUR 1mn in the baseline scenario.

71. **Technical provisions (excluding benefit reductions) increase by 24% in the Common Methodology in comparison to the NBS, largely due to lower discount rates.** Different methods are used by Member States for the valuation of liabilities and in particular for setting discount rates (see Annex 1). Other elements that influence the level of liabilities are the assumptions with respect to mortality assumptions and indexation of pension rights. Under the common methodology, all IORPs are required to calculate the value of their liabilities in the same way. By comparing the value of technical provisions on the NBS to the value of technical provisions under the common methodology, the differences on the level of liabilities can be broadly illustrated (Figure 17 and Figure 18) while a more detailed explanation of the differences among the different national results is available in Annex 1.

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[19] Reductions upon sponsor support can only apply if the sponsor is insolvent, as a measure of last resort.
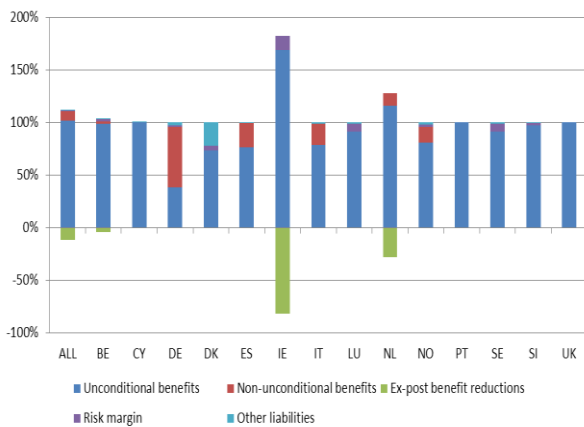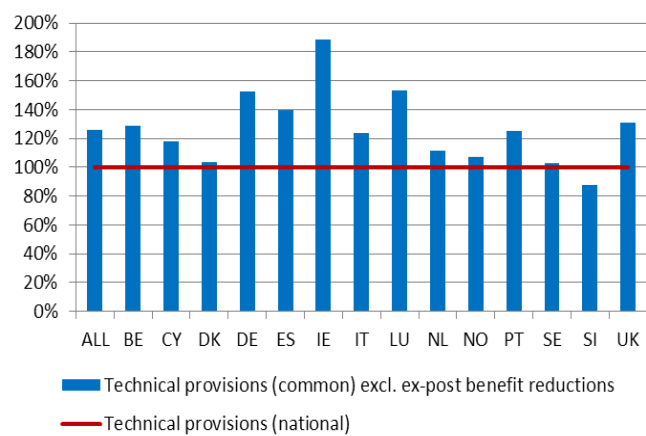
Source: EIOPA

Source: EIOPA

72. The liability side of the Common Methodology is increased by an average risk margin of 1% for the total sample (Figure 19). This average is brought down considerably by the absence of a risk margin for IORPs that applied the balancing item approach either for sponsor support or benefit reductions[20], including all those in CY, IT, PT and the UK as well as some IORPs in ES and DE. Where a margin was applied, it differs greatly between Member States; the highest rate applicable was 13% of the best estimate of the technical provisions (IE).[21] Non-member benefit related liabilities such as deferred tax and other liabilities made up less than 1% of the liabilities reported by IORPs.

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[20] Under certain prescribed circumstances IORPs may use this approach by assuming that sponsor support as an asset has a value necessary to eliminate any negative EALs or that benefits can be reduced by an amount needed to eliminate negative EALs to balance the balance sheet used in the Common Methodology. See I.6.25 to I.6.29 of the QA specifications for further details: EIOPA-BoS-15-070v2-Technical_specifications_QA_IORPs.pdf

[21] In Ireland, the requirement to calculate a risk reserve (the Funding Standard Reserve) was introduced in 2012, but did not formally become part of the funding requirements of the Irish Pensions Act until 1 January 2016. The Reserve is calculated as the sum of two components. The first part (the Asset Volatility Component) is 10% of any amount by which the Funding Standard liabilities exceed the prescribed assets, e.g., EU government bonds. The second part (the Interest Rate Component) is the combined effect on the assets and liabilities of a 0.5% reduction in interest rates.

The reported levels of risk reserve as a percentage of liabilities have been declining over time as funding levels have improved, as schemes have moved more assets into bonds and other prescribed assets, and as the matching by term of assets and liabilities have been improved. It is expected that ultimately the level of risk reserve reported will be significantly lower than appears for IE in this report, although it is not possible to predict this accurately at this juncture.

Figure 19: Average Risk Margin as % of Total Liabilities
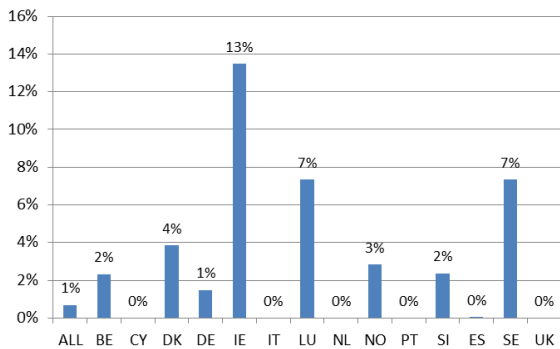
Source: EIOPA

2.3. Instantaneous shock scenarios

2.3.1. Stress assumptions

73. **The impact of two instantaneous adverse market scenarios[22] and one instantaneous longevity scenario on defined benefit was assessed.** The impact of three stress scenarios was evaluated against the baseline (i.e. situation before the stress scenario) with respect to the NBS as well as the Common Methodology. Impact was assessed after the instantaneous shocks in assets prices and assumptions like the interest rates used in the valuation of liabilities. EIOPA, in cooperation with the ESRB and ECB, developed two macro-financial stress scenarios containing instantaneous shocks to asset prices regarding the most relevant market risk exposures of IORPs. The probability of the events that serve as a trigger for the scenarios was set to 0.5%.

74. **The first adverse market scenario assumes a negative demand shock.** The narrative of this scenario takes as its starting point an abrupt broad-based reversal in asset prices emanating from the developed economies and affecting all major asset classes. This would trigger further vulnerabilities, in particular those related to the condition of the EU sovereigns and to bank funding conditions. The initial shock is assumed to take place in equity markets in the European Union.

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[22] These scenarios are further described in the material published in EIOPA website together with the stress test specifications.

75. **The second adverse market scenario assumes negative demand as well as a supply shock.** This scenario similarly entails an abrupt decline of prices across a broad spectrum of asset classes. However, unlike the first scenario, it also assumes a materialisation of geopolitical risks which lead to a negative supply shock to the oil market and other commodities. The effects of such supply shocks on the oil price and other commodity prices are assumed to at least make up for the opposite effects of the decreased demand for oil and commodities on their prices due to the low economic activity in the European Union.

76. **The final tested scenario for DB IORPs is the longevity scenario**. The impact of an instantaneous permanent decrease in mortality rates on IORPs is evaluated as a separate scenario that is statistically independent with the financial market shocks. This scenario is further specified in section 2.3.3. The same shock has been applied whether or not the mortality assumptions in the Member State allow for future improvements or not.

77. Table 1 provides an overview of the main stress impacts under the two adverse market scenarios. More details on the scenarios are provided in Annex 2.

Table 1: Main stress impacts in scenarios		
	Adverse market scenario 1	Adverse market scenario 2
EU property (price downward shock)	-55%	-36%
EU stock prices (price downward shock)	-45%	-33%
EU government bonds (spread widening)	120 bps	67 bps
Corporate bonds (spread widening)	120 bps	204 bps
Euro-dollar exchange rate	+20%	-2%

78. Figure 20 and Figure 21 show the stressed interest rate and inflation curves and in the stress test they are assumed to be the same for all countries.

Figure 20: Interest rate stresses
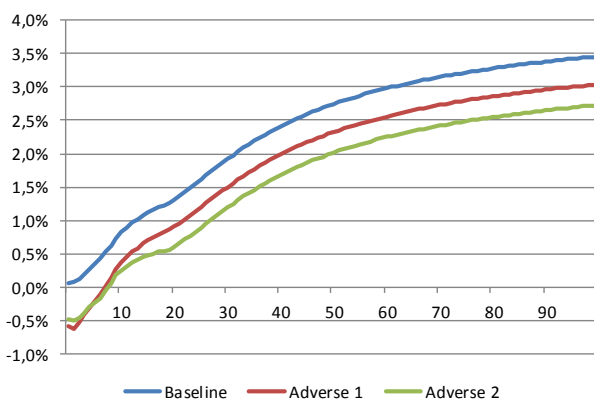
Figure 21: Stressed inflation curve
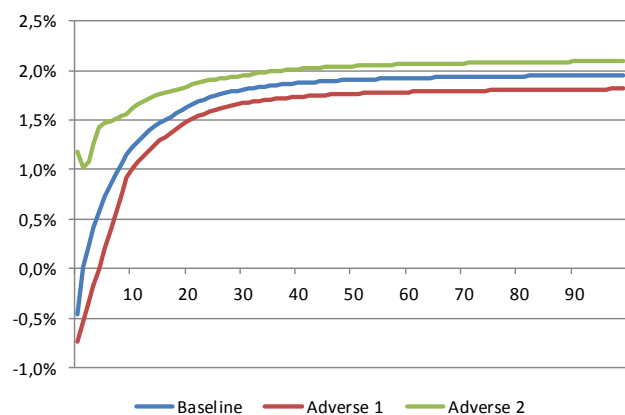
Source: EIOPA

Source: EIOPA

2.3.2.   Adverse market scenarios results

2.3.2.1.   National balance sheet

79. **On average for the participating IORPs, after application of the adverse market scenario 1 and 2, the deficit of assets over liabilities is respectively EUR 373bn and EUR 346bn, corresponding to 25% and 22% of the liabilities (Figure 22). The deficit over the national funding requirement divided by total liabilities is 37% and 34% for the two scenarios**. This corresponds to a deficit of 33% and 31% when comparing to the national funding requirement. Moreover, the average excess over liabilities and the surplus over the funding requirement are already negative in the baseline scenario. This is due to a deficit in the UK, CY and IE pre-stress.

Figure 22: Excess A/L and surplus over national funding requirement, as a percentage of liabilities
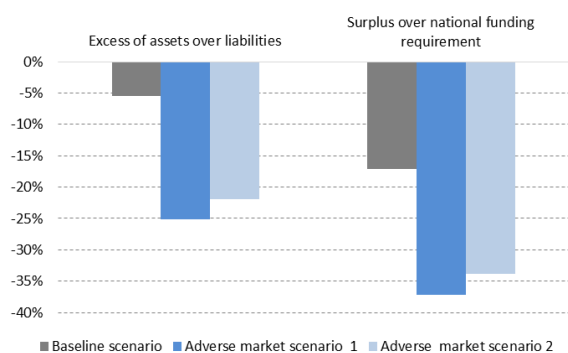
Source: EIOPA

80. **The impact in the national funding ratio is mostly driven by the decrease in value of investments and not that much by the increase in the liabilities.** Nevertheless, there are also other factors driving the results. Due to the prescribed decrease in interest rates the value of technical provisions increases which implies an increase of the deficit over the national funding requirements. However, given that the different rules for discounting the liabilities at national regimes do not always prescribe market based rates the impact of the stresses on the value of liabilities appears to be rather limited. The average pre-stress funding ratio for all IORPs and the main drivers of stress impact clearly show that the change in the value of investments is the largest driver of the stress under both scenarios followed by the increase of the aggregate funding requirement as a consequence of the increase in liabilities' values, which is in turn driven by the decrease in discounting rates (Figure 23 and Figure 24).

Figure 23: Drivers of stress impact – Adverse market scenario 1
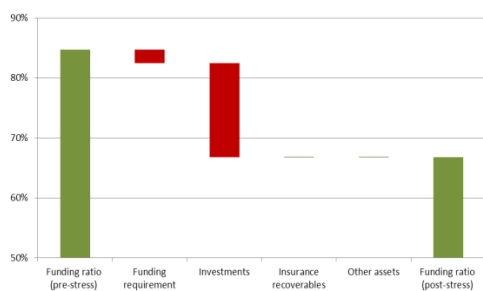
Figure 24: Drivers of stress impact - Adverse market scenario 2
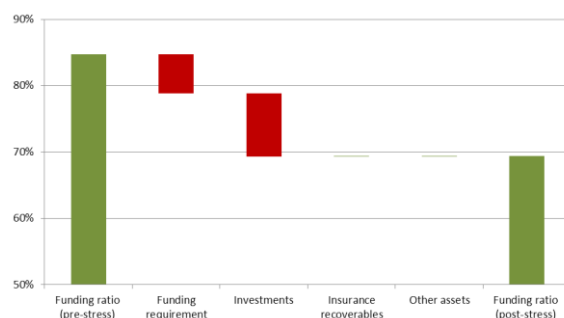
Source: EIOPA

Note: The funding ratio is defined as the value of items eligible to cover the funding requirement divided by the national funding requirement.

81. **For most countries the surplus over funding requirement is already or turns negative under the stress scenarios.** Figure 25 shows the surplus over national funding requirement in the baseline and after the stress scenarios in per cent of GDP. The conclusions are in line with the previous findings for the ratio of assets over liabilities. Before stress, 10 out of 14 countries showed a positive surplus. Only CY, IE, the NL, and the UK had a negative surplus in the baseline. However, under adverse market scenario 1 BE, LU, SE and NO still show a positive surplus over the national funding requirement (as a share of the requirement). When measured a share of the funding requirement, the NL and CY show the largest deficit (negative surplus) after adverse market scenario 1. For the NL, on one hand the relatively large amount invested in equity and property explain the impact. On the other hand, IORPs in the NL are subject to higher funding requirements (125% versus 100%) and have to value their assets and liabilities using market value. This has a negative impact on their funding position. For CY the severe economic crisis and the drop of values in properties and equity especially after the collapse of one of the major banks in the country, contributed to the shortage in funding requirements of the IORPs with a relatively large share of equities and property in their investment portfolio, after adverse market scenario 1.

82. **The high deficits in some countries may put pressure on sponsors or fiscal sectors.** Insufficient assets covering funding requirements may imply a financial burden for a sponsor or may lead to benefit reductions. This in turn could lead to a default of some sponsors with potential negative fiscal implications, also for the overall financial stability (Figure 25). In case of a funding ratio below 100%, the potential financial burden and therefore also the potential default of some sponsors highly depend on the answer to the question whether the whole deficit would have to be balanced immediately by the sponsor. In many Member States IORPs would be given substantial recovery periods in order to balance a deficit. However, the results reflect also the fact that national valuation methods, national regulatory frameworks as well as size of the IORPs sector differ considerably among Member States.[23] Hence, more comparable results can be seen under the common methodology (see section 2.3.2.2).

Figure 25: Surplus (deficit) over funding requirement before and after stress, per Member State in % of annual GDP
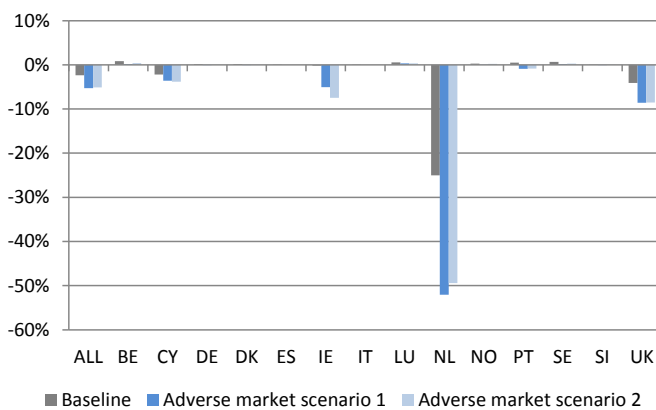
Source: EIOPA

Note: This figure displays the surplus (deficit) over the national funding requirement, as a percentage of nominal national GDP. The results do not only depend on the scenario, but also on the national regulatory framework.

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[23] The relatively high impact for the NL is partly driven by the size of its IORPs sector and its regulatory framework. First of all, the NL has a large IORPs sector as it has built up pension in the second pillar over the last decades. Furthermore, the funding requirement for Dutch IORPs equals 127% of liabilities, valued on a market consistent basis. Moreover, benefit reductions are only allowed as ultimate solution, which means that benefit reductions are not possible if the funding ratio is above 100%, and legally enforceable sponsor support is only available for some individual IORPs. Benefit reductions are therefore only allowed as part of a recovery plan and can be smoothed over time.

83. **While IORPs with a relative large share of equities and property in their investment portfolio are most severely impacted by the stress scenario, there are other factors that also affect the sensitivity to the stress test**. There is also a negative relation between the share of equity and property in the investment portfolio and the impact on the ratio of assets over liabilities. However, for a few countries, the decrease in assets is offset by a decrease in liabilities. This occurs in countries such as ES where the DC elements of hybrid schemes are substantial, and in NO where conditional benefits are proportionally more relevant than in other countries.

84. **We can distinguish four factors (asset allocation, different discounting, asset valuation and funding requirements) that can explain the differences in impact of the stress scenarios on the NBS at a country level.**

   • First of all, the asset allocation of IORPs partly explains their sensitivity to the applied scenario. Under the adverse market scenario 1, the assumption is that especially equity and property markets will be significantly hit. Therefore, IORPs with a relative high share in these assets will be more impacted by the prescribed scenario than IORPs with a large share of fixed income assets.

   • Second, due to the variety in national regulatory frameworks, Member States use different methods for setting discount rates to calculate their technical provisions. Hence, the impact of the lower RFR is not the same for each IORP sector. IORPs in Member States that require IORPs to use the current risk-free market rate for discounting their liabilities will be most severely impacted. In fact, the current national valuation methods imply a certain reliance on a sponsor support, which could be significant if the national value of liabilities differs considerably from the market consistent value of liabilities (see Annex 1 for further details).

   • Third: market-consistent versus book value in some countries, although even under the national frameworks most countries use market consistent valuation.

   • Fourth, and as stated before, the funding requirements also differ per Member State. Whereas IORPs in the NL are required to maintain a funding ratio about 125%, other countries require a funding ratio of about 100%. Similarly, the benefits included in the valuation of technical provisions also differ, e.g. inflation indexation is included in the valuation of technical provisions in the UK but not the NL.

2.3.2.2. Common Methodology

85. **Aggregate deficit of assets (excluding sponsor support and PPS) over liabilities (before any benefit reduction) is EUR 755bn (adverse market scenario 1) and EUR 773bn (adverse market scenario 2) corresponding to 41% and 39% of liabilities, excluding any benefit reductions.** In this case, the impact is measured as a fall of total investments (which does not include sponsor support nor PPS) and increase of liabilities excluding any benefit reductions in order to be able to identify deficit of assets over liabilities which otherwise would be rebalanced by security mechanisms (affecting the assets) or benefit reductions (affecting the liabilities). The obtained results are driven mostly by the NL and the UK (Figure 26). However, even for the countries where the total losses are relatively small compared to the EU aggregate number, it is still a substantial part of their aggregate liabilities (Figure 27).

86. **The application of common rules which are market consistent reveals that adverse market scenario 2 is more severe due to the higher impact of changes in the interest rates and inflation rates to the market value of the liabilities.** This is not visible under the current NBS regime. The impact of the adverse market scenario 1 is mostly driven by the fall in the investments, similarly to what was observed in the NBS results. On the contrary, the impact of the adverse market scenario 2 that is more severe is mostly driven by the decrease in the interest rates and increase in inflation which leads to an increase of the liabilities. A market consistent valuation of investments and especially of the liabilities reveals a higher effect even with smaller stress in the investments due to the higher impact of a decrease in the interest rates and an increase in inflation rates to the market value of the liabilities (Figure 28 and Figure 29).

Figure 26: Impact of adverse market scenario 1 in EUR bn. and in % of baseline-liabilities
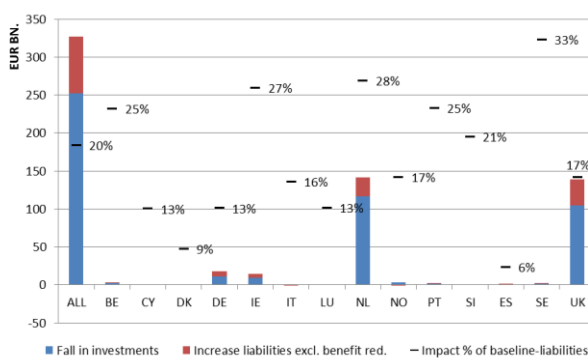
Figure 27: Impact of adverse market scenario 1 in % of baseline-liabilities
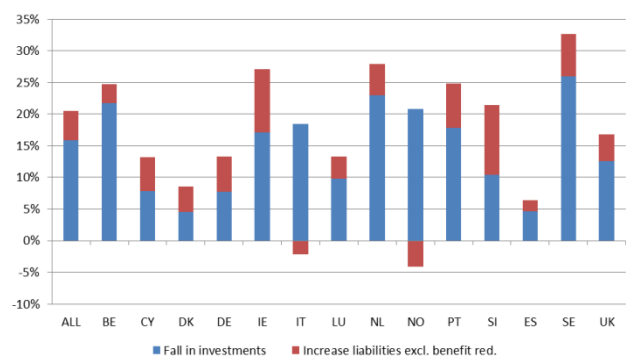
Source: EIOPA

Source: EIOPA

Figure 28: Impact of adverse market scenario 2 in EUR bn. and in % of baseline-liabilities
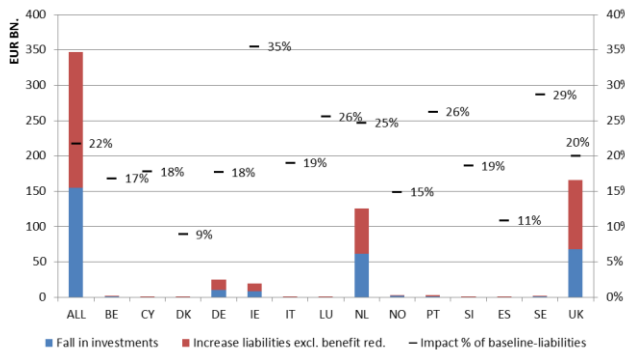
Figure 29: Impact of adverse market scenario 2 in % of baseline-liabilities
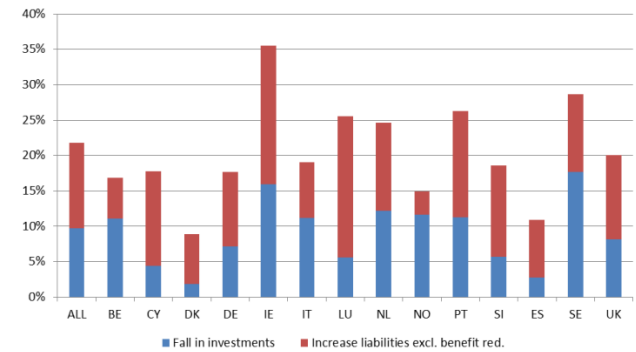
Source: EIOPA

Source: EIOPA

87. **The impact of adverse market scenarios 1 and 2 would imply approximately a doubling of both benefit reductions and sponsor support as a share of total investments (Figure 30 and Figure 31).** The picture at country level is more heterogeneous (Figure 32 and Figure 33). The negative effects of adverse shocks would need to be solved either through extension of recovery plans that allow for markets to recover or through increased sponsor support or benefit reductions. It could be supported that pension liabilities (pay-out) only arise very gradually over many years. If the negative economic shock only endured for a relatively short period, e.g. 5 to 10 years, consequences for financial stability are unlikely. Indeed, the use of longer recovery plans in such circumstances smooth out the cost of contributions to the sponsor and reductions of benefits to members. If the negative economic shock was to endure for several decades, e.g. 20 years or more, then this could increase the pressure on security and benefit adjustment mechanisms like sponsor support and benefit reductions with potential negative consequences for sponsors and members. However, the overall impact of such increases in contributions or reduction in benefits is unlikely to have any material impact from a financial stability perspective given their low relevance to the EU economy. At country level, however, the potential relevance of the sponsors for the national economy or whether the stress situation and the pressure may be evenly spread across different sectors or if the potential negative consequences may concentrate on specific sectors remain to be seen. In any case, the timeframe in which the deficit would have to be balanced has to be taken into account when assessing the potential relevance.

Figure 30: Impact of adverse market scenarios on sponsor support and ex-post benefit reductions in % of total investments
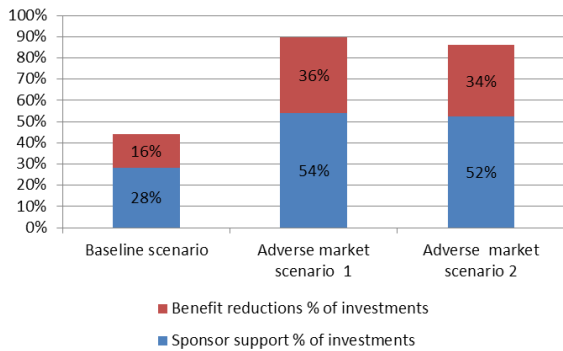
Source: EIOPA

Figure 31: Change in sponsor support and ex-post benefit reductions in % of baseline-investments
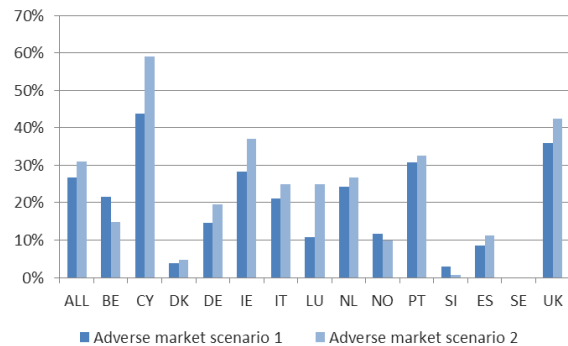
Source: EIOPA

Figure 32: Sponsor support and ex-post benefit reductions in % of total adverse market scenario 1 investments per country
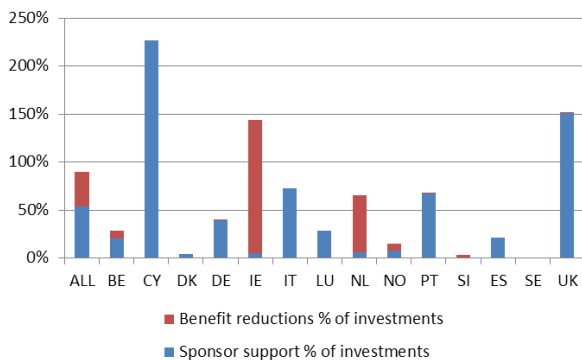
Source: EIOPA

Figure 33: Sponsor support and ex-post benefit reductions in % of total adverse market scenario 2 investments per country
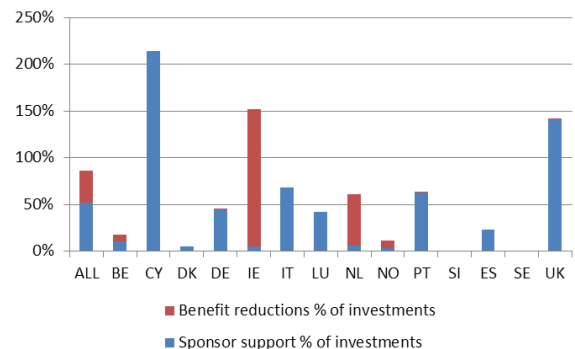
Source: EIOPA

88. **The Common Methodology allows for the explicit recognition of all relevant security and benefit adjustment mechanisms that are available to IORPs in different Member States.** Therefore, when analysing the behaviour of the excess of assets over liabilities in adverse market scenarios, it should be taken into account that the loss absorbing capacity of these mechanisms can compensate the decrease in investments and / or the increase in unconditional benefits (Figure 34). For a number of IORPs, pension protection schemes, sponsor support or benefit reductions have been used as a balancing item to compensate for any deficits in the adverse market scenarios, which explains an excess of assets over liabilities close or equal to 0 in some countries (CY, DE, ES, IE, IT, LU, NO, PT and the UK). Few other countries (BE, DK, the NL, SE, SI) present a positive excess of assets over liabilities in the post-stress scenarios. The deterioration of the value of assets over unconditional liabilities in the NL leads to an increase in the value of benefit reductions and a decrease in the value of future indexations. These effects account for the change in the financial position. In SE it is explained by the availability of financial assets. In the other cases, this result is achieved with recourse to security and benefit adjustment mechanisms.

Figure 34: Excess of assets over liabilities as a % of liabilities for baseline and adverse market scenarios
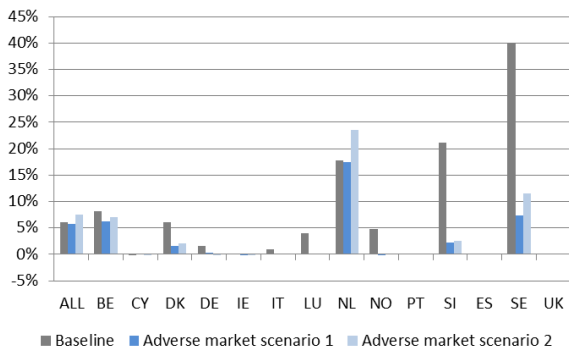
Source: EIOPA

89. **Due to the loss absorbing capacity of security and benefit adjustment mechanisms the analysis of the behaviour of the excess of assets over liabilities in adverse market scenarios should be done taking into account the behaviour of the different components that are recognised in the Common Methodology.** The Figure 35 and Figure 36 below provide an insight into the security and/or benefit adjustment mechanisms that are triggered to absorb losses in different countries, reflecting different national frameworks. These figures show that security and adjustment mechanisms play an important role in both adverse market scenarios in almost all countries. Several countries make use of security mechanisms. These include sponsor support and pension protection schemes. For others benefit reductions (*ex-ante* and *ex-post*) are more important.

Figure 35: Decomposition aggregate change EAL on Common Methodology, adverse market scenario 1, % baseline-liabilities
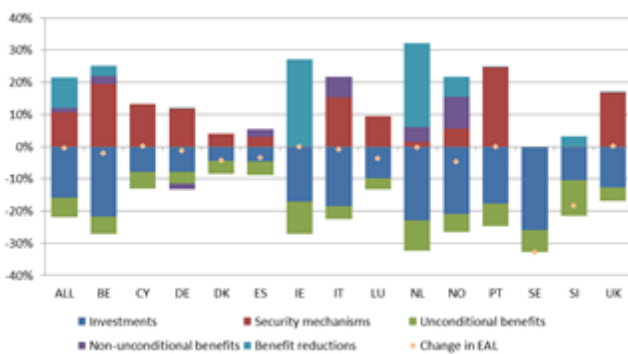
Source: EIOPA

Figure 36: Decomposition aggregate change EAL on Common Methodology, adverse market scenario 2, % baseline-liabilities
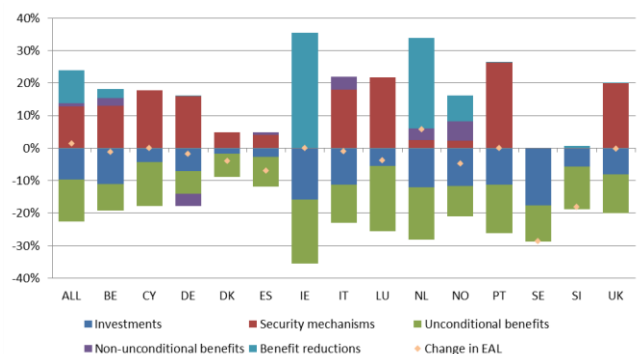
Source: EIOPA

90. **On the assets side, as presented in 2.2.3, the total value of investments decreases by 21% and 13%, in adverse market scenarios 1 and 2**. (Re) insurance recoverables increases by 3.1% and 7.2%, respectively. However, this amount only represents around 1% of total liabilities. The overall value of sponsor support increases quite significantly in the adverse market scenarios, in particular in adverse market scenario 2. In fact, the weight of sponsor support, in terms of baseline-liabilities, increases from 21% to 32% in adverse market scenario 1 and to 34% in adverse market scenario 2. Figure 37 below compares the weight of sponsor support, as a percentage of baseline-liabilities, in a pre- and post-stress situation. In several countries (BE, CY, DE, IT, LU, PT and the UK) there is a strong reliance on sponsor support. In the particular cases of CY and the UK it is about 50% of liabilities in the adverse market scenarios.

91. The contribution of pension protection schemes that exist for DE and UK IORPs is fairly small, in comparison to the amount of liabilities partly due to the low levels of probability of default for the sponsors included in the sample. The UK Pension Protection Fund (PPF) provides compensation to members of eligible DB IORPs when there is an insolvency event in relation to the employer, and where there are insufficient assets in the IORP to cover the PPF level of compensation. In DE, there is a Pensions-Sicherungs-Verein aG (PSVaG) that is responsible for protecting corporate pension schemes against insolvency of the sponsor. The PSVaG is applicable only for a part of German IORPs, namely the Pensionsfonds.

92. On the liabilities side, the total value of unconditional benefits increases 6% in adverse market scenario 1 and 12.8% in adverse market scenario 2. Reduction of non-unconditional benefits takes place in BE (discretionary benefits), DE (ex-ante benefit reductions and mixed benefits), the NL (mixed benefits) and NO and IT (pure conditional benefits). In IE and the NL a considerable value of benefit reductions is recognised.

93. For some countries *ex-post* benefit reductions have been considered to absorb losses. This is the case for BE, IE, the NL, NO and PT. For DE, ex-ante benefit adjustment mechanisms are important to absorb losses. However, it is important to note that there are other countries that can make use of other types of benefit reductions. For example, while the UK and LU can also make use of benefit reductions in specific circumstances (see Table 8, page 103) the participants there did not report those reductions in benefits in their stress test results since benefit reductions are only considered in exceptional circumstances (e.g. where all members consent) and since under the stress test specifications, their sponsors are strong enough to satisfy the relevant conditions for increasing the sponsor support to the extent required to absorb the loses.

Figure 37: Sponsor support as a % of baseline-liabilities
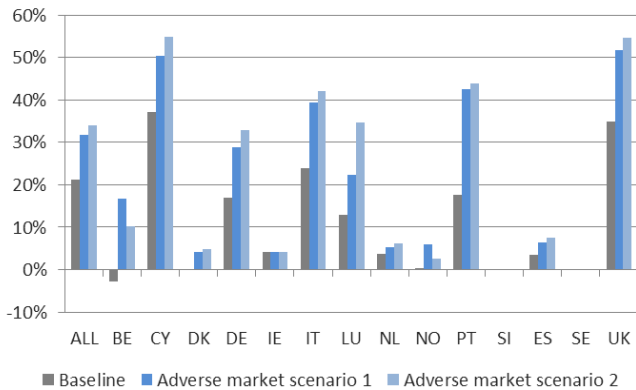
Source: EIOPA

94. **The necessity to absorb the (potential) deficits via the security and adjustment mechanisms would possibly put a substantial pressure on balance sheets of sponsors or alternatively on beneficiaries in a few countries (mainly the NL, IE and the UK), depending on the timeframe in which the deficit would have to be balanced.** The substantial deficit of IORPs' sectors in some countries (even under the baseline scenario) needs to be covered either by increased sponsor support, PPS or by benefit reductions. In the first case it might imply pressures on firms' profitability, although it would be the case that such contributions from sponsors may be spread gradually. In the second case, it negatively impacts households' incomes which could have negative implications for aggregate consumption and the real economy (Figure 38).

Figure 38: Security mechanisms as share of GDP (end 2014)
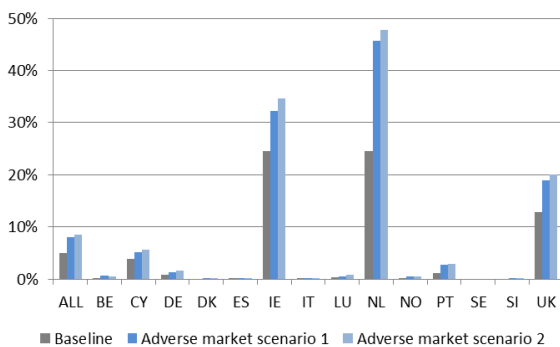
Source: EIOPA

2.3.2.3.   Investment mix in the Common Methodology

95. **Under adverse market scenario 1, the value of most investments based on the Common Methodology significantly decreases by 21%.** This can be explained by the decrease in equity and property values, which decrease by 42% and 50% respectively. Furthermore, the value of government and corporate bond also shrink, both by around 3%. On average, other investments (consist of among others loans and mortgages, deposits, structured loans etc.) decrease by 29%. Finally, the derivatives increase in value and more than double, which is mainly due to the depreciation of the US dollar and the decrease in interest rates but also to a lesser extent due to the fall in equity prices and the increase in credit spreads. IORPs reported making use of derivative instruments to hedge foreign exchange risk (24%), interest rate risk (15%), equity risk (11%) and spread risk (4%). A small proportion of IORPs (3%) indicated to use derivate instruments to hedge inflation risk, but break-even inflation declines in adverse market scenario 1.

96. **The total value of investments also decreases in adverse market scenario 2, but only to a lesser extent, as the total value of investments decreases by 13%.** While the decrease in property values under adverse market scenario 2 (46%) is close to the decrease under adverse market scenario 1 (50%), the decrease in the equity values under adverse market scenario 2 (24%) is significantly smaller than under adverse market scenario 1 (42%). This is in line with what could be expected by the stress scenarios.[24] Moreover, the prescribed shock in the spread for corporate bonds is much higher under adverse market scenario 2 and subsequently the corporate bond portfolio decreases by 7% under this scenario.

Figure 39: Investment allocation baseline versus adverse market scenarios 1 and 2

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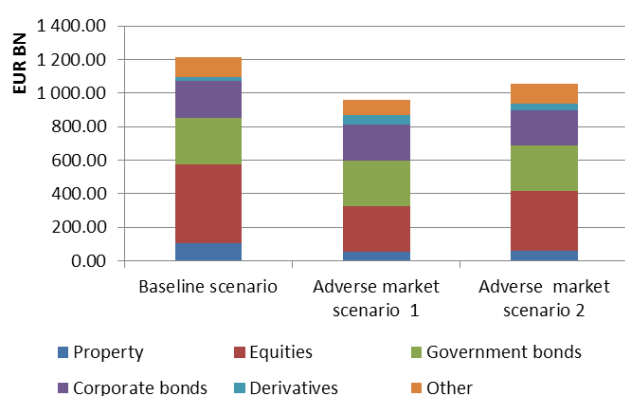
[24] The prescribed shock for equity (developed markets) under adverse market scenario 2 (-13%) is much lower than the shock under adverse market scenario 1 (-43%). Moreover, for (EU) property the differences between the two scenarios are much smaller with a price decrease of -55% in adverse market scenario 1 versus 36% in adverse market scenario 2.

Baseline scenario — Adverse market scenario 1 — Adverse market scenario 2

Legend:
- Property
- Equities
- Government bonds
- Corporate bonds
- Derivatives
- Other
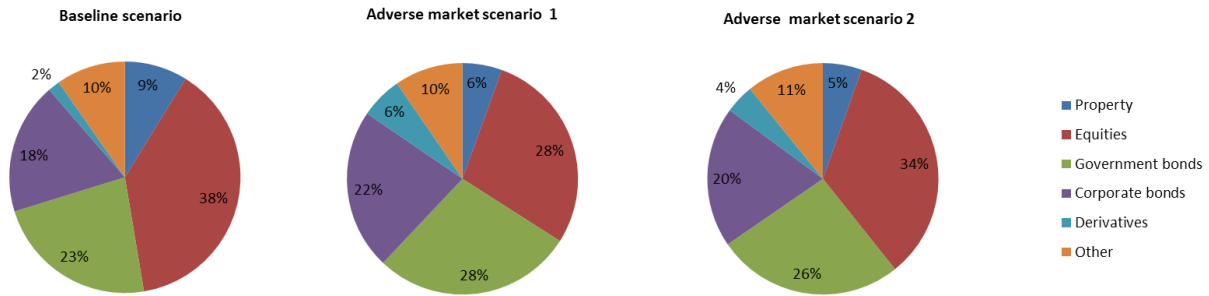
Source: EIOPA

97. **Property and equity are most severely hit by the scenarios and thereby account for most of the decrease in the value of investment.** Figure 40 shows the relative impact of each asset category on the total decrease of investments under adverse scenario 1. As stated before, the total value of investments decreases by 21%. The decrease in equity accounts for most of the decrease in the total investment portfolio, followed by property. Figure 41 shows the same after the adverse scenario 2. While the property and equity values are impacted to a lesser extent in scenario 2, the impact on these asset categories still accounts for most of the decrease in the total value of investments.

Figure 40: Impact on total investment by asset category adverse market scenario 1

Figure 41: Impact on total investment by asset category adverse market scenario 2

Source: EIOPA

Source: EIOPA

98. **Considering the initial investment mix per Member State, the proportion of fixed income assets differs considerably.** As shown before in section 2.2.3 (asset profile before stress), the initial investment mix per Member State differs. Indeed, the UK, the NL, SE, IE and BE invest a relatively large part (>40%) of their portfolio in equity. On the other side, 9 out of 14 Member States invest at least half of their portfolio in bonds (i.e. BE, DE, DK, IT, LU, NO, SI, ES, SE).

99. **There is also considerable difference of the impact of the stress scenario on the investment portfolio between Member States.** The impact on the overall value of investments in Member States with a significant proportion in equity (the UK, the NL, IE, SE, BE) is relatively strong under adverse scenario 1. Figure 42 shows the impact of the stress scenarios. All Member States are more impacted under the adverse market scenario 1.

Figure 42: Decrease in investments after stress, per Member State
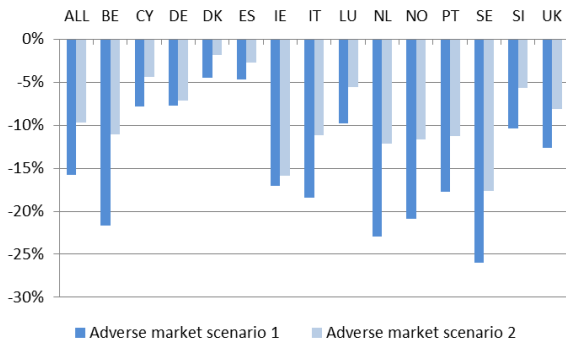
Source: EIOPA

2.3.3. Longevity scenario

100. **Apart from the adverse market scenario, the impact of an instantaneous permanent decrease of 20% in mortality rates was evaluated as a separate scenario.** Any longevity hedging was considered by adjusting the longevity-related assets, such as insurance recoverables. The stress is assumed for rates for each age and each member or beneficiary.

2.3.3.1. National balance sheet

101. **On average, the excess of assets over liabilities, as a percentage of liabilities decreases by 6 percentage points having applied the longevity scenario under the NBS.** In this case, the deficit of assets over liabilities is EUR 164bn. The surplus over national funding requirements decreases by 7 percentage points as a result of this scenario (Figure 43).

Figure 43: Excess A/L and surplus over national funding requirement, as a percentage of liabilities
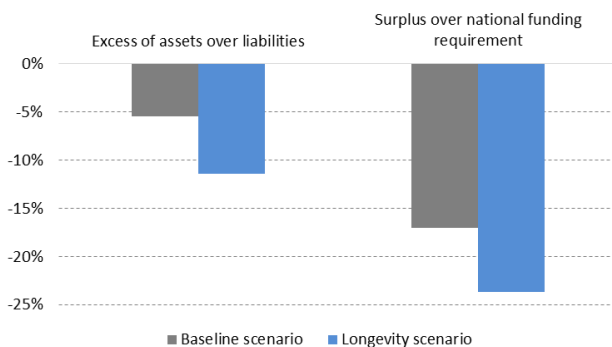
Source: EIOPA

102. **For all countries, the longevity scenario leads to smaller excess over liabilities or bigger deficit where the latter already existed in the baseline. The same can be observed regarding the surplus or deficit over the national funding requirements.** This impact is however less pronounced than in any of the two adverse market scenarios, one reason being that the longevity scenario only affects one single risk factor on the liability side while the adverse market scenarios foresee stresses over more risk factors negatively affecting both sides of the balance sheet (Figure 44 and Figure 45).

Figure 44: Assets over liabilities before and after stress, per Member State
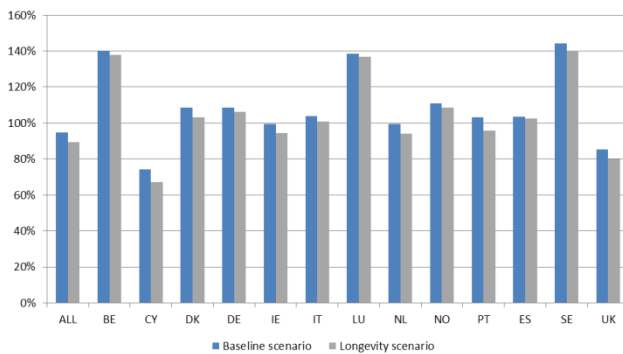
Figure 45: Surplus (deficit) over funding requirement before and after stress, per Member State
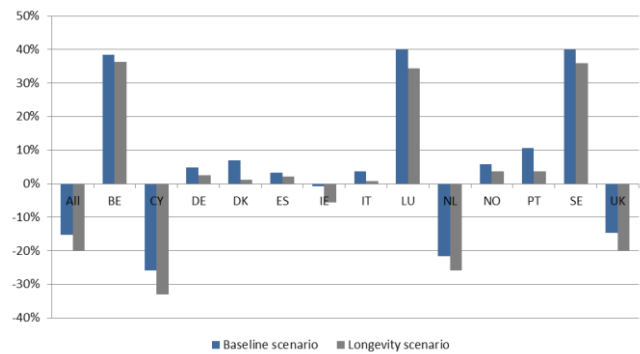
Source: EIOPA

Source: EIOPA

Note: This figure displays the surplus (deficit) over the national funding requirement, as a percentage of the national funding requirement. The results do not only depend on the scenario, but also on the national regulatory framework.

2.3.3.2.   Common Methodology

103. As stated previously the Common Methodology allows for the explicit recognition of all relevant security and benefit adjustment mechanisms that are available to IORPs in different Member States. Once again it is necessary to observe the different outcomes by the participating IORPs in different jurisdictions in terms of the increase in the sponsors' support in CY, DE, IT, LU, PT and the UK, also although less notable in BE, ES, the NL and NO or increasing the benefit reductions as it is the case for IE and the NL (Figure 46).
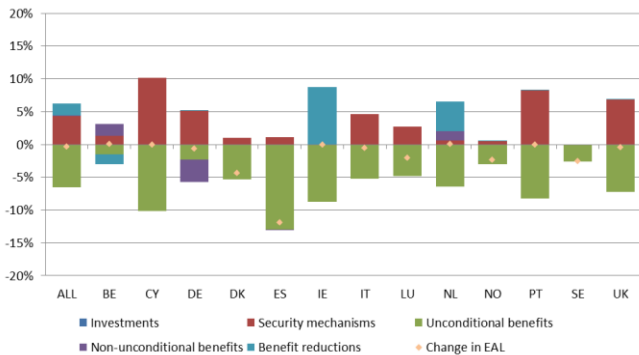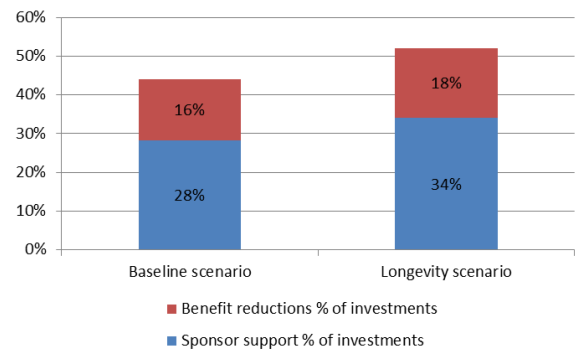
Source: EIOPA

Source: EIOPA

104. **The impact of the longevity scenario would imply a deficit of assets over liabilities of EUR 526bn, excluding sponsor support, PPS and benefit reductions. Accounting for security mechanisms, the longevity scenario would lead to a 20% increase of the sponsor support and 15% increase of benefit reductions under the Common Methodology.** Figure 47 shows that benefit reductions and sponsor support increase from 16% to 18% and from 28% to 34%, respectively, as a share of investments. Despite it is not a negligible impact, it is clearly not the major risk IORPs are facing compared to roughly 50% increase for both sponsor support and benefit reductions for the market scenarios (Figure 47).

105. **Considering that the longevity scenario only affects the liability side, it can be concluded that IORPs are exposed to this scenario to a substantially less extent compared to the market stress scenarios which negatively affect both sides of the balance sheet at the same time.** The fall in investments is negligible and not visible for any country. However, the label kept in the figures below just to illustrate that the longevity scenario does not affect the asset side and for consistency with the analysis done for the adverse market scenarios *(Figure 48 and Figure 49).*

Figure 48: Impact of the longevity scenario in EUR bn. and in % of baseline liabilities

Figure 49: Impact of the longevity scenario in % of baseline-liabilities
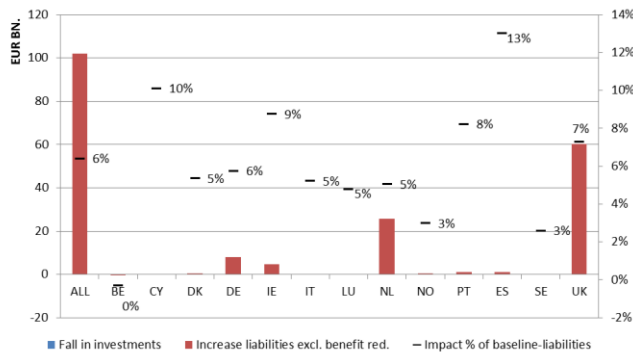
Source: EIOPA

Source: EIOPA

Note: In BE the exclusion of benefit reductions after the longevity scenario gives a decrease in the liability compared to the baseline, which is however negligible in relative and absolute terms (e.g. 0,3% of baseline liabilities).
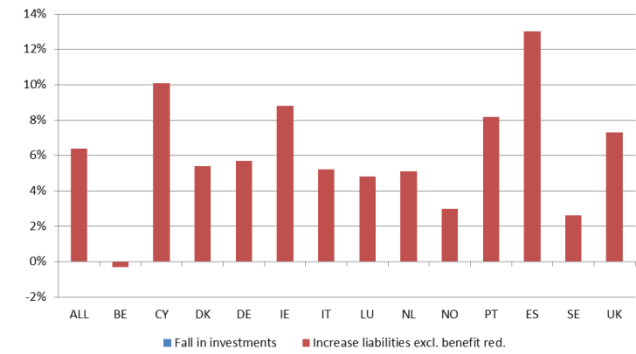
106. Member States currently have different approaches towards life expectancies. Some countries (like the NL and the UK) take into account expected improvements in life expectancy (by including a trend in mortality rates), while others do not. The likelihood of a 20% decrease of mortality rates is much lower if these improvements have already been factored in[25].

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25 http://www.oecd.org/publications/mortality-assumptions-and-longevity-risk-9789264222748-en.htm. Especially Chapter 3 ("Trends in life expectancy and mortality improvements: implications for pension funds and annuity providers") is relevant in this respect.

3. DC satellite module

3.1. DC IORP sample description

107. The DC IORP sector represents approximately 15% of the total European IORP sector. Figure 50 below provides an overview of the contribution of each Member State to the European DC IORP sector.

Figure 50: Market share DC sector by EU country (in % of total assets)
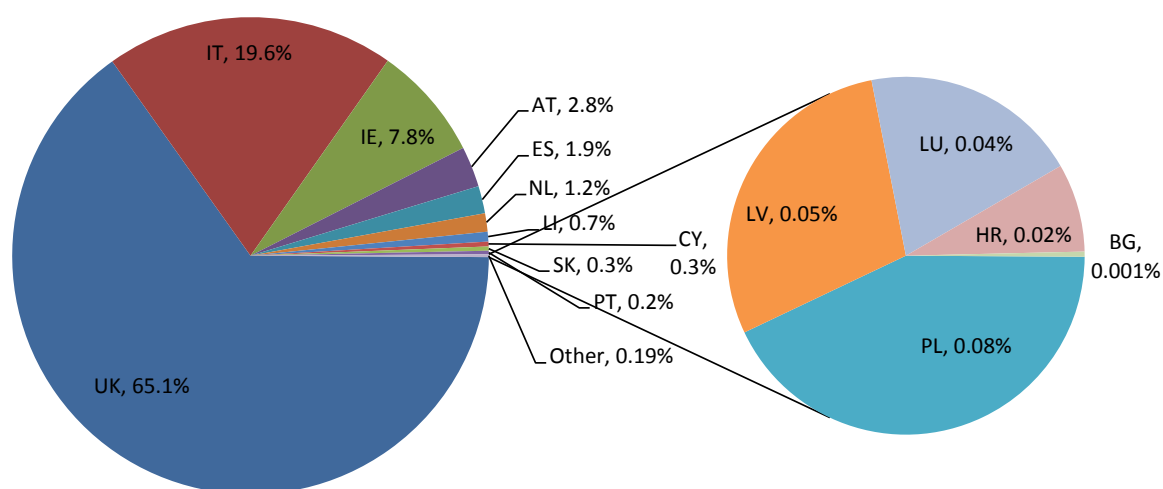
Source: EIOPA

Notes: Non-IORPs pension provisions and public pensions are not covered by this figure, and are also not relevant for this satellite module. Moreover, this figure is based on the total DC market and therefore also includes countries that do not participate in the DC part of this satellite module (IE, LI, PL, LV, LU, HR and BG).

108. The DC satellite module included 64 IORPs from 9 European countries (AT, CY, ES, IS, IT, the NL, PT, SK and the UK)[26]. Total assets held by these IORPs is almost EUR 83bn, representing around 17% of the total DC IORPs assets for those countries. In addition to this, the DC sector in all participating countries is greater than EUR 500bn. The reference date of the dataset is end of 2014.

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[26] BE did not participate in the DC satellite module because, according to the EIOPA definition for DB/DC schemes, all Belgian IORPs were considered as DB for this exercise.

109. The number of participating IORPs was above 10 in two Member States, between 5 and 10 and in four Member States and below 5 in the remaining three Member States. In terms of percentage of total assets, SK achieved a coverage rate of 100%, meaning all Slovakian DC IORPs participated in the satellite module, followed by AT, where participating IORPs represented 93% of the total assets of the DC IORPs sector. For IT members, the coverage is slightly above 50%. Participating IORPs in the UK represented a high proportion of the members of DC schemes. Reason is the inclusion of the largest new schemes set up to provide pensions to people newly auto-enrolled as well as some IORPs which have existed for longer. As these are new IORPs, they have relatively low assets at present and the sample members on average have low accumulated assets at the start date for the projections.

110. **Half of the schemes in the DB/hybrid-part of the stress test is closed to new accruals/members, whilst most DC plans (83%) included in the DC satellite module are open.** This reflects the trend that traditional DB and hybrid schemes will gradually be replaced by DC plans in the coming decades.

111. **The responses received show that the occupational DC market in general consists of non-pensioners[27].** Around a quarter of DC members falls within the representative member category with 35 or more years away from retirement; approximately 60% of the DC members fall in the category of more than 20 years to go until retirement. Nevertheless, variations in maturity of the DC system depend on the country as demonstrated in the Figure 51 and Figure 52 below.

Figure 51: Percentage of the total number of members broken down by remaining years to retirement age at the end of 2014 for the whole DC sample (in %)
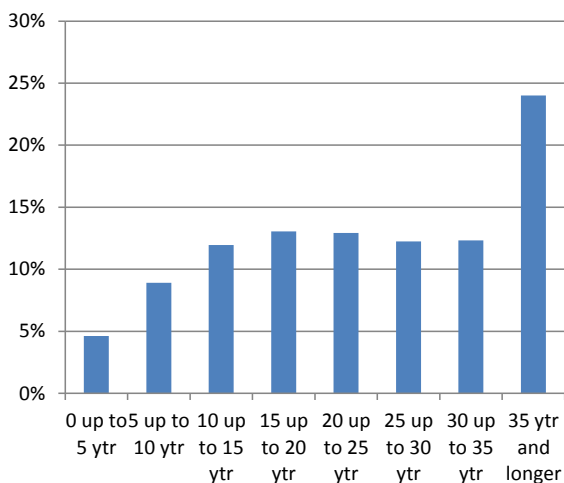
Figure 52: Percentage of the total number of members broken down by remaining years to retirement age at the end of 2014 by country (in %)
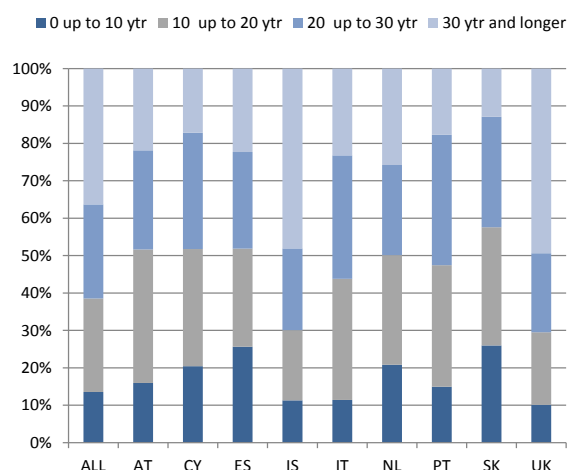
Source: EIOPA

Note: For ES most of the deferred members belong to just one scheme. Contributions to this particular scheme are currently forbidden by law.

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[27] In some markets, decumulation of the pension benefits by the IORP is allowed.

112. **Members with 20 years or more until retirement hold around 40% of the assets.** There are fewer than 400 thousand members (4.5%) with zero to 5 years to retirement. These members hold approximately EUR 7bn. For most of the countries (except of ES and IS) the sample consists of active members (Figure 53 and Figure 54).

Figure 53: Percentage of total assets held by members broken down by remaining years to retirement age at the end of 2014 for the whole DC sample (in %)
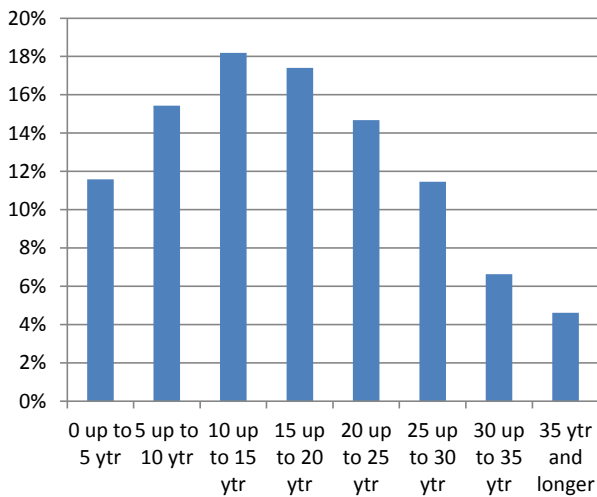
Figure 54: Breakdown of membership status across the sample
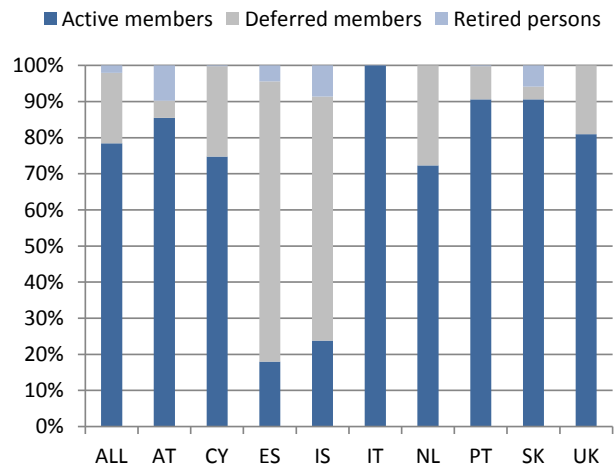
Source: EIOPA

Source: EIOPA

Note: For ES most of the deferred members belong to just one scheme. Contributions to this particular scheme are currently forbidden by law.

3.2. Overview and baseline scenario

3.2.1.   Overview

113. **The aim of the DC satellite module is to assess the impact on future retirement income of three representative plan members to the adverse market scenarios and an increased longevity scenario**. These three representative plan members are at year-end 2014 respectively 35 years, 20 years, and 5 years before the expected retirement date.

114. The design of DC plans provided by IORPs differs significantly among and within countries, in particular with respect to the accumulation phase. The DC satellite module analyses to what extent investment strategies in the accumulation phase contribute to reducing risk exposure of retirement income during the decumulation phase. A number of adverse scenarios are being considered to test the robustness of investment strategies under different stressed economic and financial market conditions. Moreover, the exercise measures how risks are distributed over the different stages of the members' life-cycle by considering three representative members with different years remaining to retirement.

115. The DC satellite module takes a realistic approach to model the characteristics of the DC plans and the representative members. Differences in variables such as contribution rates and starting wealth, representing cumulative contributions and returns in the past, influence the exposure of retirement income to adverse scenarios. Moreover, the DC satellite module allows for different developments in risk-free interest rates and inflation rates in the Eurozone, IS and the UK. As a result, differences in sensitivity to risk between IORPs in different Member States cannot be explained only by a varying investment strategy, but should also consider the other characteristics mentioned.

116. The risk exposure of retirement income to adverse scenarios also depends on the pay-out method. A nominal annuity will be sensitive to changes in nominal interest rates, an inflation-linked annuity to changes in real interest rates. A scheduled withdrawal from an investment portfolio with allocations to equities will be subject to unfavourable stock market developments. Pay-out methods vary considerably between IORPs and sometimes even between members of the same IORP. In addition, accumulated pension wealth may be distributed to plan members by means of multiple pay-out methods. Therefore, participants were asked to select the most representative decumulation method.

117. In many countries, all or part of accumulated pension wealth is frequently withdrawn as a lump-sum. Subsequently, the plan members have to choose how to transform the lump-sum payment into a regular income stream during retirement. In presenting the results, EIOPA assumes that plan members convert lump-sum payments into a nominal annuity, which yields the highest pension income at retirement under the modelling assumptions in the DC satellite module. However, the sensitivity of the lump-sum itself to adverse scenarios will also be reported, recognising it is often beyond the reach of the IORP how plan members draw down accumulated assets.

118. The risk to retirement income will not only depend on the pay-out method, but also on the way it is measured. The outcomes of the DC satellite module will be presented in terms of replacement rates. The replacement rate is the retirement income at the start of the retirement period as a proportion of the final salary just before retirement. This implies the introduction of inflation risk, as wages tend to grow with inflation. At the same time, it also means that a replacement rate is a comprehensive measure by taking into account the purchasing power afforded by future retirement income. Still, the sensitivity of retirement income expressed as a nominal value will also be shown.

119. In contrast to the core module for DB/Hybrid IORPs, the DC satellite module takes a top-down approach. IORPs only had to provide input data relating to the features of three representative plan members, the asset allocation of the representative plan members' during the accumulation phase, administrative costs and investment fees and charges and the typical pay-out method of the DC scheme. EIOPA developed a spreadsheet tool which automatically performed the calculations based on the input data for all representative members and scenarios.

120. A top-down approach reduces the burden on participants on the one hand. On the other hand, it applies a stylised model of a DC plan and does not take into account all specificities. Most notably, the tool does not consider derivative hedging of interest rates, inflation, equity, spread and longevity risk, which may materially impact the outcomes of the (instantaneous) market and longevity shocks. Another important assumption is that the asset allocations over the life-cycle of the plan members are fixed and independent of financial market conditions.

3.2.2.   Baseline scenario (pre-stress situation)

121. Some of the assumptions underlining the baseline scenario are specific to the DC plans and provided by the participants, others concern common assumptions prescribed by EIOPA. The common assumptions imply that the outcomes in the baseline scenario are not comparable to national estimates of future retirement income or replacement rates. In that respect, it should be reiterated that the goal is not to make pensions' projections, but only to construct a baseline scenario serving as a benchmark to measure the impact of adverse scenarios.

122. **The returns on assets in the baseline scenario are based on the following assumptions:**

   - Basic RFR curve and inflation curves are derived from swap curves using the Smith-Wilson methodology including the Ultimate Forward Rate (UFR) as applied under Solvency II.
   - Future interest rates follow forwards implied by the current yield curve at the end of 2014 (i.e. no term premium)
   - Realised price inflation follows forwards implied by the inflation curve at the end of 2014 (i.e. no inflation risk premium)
   - Sovereign bonds earn a risk premium over the RFR of 30bp, which is based on the long-term average spread on a basket of EU government bonds and after correcting for the expected losses due to default and/or downgrade.
   - Corporate bonds (incl. other fixed-income categories) earn a risk premium over the RFR of 90bp, which is based on the long-term average spread on "A" rated euro denominated corporate bonds and after correcting for the expected losses due to default downgrade.
   - Cash and deposits are assumed to earn no risk premium.
   - Equities and other non-fixed income assets, such as property and alternatives, earn a fixed equity risk premium of 300bp.

123. **The future RFR and inflation rates differ significantly among countries in the Eurozone, IS and the UK.** The 1-year forward interest rates in the UK will exceed those in the Eurozone until 2035, but will turn sharply lower in the following years (Figure 55). The market-implied inflation rates are significantly higher in the UK (Figure 56), resulting in lower real interest rates over the entire projection horizon. The 1-year forward nominal and real interest rates in IS are significantly higher than in the Eurozone until 2050.

Figure 55: Forward 1-year RFR (in %)
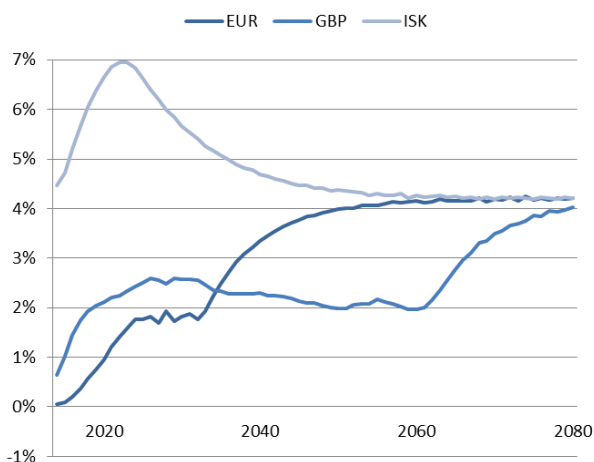
Figure 56: Forward 1-year inflation rates (in %)
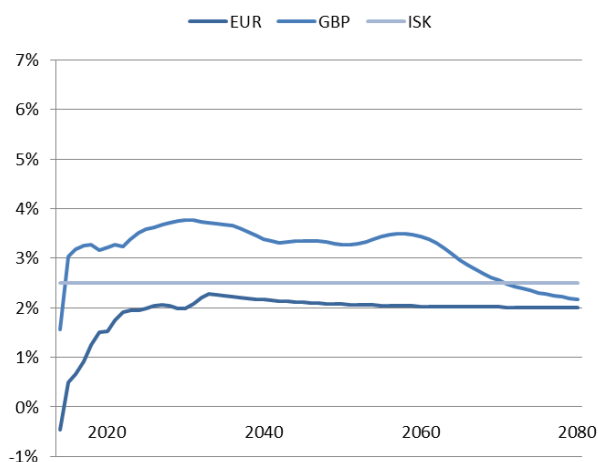
Source: EIOPA

124. The absence of a term premium means that the cumulative return on a 10-year bond is the same as rolling over 1-year bonds for a period of ten years. Conversely, the return on a 10-year risk free bond in a given year is the same as the return on a 1-year risk-free bond during the same year. Similarly, the absence of an inflation risk premium (as well as an illiquidity premium) implies that the returns on inflation-linked risk-free bonds are the same as on nominal risk-free bonds.

125. Cash is the only risk-free asset, with a risk premium of zero. Government bonds and corporate bonds are subject to credit risk, earning a risk premium of respectively 30 and 90 bps over the RFR.

Table 2: Risk premiums in the baseline scenario

Fixed income risk premium over risk-free interest rate

Government bonds	30 bps
Corporate bonds (and other fixed-income excl. cash and deposits)	90 bps

Non-fixed income risk premium over risk-free interest rate

Equities, property, alternatives and other non-fixed income	300 bps

Cash and deposits risk premium over risk-free interest rate

Cash and deposits	0 bps

3.2.2.1. Salary growth

126. The development of annual earnings of the representative plan members determines the amount of contributions paid into the DC plan and the level of the replacement rate, which expresses retirement income as a percentage of final earnings. Annual wages are assumed to grow in line with inflation and real wage growth of 1% in all countries. Participating IORPs had to provide an estimate of the career-growth component of salary growth for the three representative plan members as well as their starting salaries.

127. **An important driver of replacement rates is career salary growth**. Whilst higher rates of salary growth lead to higher final pension assets, and therefore higher retirement incomes, it can also create lower replacement rates. As an example consider a member whose salary doubles in the year before retirement. Whilst they would get larger contributions in that year, these contributions would not benefit from compound interest. As a result, the first year income in retirement would only go up slightly due to the higher contribution, but the pre-retirement salary has doubled and therefore the replacement rate will be lower. In particular, AT and UK IORPs have assumed high career salary growth during the last decade before retirement (Figure 57).

Figure 57: Average real career salary growth, plan member 35 years before retirement (Index 2014=100)
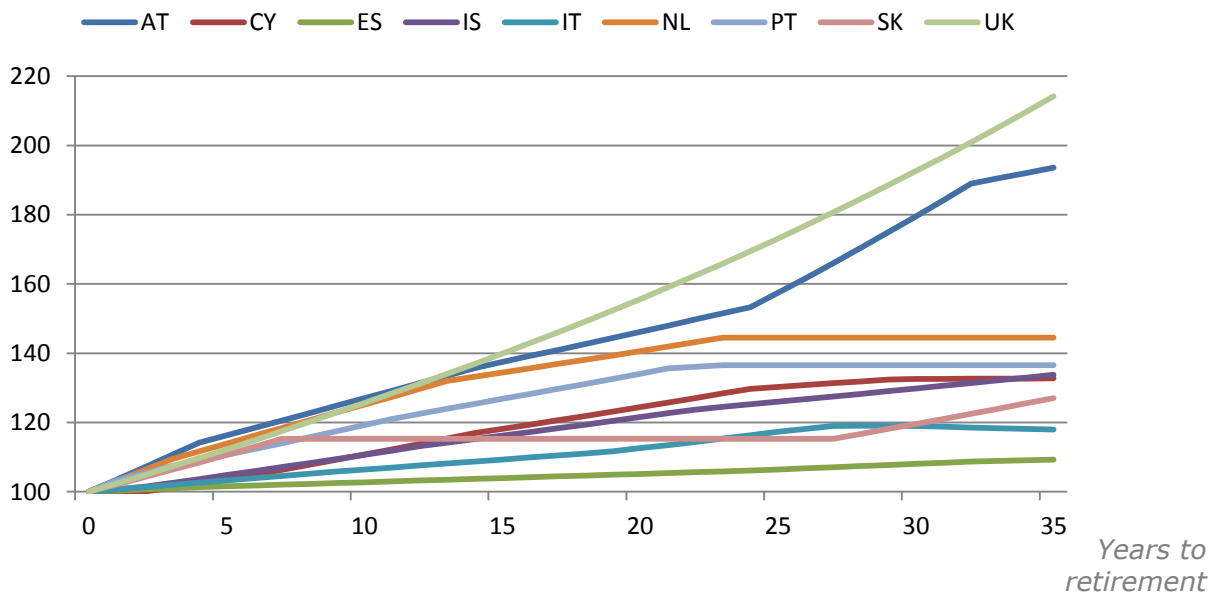
Source: EIOPA

128. The initial starting salaries have an impact on the value of retirement income, but generally not on the level of replacement rates. The reason is that doubling initial salaries will double final salaries, but also retirement income provided that contributions are determined in a linear fashion with respect to earnings. Most notably, this is not true in the NL and the UK where eligible salaries to which contribution rates are applied are subject to a floor. In these cases, lower starting salaries lead to lower replacement rates and vice versa.

129. The highest starting annual salaries can be found in the NL, followed by AT and then ES (Figure 58). Both SK and the UK have assumed relatively low starting salaries. For most countries, starting annual salaries are assumed to be higher for members who are closer to retirement, though SK and the UK have similar annual salaries for all members. Current annual salary data in SK are approximated by median earnings of corresponding age groups from Eurostat, as SK IORPs do not have information on annual salaries of their members.

Figure 58: Current Annual Salary at the end of 2014 (in EUR)
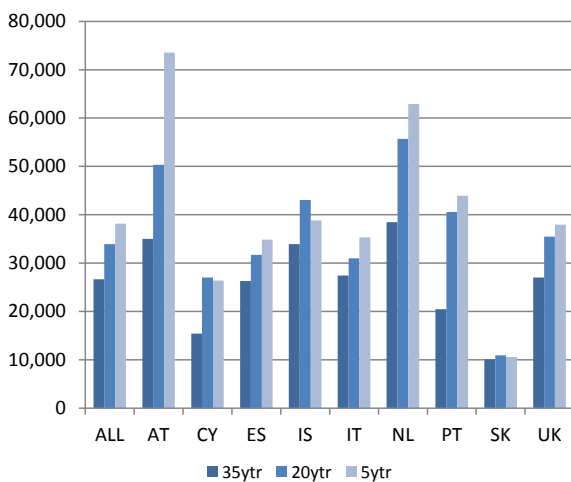
Source: EIOPA

3.2.2.2.   Contribution rates and initial wealth

130. **A key driver of the growth of a DC member's pension's pot is the amount which they contribute to it**. Figure 59 shows the average contribution rates over the life-cycle of the representative plan member with 35 years before retirement.

Figure 59: Average contribution rates over the life-cycle for representative plan member 35 years before retirement, % salary, weighted by members[28]
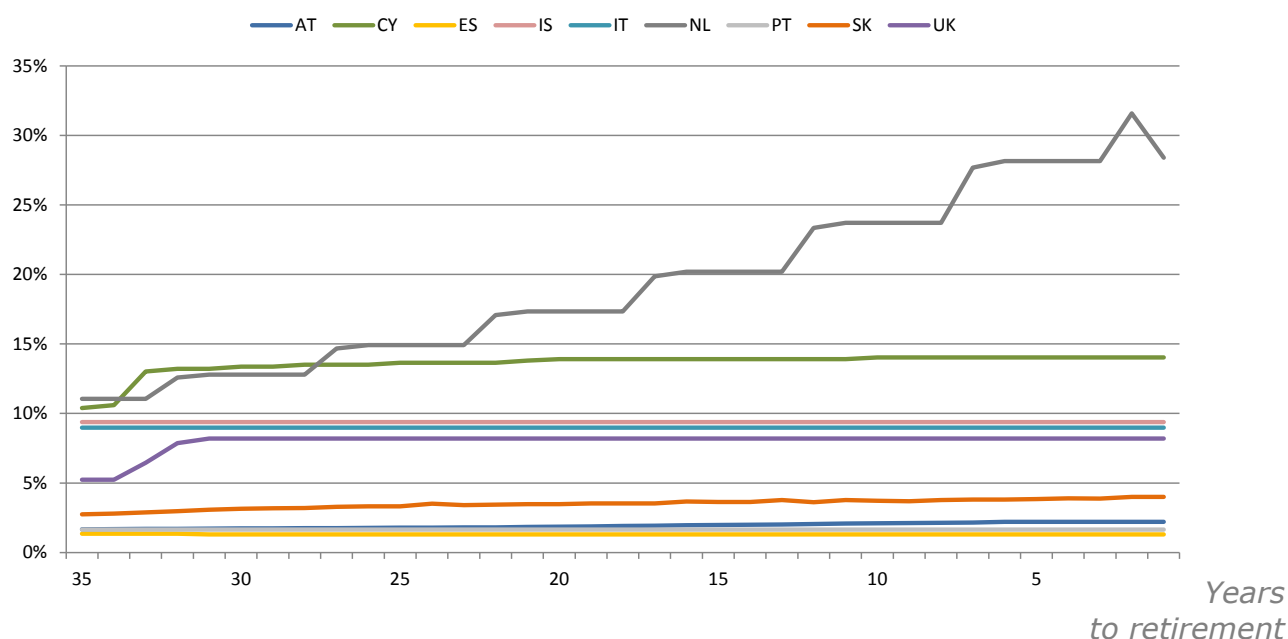
Source: EIOPA

Note: The contribution rate in IS is below the mandatory rate of 12%. The reason is that it only includes contributions for old-age pensions, but excludes contributions for other insurance components, such as survivor benefits.

131. The country with the highest contribution rate is the NL with on average 20% of wages over the life cycle. The next highest country is CY with on average 13% of wages. Four of the nine countries have total contributions of less than 5%. In PT, future contribution rates of a representative scheme in term of members included in the sample are expected to be zero. This has a downward effect on the weighted average contribution rate. Whilst contribution rates vary significantly across countries, they are relatively consistent measured over the life cycle. The exception to this is the NL. Their contributions are on average higher when members get closer to retirement. In CY there is a slight tendency for higher rates for the profiles that are further away from retirement.

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[28] The Spanish data is mainly driven by a pension scheme whose further contributions are currently forbidden by law due to fiscal consolidation, but without this atypical scheme the average is: 4.97%.

132. The contribution rates do not allow an estimate of how much members are saving into their pensions. To create this estimate, the contribution rate should be combined with the salary after correcting for any floor.

133. Participants in the DC satellite module were also requested to provide the pension assets the three representative members held at the reference date. Especially for the older plan members, this initial wealth has a significant impact on the replacement rates achieved by these schemes. Starting wealth reflects the amount of contributions paid in the past and investment returns made on these contributions. As a consequence, the starting pension wealth can be relatively low because of a low level of (past) contribution rates or because the DC IORPs started operating relatively recently. The latter is the case in the UK where a substantial part of the IORPs in the sample were established shortly before the introduction of auto-enrolment in 2012. In IT, the other large DC market, auto-enrolment was introduced in 2007. The relatively low pension wealth in SK can in part be attributed to the possibility plan members had until recently to withdraw funds from their accounts before retirement.

134. In most countries members who are closer to retirement have a higher value of pension assets at the reference date as a percentage of the initial wage. There is significant variation between the starting wealth for each country, with 5 countries where all members start with significantly less than 100% of initial wages at the reference date. In the NL starting wealth amounts on average to as much as 370% and 710% of the initial wage for the representative members with respectively 20 and 5 years before retirement. For the NL, the data provided represents the actual situation, with the exception of initial pension wealth.

3.2.2.3. Asset allocation

135. The money which the members held at the start of the exercise (reference date) and which is subsequently contributed is invested in various assets, and the returns achieved on these assets help to drive the growth of the members' pension assets. Asset allocations vary across time in the NL, SK, the UK and to a lesser extent AT and PT (Figure 130 in Annex 3). In the first-mentioned countries DC IORPs tend to invest in non-fixed income assets which are expected to deliver higher returns, but which have also high volatility, for those members currently far from retirement. On the other hand, schemes tend to switch into lower risk, lower return assets as the member approaches retirement.

136. Fixed-income assets (excl. cash and deposits) are mostly government bonds (70%) and corporate bonds (30%) (Figure 60). Especially DC plans in PT allocate a high proportion (almost 50%) of fixed income assets to corporates (Figure 61).

Figure 60: Fixed income mix at the end of 2014 for the 3 representative members

Figure 61: Fixed income mix for the member with 35 years to retirement at the end of 2014
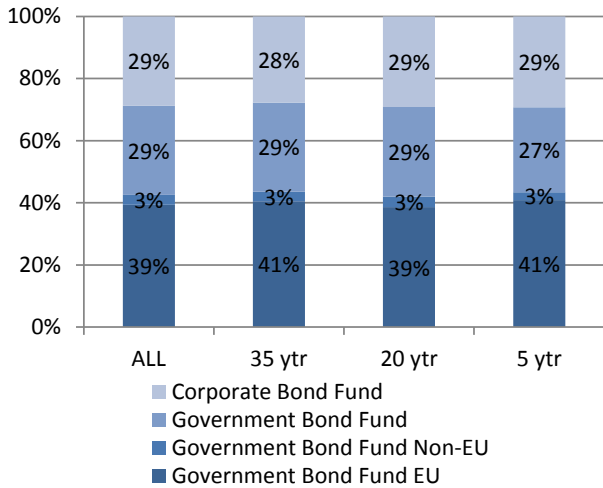
Source: EIOPA

Source: EIOPA

Note: ALL is calculated based on a simple average
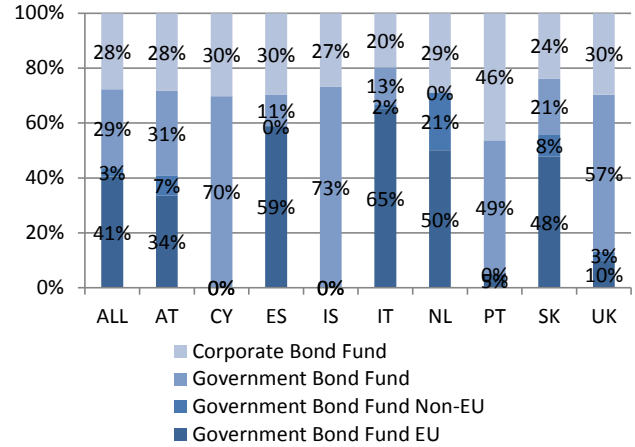
3.2.2.4. Replacement rates in baseline scenario

137. The replacement rates are calculated using the most representative pay-out method, as indicated by the participating IORPs. Furthermore, it is assumed that plan members convert lump-sum payments into a nominal annuity at retirement.

138. **The average replacement rates exhibit a lot of variation between the nine participating countries as well as the three representative plan members within countries.** The value of retirement income relating to the typical pay-out method as a percentage of the final wage ranges from 4% in AT and ES to 48% in the NL for the plan member 35 years away from retirement. In most countries the expected replacement rate increases with the number of years remaining to retirement. Most notably this is the case in CY and IT and to a lesser extent in SK and the UK. This is also the case for most participating IORPs from PT but the weighted average replacement rates are being influenced by the results of one non-typical yet representative scheme in the sample with no expected future contributions.

139. **The expected replacement rates cannot be seen in isolation from the wider occupational pension system.** In general, the DC plans are meant to supplement State pension provision in the first pillar. Therefore, participating IORPs were requested to provide an estimate of public pension replacement rates for the three representative plan members.

140. State pensions in AT, CY, ES, IT and PT are earnings-related, yielding relatively high replacement rates in the first pillar. The public pension replacement rate in SK is about 45%, which includes income derived from the first pillar pay-as-you-go scheme and the second pillar (or the so-called first pillar bis) funded social security system. In IS and the NL, workers are provided with flat-rate State pensions resulting in relatively low replacement rates. In the UK the State pensions are a combination of a flat-rate and an earnings-related amount. However, workers who have been members of an IORP which met certain conditions will have their IORP benefit replacing some or all of the earnings related component of the State pension. This system is being phased out from April 2016 onwards and will be replaced with a new flat-rate State pension. Workers' rights under the flat-rate and earnings-related system are protected in the transition rules.

141. **The combined replacement rates of State pensions and the DC schemes exhibit much less variation.** High DC replacement rates tend to be offset by low State pension replacement rates and vice versa. Still, there are substantial differences in combined replacement rates. Figure 62 for the UK excludes any pension accrued either in the earnings related part of the State pension system or in any private pension before the start of the DC projections. Hence, it substantially underestimates the replacement rate for the sample, especially for the 5-year and 20-year members, who almost certainly will have accrued such pensions. Ignoring the UK, the replacement rates range from around 45% to 50% in SK to as much as 100% for some plan member profiles in CY and IT.

Figure 62: Baseline scenario - Average replacement rate of DC plans – Typical pay-out method
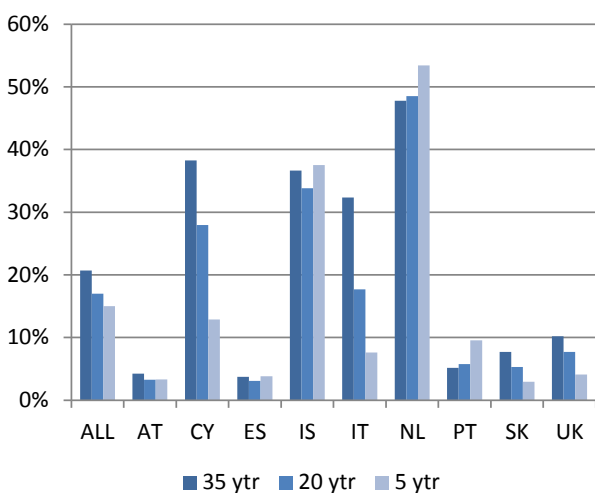
Figure 63: Baseline scenario - Average combined replacement rates of State pensions and DC plans
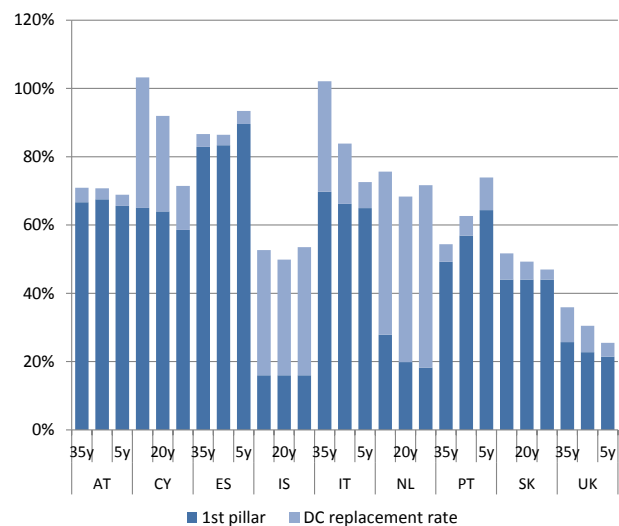
Source: EIOPA

Source: EIOPA

142. The variation in average replacement rates among countries are explained in Figure 62 and Figure 63. They provide a decomposition of the difference between the national average replacement rates. The average DC replacement rates amounts to 16% of the last earned wage for the 35-year plan member, 11% for the 20-year plan member and 8% for the 5-year plan member. The overall average replacement rate represents a plan member weighted average of the replacement rates in the nine participating countries. Hence, IT and the UK are given a large weight with the number of plan members in the sample well exceeding 1 million, while CY, the NL and PT are getting a small weight with the number of plan members in the sample being less than 50 thousand.

Figure 64: Decomposition of replacement rate with member weighted average in nine countries, 35 years to retirement

%-points final earnings
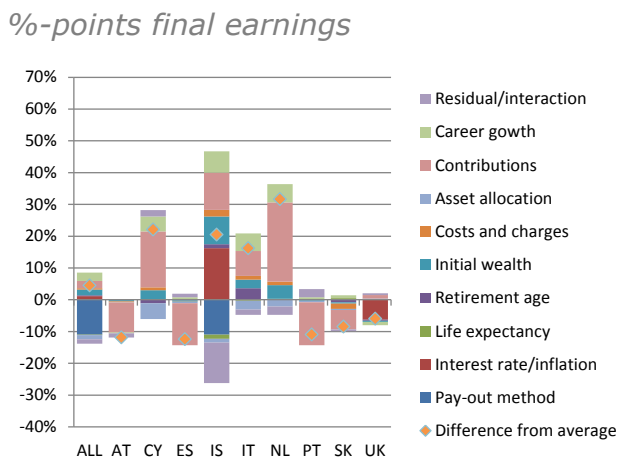
Source: EIOPA

Figure 65: Decomposition of replacement rate with member weighted average in nine countries, 20 years to retirement

%-points final earnings
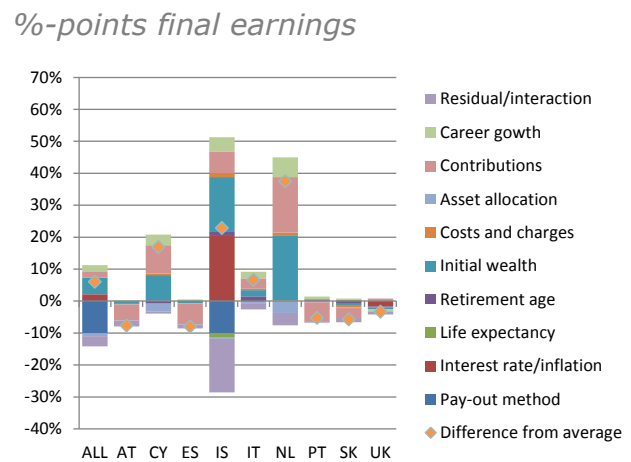
Source: EIOPA

Figure 66: Decomposition of replacement rate with member weighted average in nine countries, 5 years to retirement

%-points final earnings
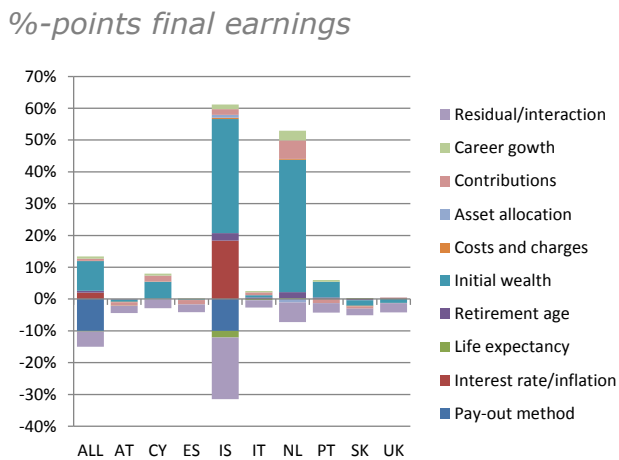
Source: EIOPA

143. The contributions of the various drivers to explaining the differences are obtained by comparing the outcomes using as an input the national average for the particular drivers and the overall member-weighted average for the same driver. One exception is the pay-out method where inflation-linked annuities and income drawdowns are compared to the "average" nominal annuity. The other exception is the currency underlying the RFR and inflation rates. Here, the euro is used as the "average" against which IS (Iceland Krona) and the UK (Great Britain Pound) are benchmarked.

144. The difference between the national average and the overall average replacement rate is decomposed in the following drivers of the outcomes:

- **Pay-out method**. All IORPs in IS selected the inflation-linked annuity as the typical pay-out method, resulting in a 10% to 11%-point lower replacement compared to the European average.

- **Interest rates/inflation**. The differences in future interest and inflation rates have a significant effect on estimated replacement rates. In the UK it results in lower replacements of 6 percentage points and 2 percentage points for the representative plan members 35 years and 20 years away from retirement. In IS the effect is even more pronounced with higher (real) interest rates having a positive effect on the replacement rates in the range of 16 percentage to 20 percentage points.

- **Life expectancy and retirement age**. The combined impact of life expectancy and the retirement age on the replacement rate for the young and medium-aged plan member is most positive in IT and most negative in CY relative to the sample average. The combined effect is most positive in the NL and SK for the representative member with 5 years to go until retirement.

- **Initial wealth**. In CY, IS, IT, the NL and PT the initial wealth as a percentage of initial wages exceeds the nine-country average, which is heavily influenced by the immature UK sample. In these five countries there is a positive impact (sometimes substantial) relative to the average on estimated replacement rates, especially for the older representative members.

- **Costs and charges**. The situation in every jurisdiction is so heterogeneous that strong conclusions or direct comparisons cannot be derived without additional information on investment and risk management strategies, returns or guarantees or knowledge about the differences in national occupational pension systems. Further work is needed to get a holistic understanding of the differences among countries on this matter.

- **Asset allocation**. DC schemes in the UK have the highest allocations to non-fixed income assets over the life-cycle, although the average asset allocation in the sample starts to decline to zero from around 10 years to retirement. These non-fixed asset classes (equities, real estate and alternatives) earn a risk premium of 300 bps in the baseline scenario compared to 30 bps on government bonds and 90 bps on corporate bonds. As a consequence, the estimated average replacement rate of young UK plan members is 0.4 percentage points higher than the 9-country average. The contribution of the asset allocation to the replacement rate for all other countries is negative relative to the overall average. DC IORPs in the NL have around 85% of the portfolio invested in equities, but only until 20 years before retirement when pension pots are still relatively small. After that equity allocations are fairly quickly reduced to 10% at the retirement date.

- **Contribution rates**. The contribution rates exceed the European average in CY, IS, IT, the NL and the UK. In these countries the level of contributions has a positive impact on replacement rates compared to the overall average. The positive effect decreases with the number of years until retirement, as the time to generate investment returns diminishes.
- **Career salary growth**. AT and UK IORPs reported the steepest career salary growth during the last decade before retirement resulting in a lower replacement rate compared to the European average. IORPs in CY, IS, IT and the NL have the flattest salary growth at the end of the worker's career. In IT career salary growth is even slightly negative. In these four countries career growth resulted in 5 percentage points to 7 percentage points higher replacement rates.
- **Residual.** Residuals are representing the interaction between the above drivers. In particularly, IS has a large, negative residual term, correcting the positive interaction between high interest rates and high contributions/initial wealth compared to the European average.

3.3. Instantaneous shock scenarios

3.3.1.   Stress assumptions

145. **The two asset price shock scenarios aim at testing the impact of expected retirement benefits to short-term financial market shocks.** These shocks may have a more significant impact on members who are closer to retirement, as they have accumulated a higher pension wealth and have less time to recover from financial market shocks. Nevertheless, the size of the impact depends on the underlying asset mix, in particular if life-cycling or target-date investing strategies are embedded in the pension scheme.

146. **The asset price shock scenarios are based on the two instantaneous stress scenarios for the DB/hybrid schemes (demand shock scenario and demand and supply shock scenario), but excluding the USD exchange rate stress.** These stresses are applied as (permanent) shocks to the baseline scenario, assuming that there is no impact on long-term risk premiums.

147. **The first asset price shock scenario combines a fall in asset values with a downward shift in the interest rate term structure, resulting in a decline in (forward) nominal interest rates**. The decline in real interest rates is less pronounced as the scenario also assumes a fall in break-even inflation rates. Not only the value of non-fixed income assets declines, but also the value of fixed-income assets. The rise in credit spreads on government and corporate bonds exceeds the fall in both the nominal as well as the real RFR. As a consequence, the yields on nominal and inflation-linked government bonds and corporate bonds increase (Figure 67 and Figure 68).

148. **The asset price scenario 2 is similar to the first scenario, although the relative sizes of the shocks differ**. The credit spreads on government bonds widen less, the credit spreads on corporate bonds more. A major difference is that break-even inflation rates increase in the second scenario, which causes a sharp fall in real interest rates. On balance, the nominal yields on government bonds remain more or less the same, while the yields on corporate bonds rise sharply. The real yields on inflation-linked bonds decrease by 0.2 percentage points, while the yields on inflation-linked corporate bonds increase by 0.9 percentage points in the shock scenario 2.

Table 3: Overview of impact shock scenarios on credit spreads and non-fixed income assets		
	Shock scenario 1	Shock scenario 2
Property stresses (percentage change in the value of property measured in EUR/reporting currency)		
Global real estate	-46%	-62%
- EU	-55%	-36%
- non-EU	-44%	-67%
Equity (listed) stresses (percentage change in the value of listed equities in EUR/reporting currency)		
Developed markets	-43%	-13%
- EU	-45%	-33%
- US	-42%	-2%
- other developed	-43%	-13%
Emerging markets	-32%	-32%
Alternative investment stresses (percentage change in the value of alternatives in EUR/reporting currency)		
Private equity (unlisted)	-42%	-38%
Commodities	-46%	+56%
Hedge funds	-27%	-8%

Figure 67: Nominal yield change government bonds (10-year maturity) and corporate bonds (5-year maturity)
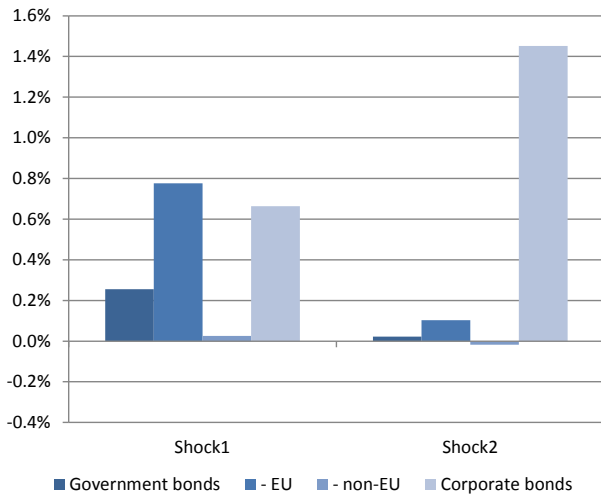
Figure 68: Real yield change government bonds (10-year maturity) and corporate bonds (5-year maturity)
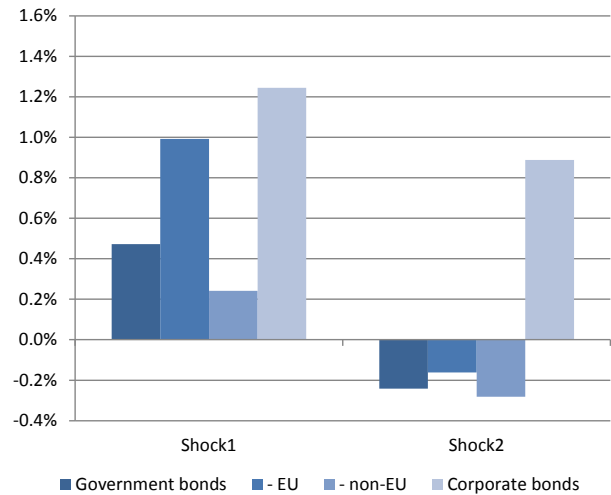
Source: EIOPA

Source: EIOPA

3.3.2. Stress results

149. **In the shock scenario 1, the replacement rates fall by 10% and 11% on average for the plan members that are respectively 35 years and 5 years away from retirement** (Figure 69). The replacement rates are based on the most representative pay-out method, as indicated by the IORP, and assuming that plan members convert lump-sum payments into a nominal annuity. This means that accumulated assets are distributed as an income drawdown in AT, an inflation-linked annuity in IS and nominal annuities in the other countries.

150. The two shock scenarios consist of two components that will affect the member profiles in a distinct way. First of all, the plan member closest to retirement will have accumulated higher pension wealth, which means the plan member will be most sensitive to the fall in asset prices. The decline in interest rates also results in lower investment returns on assets, which has the largest impact on representative member farthest away from retirement.

151. The relative impact on the different member profiles in the nine countries depends to a large extent on the exposure to non-fixed income assets of the 5-year member profile. DC plans in CY, IT, the NL, PT and SK have relatively low allocations to non-fixed income assets at the end of the life-cycle. As a consequence, in these countries the impact of the shock under scenario 1 is more severe for the young plan members than for the plan member closest to retirement.

152. **The shock scenario 2 has a more severe impact on replacement rates. The average replacement rate declines by 19% and 15% for the plan members with respectively 35 years and 5 years remaining before retirement** (Figure 70). The main reason is that future inflation will be higher, which exerts upwards pressure on wage growth. At the same time, nominal interest rates decline, which results in lower investment returns, lower accumulated wealth and lower pensions at retirement. In the shock scenario 1 the negative impact of lower interest rates was to some extent mitigated by lower inflation rates.

153. In all countries, the young plan members are more heavily impacted than the plan member closest to retirement. The decline in real interest rates is most detrimental for the young plan member by experiencing lower investment returns during the larger part of the life-cycle. Moreover, the fall in asset prices is less severe in the second scenario, which benefits the 35-year member profiles.

Figure 69: Shock scenario 1 – Weighted average replacement rates - Typical pay-out method
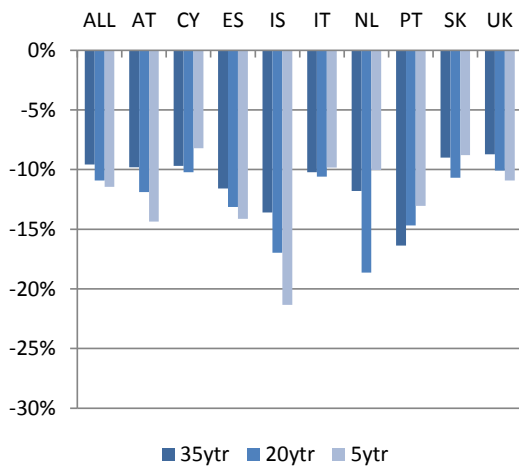
% difference from baseline

Figure 70: Shock scenario 2 – Weighted average replacement rates - Typical pay-out method

% difference from baseline

Source: EIOPA

Source: EIOPA

Note: Decrease of replacement rates, in relative terms. Index built as follows: (Replacement rate$_{stressed}$ - Replacement rate$_{baseline}$)/Replacement rate$_{baseline}$.
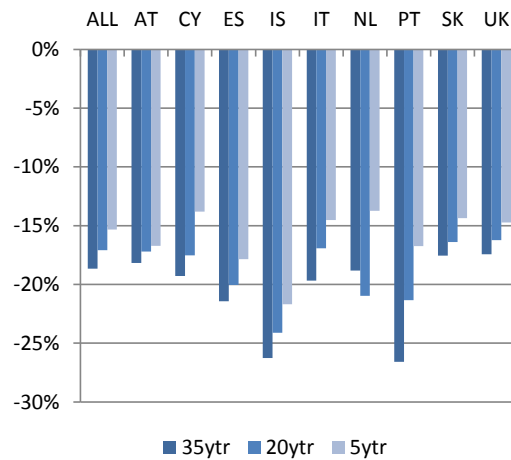
154. Members with 5 years remaining to retirement have the least possibilities to absorb an adverse market shock. The risk exposure of such members to shock scenario 1 is smaller in DC plans which invest a lower proportion of pension wealth in equities, real estate and alternatives. Figure 71 and Figure 72 show a distinct linear relationship between non-fixed income allocations and the percentage decrease in the replacement rate.

155. Clear outliers are UK DC schemes which have the highest allocations to non-fixed income assets, while the impact on the replacement rate is relatively modest. The explanation is that accumulated wealth is extremely low. Retirement income of the 5-year member profile is to a large extent generated by contributions being made between the instantaneous shock and the retirement age. As a consequence, the UK plan members with 5 years to retirement are not affected by the fall in asset prices.

156. **The impact of the shock scenario 1 is relatively benign for DC plans with little allocations to non-fixed income assets.** The value of pension income at the retirement date will decline. The lower interest rates will make annuities more expensive and reduce the returns on drawdown assets. However, this negative effect is to some extent compensated by the positive effect of lower inflation rates.

Figure 71: Shock scenario 1 – % change weighted average replacement rates (vertical axis) and allocation to non-fixed income assets (horizontal axis) – 5-year member profile

Figure 72: Shock scenario 1 – % change weighted average replacement rates (vertical axis) and allocation to non-fixed income assets (horizontal axis) – 5-year member profile
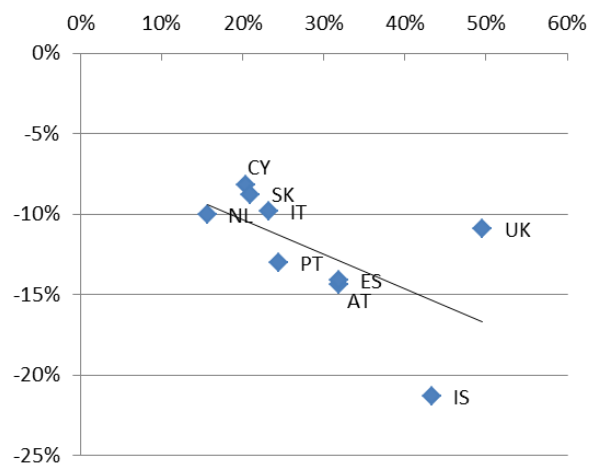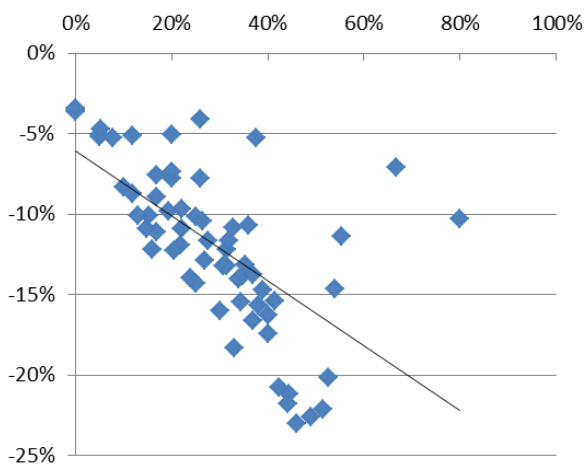
Source: EIOPA

157. The shock scenario 2 also shows a clear negative relationship between non-fixed income allocations of the 5-year member profile and the percentage decrease in the replacement rate (Figure 73 and Figure 74). However, in this scenario plan members closest to retirement are more seriously impacted by the decline in interest rates in combination with higher inflation rates.

158. Especially DC plans in the NL are aiming to hedge the interest rate risk of converting pension wealth into an annuity by increasing the duration of fixed income assets over the life-cycle. However, under both stress scenarios such a hedge is not effective. The yields on government and corporate bonds do not follow the decline in RFR due to the widening of credit spreads.

159. The large allocations to inflation-linked bonds in IS and, to a lesser extent, the NL are somewhat more effective. The value of the inflation-linked fixed income portfolio will increase if it consists of sovereign bonds. However, the effectiveness is reduced in this case as the credit spreads widen. Moreover, in IS the duration of fixed income assets is insufficient to match the duration of the index-linked annuities.

Figure 73: Shock scenario 2 – % change weighted average replacement rates (vertical axis) and allocation to non-fixed income assets (horizontal axis) – 5-year member profile
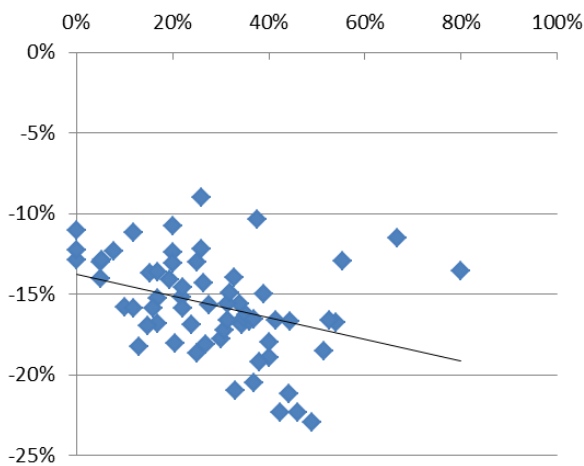
Figure 74: Shock scenario 2 – % change weighted average replacement rates (vertical axis) and allocation to non-fixed income assets (horizontal axis) – 5-year member profile
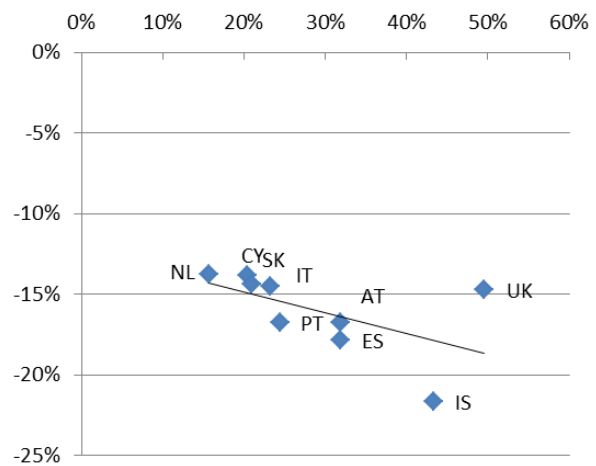
Source: EIOPA

3.3.2.1. Impact in terms of additional contributions and postponing retirement

160. **The adverse consequences of the two shock scenarios can be absorbed by paying additional contributions into the DC plan.** To keep expected replacement rates at their pre-stress levels, an increase in the amount of contributions (i.e. not the contribution rate) would be required following the shock scenario 1 of on average 11%, 25% and 67% for the 35, 20 and 5 year member profile respectively (Figure 75). Under the more severe shock scenario 2, contributions would have to be raised by 44%, 32% and 94% respectively (Figure 76).

Figure 75: Shock scenario 1 – Weighted average % increase in contributions to achieve pre-stress replacement rate - Typical pay-out method
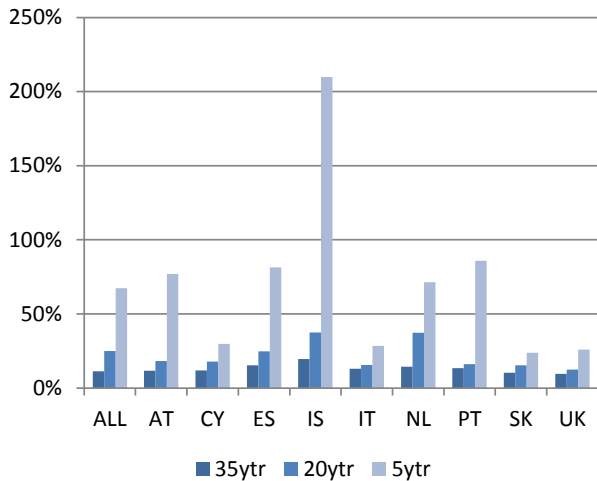
% difference from baseline

Figure 76: Shock scenario 2 – Weighted average % increase in contributions to achieve pre-stress replacement rate - Typical pay-out method

% difference from baseline
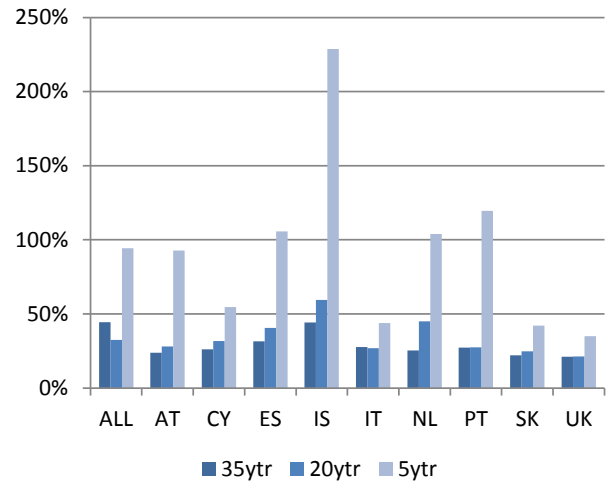
Source: EIOPA

Source: EIOPA

161. The differences between the various countries reflect the relative impacts of the two shock scenarios on the replacement rate. Moreover, the extent to which a percentage increase in the amount of contributions helps to mitigate an adverse scenario depends on the relative importance of contributions in attaining a certain replacement rate. The replacement rate in IS (high interest rates) and the NL (high initial wealth) for example relies to a large extent on other factors.

162. **Increasing the amount of contributions is most effective for the younger plan members, since there will be more time for these additional contributions to generate investment returns.** Any extra contributions made by the oldest plan member can only be invested up to five years. This is best illustrated in the shock scenario 2 which has the lowest impact on the replacement rate of the plan members with five years to go before retirement. However, the highest increase in contributions would be needed to maintain replacement rates at their pre-stress levels.

163. Almost 90% of IORPs indicated that plan members have the possibility to increase contributions following adverse market developments (Figure 77). Notable exceptions are DC plans in IS which do not allow for additional contributions as well as about half of the DC plans in CY and the NL. However, most DC IORPs plan members would not be inclined to increase contributions to mitigate the negative impacts of a financial market shock (Figure 78).

Figure 77: Possibility for plan members to increase the amount of contributions to the DC plan

% IORPs
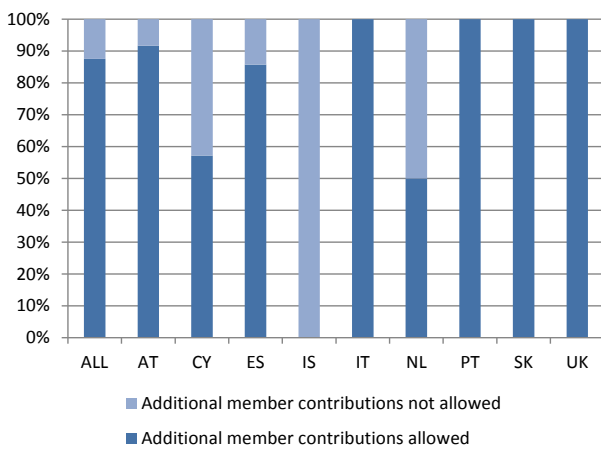
Figure 78: Inclination of plan members to raise contributions following adverse market developments

% IORPs allowing for additional member contributions
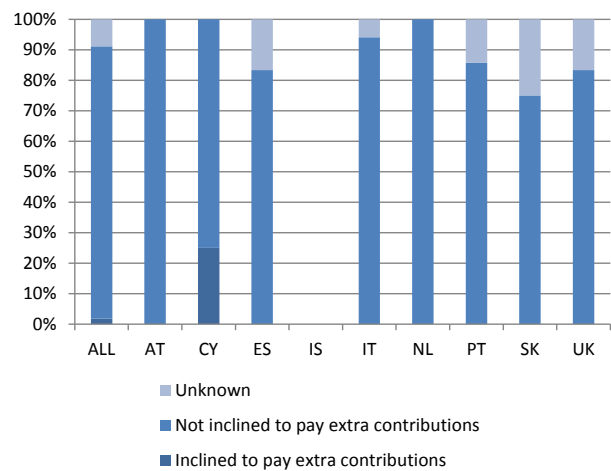
Source: EIOPA

Source: EIOPA

164. **Plan members can also delay retirement to counter the negative consequences of the shock scenarios.** To keep replacement rates at the same level after shock scenario 1, the retirement date would have to be postponed by 24, 25 and 23 months on average (i.e. about 2 years) for the 35, 20 and 5-year member profiles respectively (Figure 79). Under the shock scenario 2, the date of receiving retirement benefits would have to be delayed by 46, 40 and 33 months on average (i.e. between 2¾-4 years) for the representative plan members respectively 35, 20 and 5 years away from retirement (Figure 80).

165. **The variation between Member States depends above all on the impact of the two shock scenarios on the replacement rate. However, the extent to which an increase in the retirement age can absorb a given decline in the replacement rate may vary. Postponing retirement will mitigate the negative impact on replacement rates through two different channels:**

- Additional contributions will be paid into the DC scheme during the months the plan member keeps working. High contribution rates by itself do not make an increase in the retirement age more effective. The reason is that high contribution rates generally go hand in hand with high replacement rates, implying a bigger margin to absorb a certain percentage decline in the replacement rate. However, high contribution rates in comparison to the replacement rate will reduce the extent to which retirement has to be delayed. Most notably, this is the case for DC IORPs in the NL which use a progressive contribution schedule with rates increasing towards retirement. In SK and the UK contribution rates are also relatively high due to low level of initial wealth, whereas in ES, IS and PT contribution rates are low in comparison to the replacement rate. In the particular case of PT, future contribution rates of a representative scheme in term of members included in the sample are expected to be zero, which explains the comparatively high number of months that retirement has to be postponed to absorb the decline in replacement rates.
- The expected number of years spent in retirement will decline, resulting in higher pension income.

166. **In contrast to raising contribution rates, postponing retirement is equally effective for all member profiles in absorbing negative shocks.** The replacement rate of plan members closest to retirement was least impacted by the shock scenario 2. The 5-year member profiles are also experiencing a lower adjustment to the retirement age than the 35-year member profile.

Figure 79: Shock scenario 1 – Weighted average increase in retirement age to achieve pre-stress replacement rate - Typical pay-out method

Difference from baseline in months
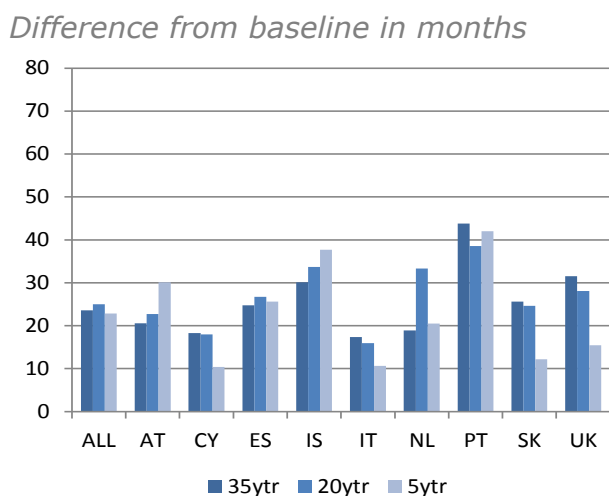
Source: EIOPA

Figure 80: Shock scenario 2 – Weighted average increase in retirement age to achieve pre-stress replacement rate - Typical pay-out method

Difference from baseline in months
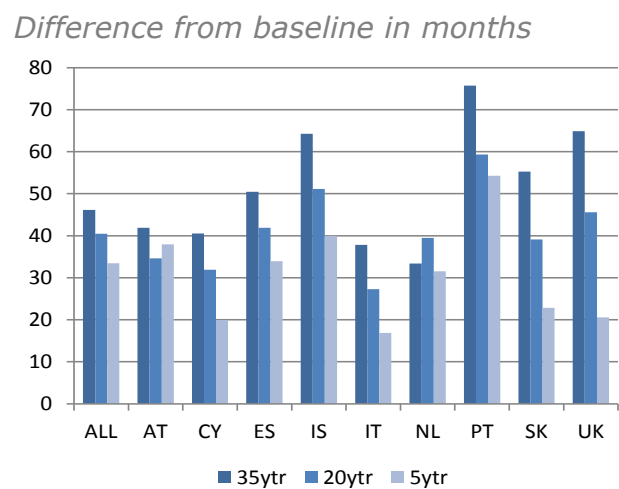
Source: EIOPA

167. **More than 80% of IORPs indicated that plan members have the possibility to delay the start year of receiving retirement benefits.** Only IORPs in CY and a minority of DC plans in AT and PT[29] do not allow for such flexibility (Figure 81). Similar to increasing contributions, most DC IORPs do not expect that plan members will be inclined to delay retirement following an adverse market shock (Figure 82).

Figure 81: Possibility for plan members to postpone the start year of receiving retirement benefits

% IORPs
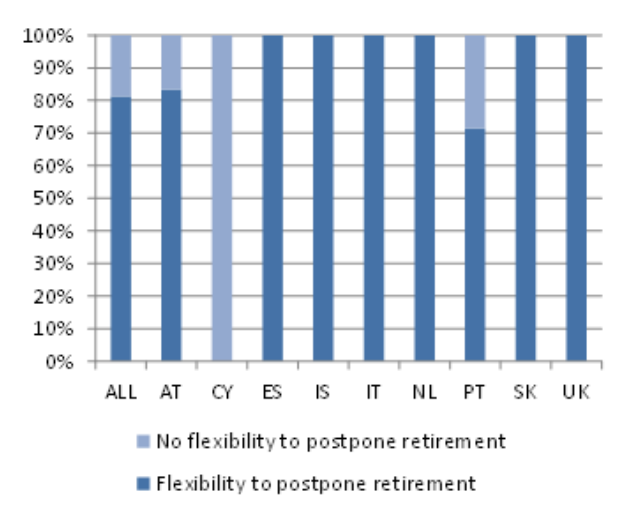
Figure 82: Inclination of plan members to postpone retirement following adverse market developments

% IORPs allowing members to postpone retirement
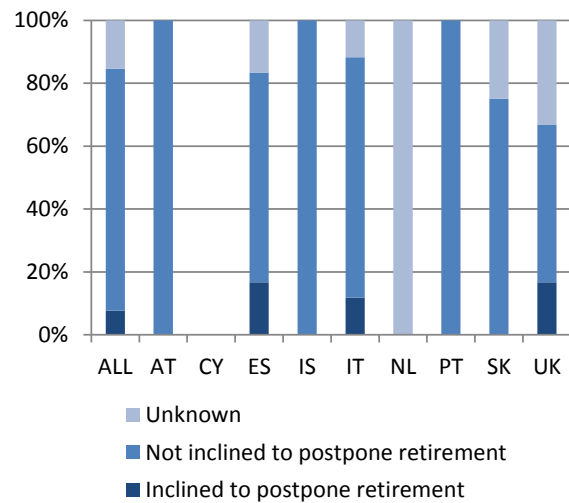
Source: EIOPA

Source: EIOPA

3.3.2.2. Impact on alternative measures of retirement income

168. **The most representative pay-out method can also be expressed in terms of a nominal value, instead of a replacement rate.** This increases the negative impact of the shock scenario 1 by 2% to 4%, as the beneficial effect of lower inflation on the retirement income measure is no longer taken into account. Conversely, the negative impact in the shock scenario 2 would be reduced by 3.5% to 4% as the detrimental effect of inflation is not included.

169. Instead of assuming that lump-sum payments are converted into nominal annuity, lump sum payments can be included as one of four typical pay-out methods. This would reduce the negative impact of the shock scenarios in countries where lump-sums are a regular pay-out method, i.e. most notably CY, ES and the UK and to a lesser extent IT and PT[30]. The reason is that the adverse impact of lower interest rates on annuity rates would no longer be taken into account (Figure 83, Figure 84, Figure 85 and Figure 86).

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[29] In PT, a new Law enacted in September 2015 foresees the possibility for plan members to postpone the timing of starting to receive retirement benefits for a maximum period of 2 years.

[30] See Annex 3. Introduction to the DC IORPs sector (paragraph 267).

Figure 83: Shock scenario 1 – Weighted average retirement income - Typical pay-out method (excl. lump sum)

% difference from baseline
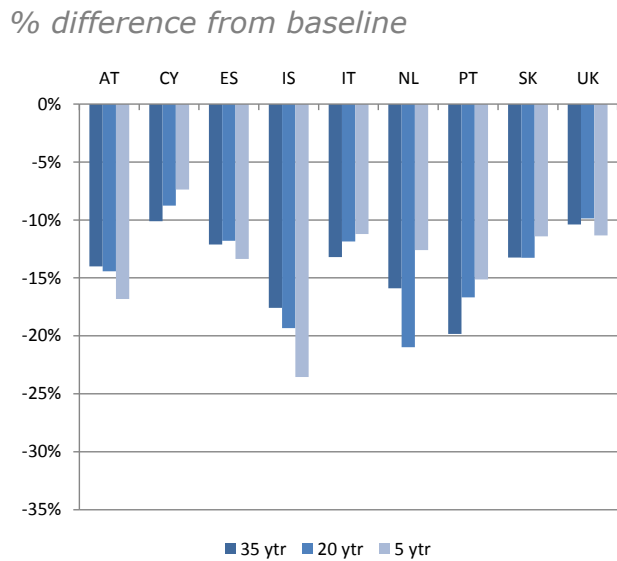
Source: EIOPA

Figure 84: Shock scenario 1 – Weighted average retirement income - Typical pay-out method (incl. lump sum)

% difference from baseline
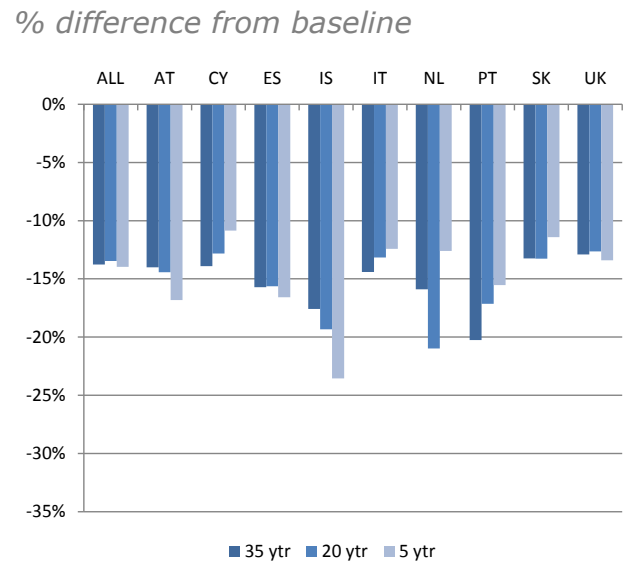
Source: EIOPA

Figure 85: Shock scenario 2 – Weighted average retirement income - Typical pay-out method (excl. lump sum)

% difference from baseline
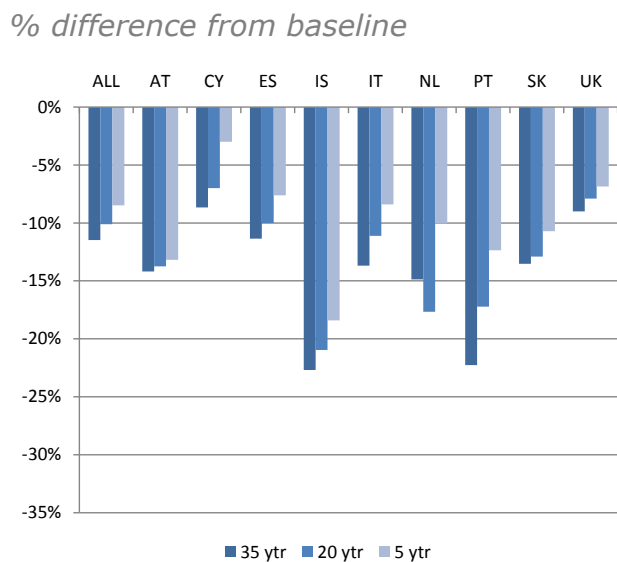
Source: EIOPA

Figure 86: Shock scenario 2 – Weighted average retirement income - Typical pay-out method (incl. lump sum)

% difference from baseline
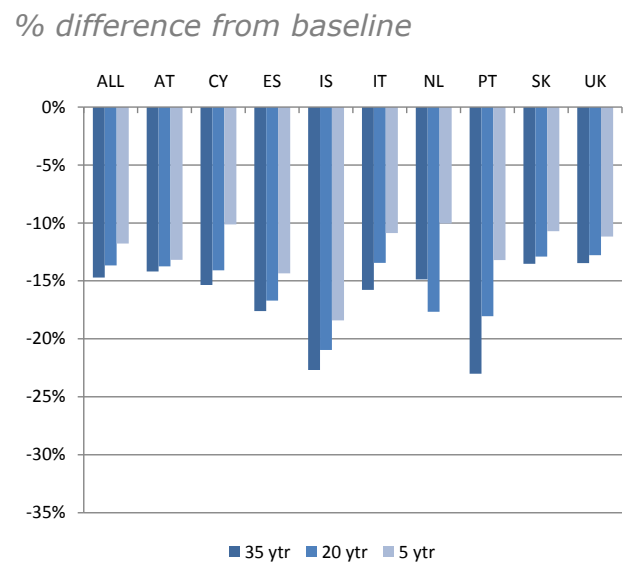
Source: EIOPA

3.4. Low return scenario 1 and 2

3.4.1.   Stress assumptions

170. **The instantaneous shocks applied to the current value of fixed income and real assets have a limited impact on young members**. Young members with many years ahead prior to their retirement have accumulated little pension wealth. These members are primarily exposed to changes in long-term shocks in the level of investment returns, i.e. lower risk premiums. As a result, it is more appropriate to complement the scenarios described in the previous section with two scenarios where the long-term levels of return are stressed instead of the asset values (Table 4).

171. Despite some shocks are common among instantaneous shock and low return scenarios the two exercises are fully independent. More specifically, the permanent shocks to nominal interest rates and inflation rates are the same as in the two stress scenarios described before. Instead of stressing the current values of fixed income and non-fixed income assets, the low return scenarios incorporate a downward shift in risk premiums on these asset classes. The decline in risk premiums also serves as a sensitivity analysis, recognising the high degree of uncertainty surrounding long-term projections for such variables.

Table 4: Overview of impact low return scenarios		
Impact on long-term risk premiums (in bps)	*Low return scenario 1*	*Low return scenario 2*
Government bonds	-25	-20
Corporate bonds (and other fixed income)	-20	-35
Equities, property, alternatives	-150	-100
Cash and deposits	0	0

172. The (real) yields on government and corporate bonds fall in line with the decline in the (real) RFR (Figure 87 and Figure 88), in contrast to the two shock scenarios. The credit spreads on government and corporate bonds do not change. The lower risk premiums are assumed to materialise through an increase in the costs of downgrade and default, instead of through a decrease of the credit spreads.
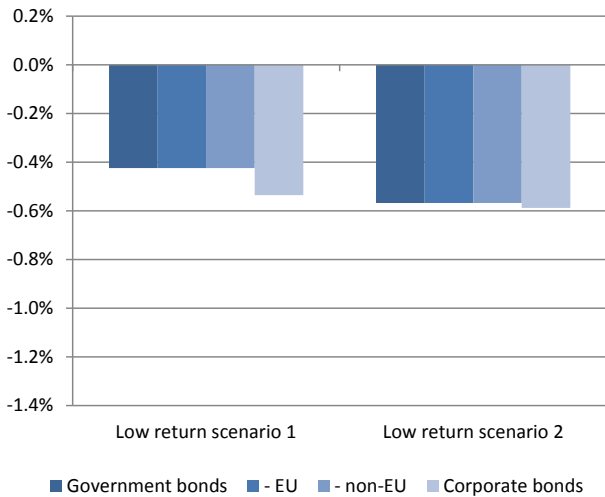
Figure 88: Real yield change government bonds (10-year maturity) and corporate bonds (5-year maturity)
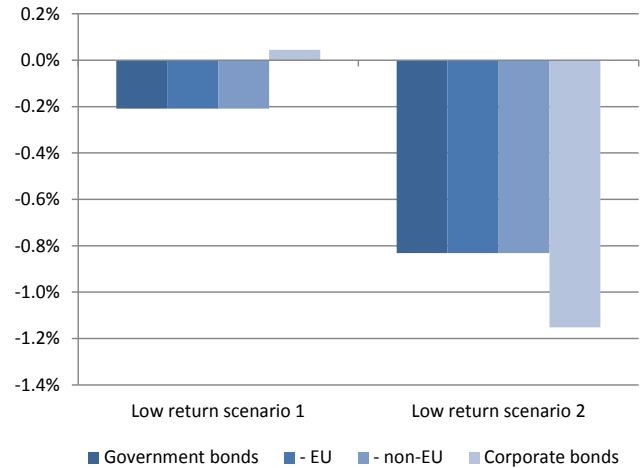
Source: EIOPA

Source: EIOPA

3.4.2. Stress results

173. **In the low return scenario 1, the replacement rates fall by 18% and 5% on average for the plan members that are 35 years and 5 years away from retirement respectively** (Figure 89). The replacement rates refer to the most relevant pay-out methods, as selected by the participating IORPs, where lump sum payment are assumed to be converted into nominal annuities at retirement. As a result, accumulated wealth is decumulated using an income drawdown in AT, an inflation-linked annuity in IS and a nominal annuity in the other countries.

174. The negative impact of the low return scenario 1 is the higher, the further the plan member is away from retirement. Young plan members receive lower investment returns over the larger part of their life-cycle due to the decline in interest rates and the lower risk premiums. In particular, the risk premium turns out to be lower for non-fixed income assets to which plan members are in general most exposed during the start of the life-cycle.

175. The impact of the low return scenario 1 on the replacement rate of the 35-year member profile differs considerably between countries. These differences are related to differences in equity exposures during the accumulation and decumulation phase. However, they also depend on the degree to which expected replacement rates depend on investment returns instead of future contributions. In an extreme case, where all pension income depends on current contributions – i.e. a pay-as-you-go scheme – the sensitivity to the low return scenario would be zero.

176. The impact on the 35-year member profile is with -15% relatively low in CY. This can be explained by the low exposures to equities, real estate and alternatives by DC IORPs in CY. AT, IS and PT have a negative impact on replacement rates in excess of 20%. DC IORPs in AT distribute retirement income by means of an income drawdown that is assumed to have an equity exposure of 25%. The relatively high replacement rates in IS are to a large extent driven by relatively high RFR and, hence, investment returns. One DC IORPs in PT and one in ES assume zero contribution rates for the 35-year member profile until retirement.

177. **In the low return scenario 2, the replacement rates fall by 24% and 12% on average for the plan members that are 35 years and 5 years away from retirement respectively.** In this scenario, lower nominal interest rates are accompanied by higher inflation rates which increase the denominator of the replacement rate measure. In IS, higher inflation also lowers the rates to convert accumulated wealth into an inflation-linked annuity.

Figure 89: Low return scenario 1 – Weighted average replacement rates - Typical pay-out method

Figure 90: Low return scenario 2 – Weighted average replacement rates - Typical pay-out method
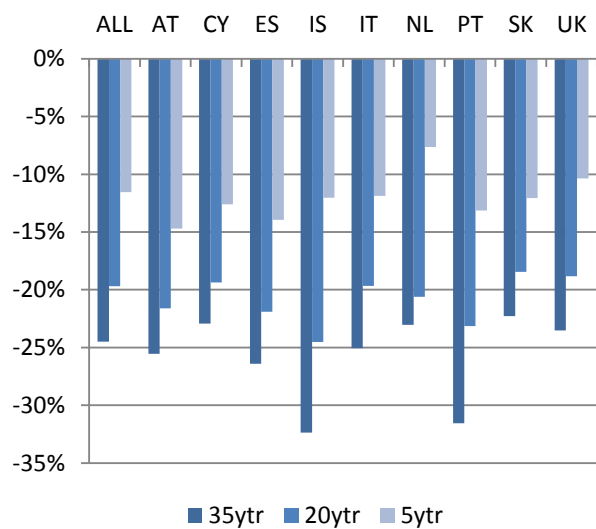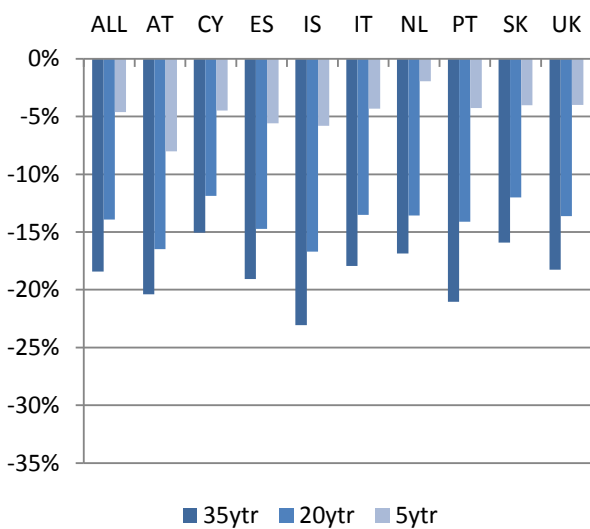
Source: EIOPA

Source: EIOPA

Note: Decrease of replacement rates, in relative terms. Index built as follows: (Replacement rate stressed - Replacement rate baseline)/Replacement rate baseline.

178. The impact of the low return 1 scenario on the plan member closest to retirement depends on the allocation to non-fixed income assets, despite small number of years remaining until retirement. The returns on non-fixed income assets are hit by the lower risk-free interest as well as a considerable decline in the risk premium. DC plans in AT experience a relatively strong fall in the replacement rate, as the lower risk premium results in a lower annual income drawdown. The impact in the UK is relatively modest due to the low value of accumulated assets.

Figure 91: Low return scenario 1 – % change weighted average replacement rates (vertical axis) and allocation to non-fixed income assets (horizontal axis) – 5-year member profile from all participating IORPS
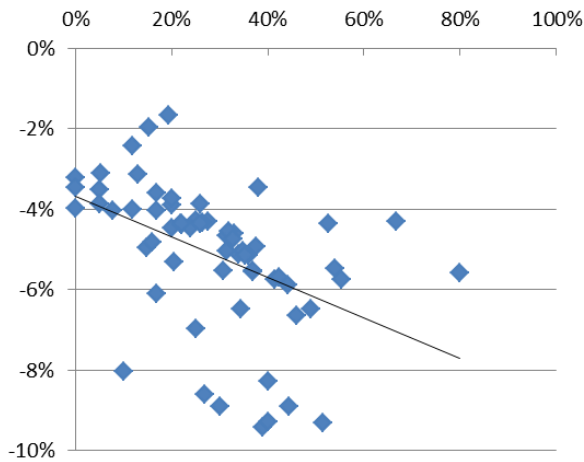
Source: EIOPA

Figure 92: Low return scenario 1 – % change weighted average replacement rates (vertical axis) and allocation to non-fixed income assets (horizontal axis) – 5-year member profile averaged per country
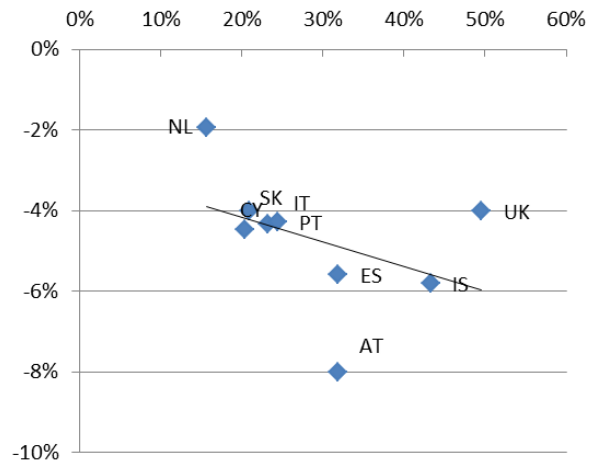
Source: EIOPA

179. DC IORPs that hedge interest rate risk in converting accumulated pension wealth into an annuity experience a relatively small drop in the replacement rate for the 5-year member profile. This is especially the case for DC plans in the NL where the duration of fixed-income assets increases to 13 years for the plan member closest to retirement. This is equivalent to a duration of overall assets of about 11 years. In contrast to the shock scenarios, government and corporate bonds prove to be effective hedging instruments in the low return scenarios. A decline in the RFR results in an equivalent reduction in government and corporate bond yields (Figure 93, Figure 94, Figure 95 and Figure 96).

Figure 93: Low return scenario 1 – % change weighted average replacement rates (vertical axis) and effective duration of assets (horizontal axis) – 5-years member profile from all participating IORPs
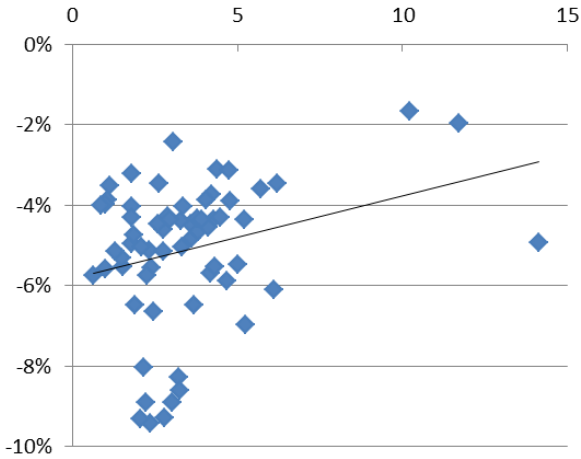
Source: EIOPA

Figure 94: Low return scenario 1 – % change weighted average replacement rates (vertical axis) and effective duration of assets (horizontal axis) – 5-years member profile averaged per country
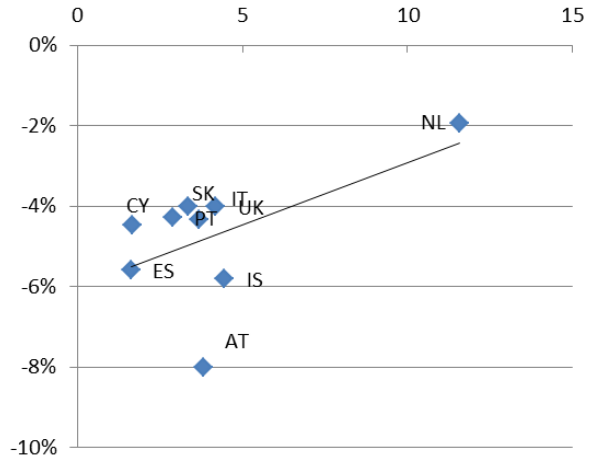
Source: EIOPA

Figure 95: Low return scenario 2 – % change weighted average replacement rates (vertical axis) and effective duration of assets (horizontal axis) – 5-years member profile from all participating IORPs
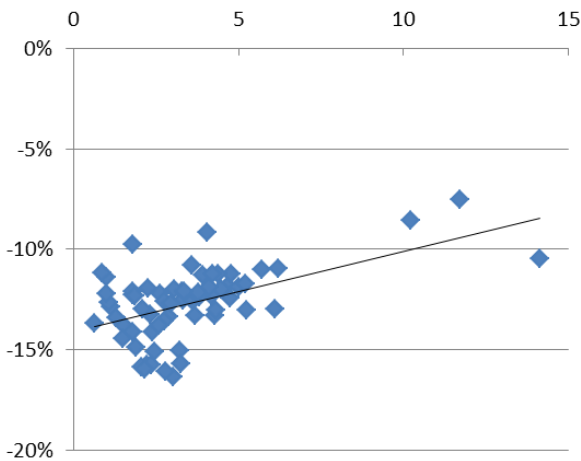
Source: EIOPA

Figure 96: Low return scenario 2 – % change weighted average replacement rates (vertical axis) and effective duration of assets (horizontal axis) – 5-years member profile averaged per country
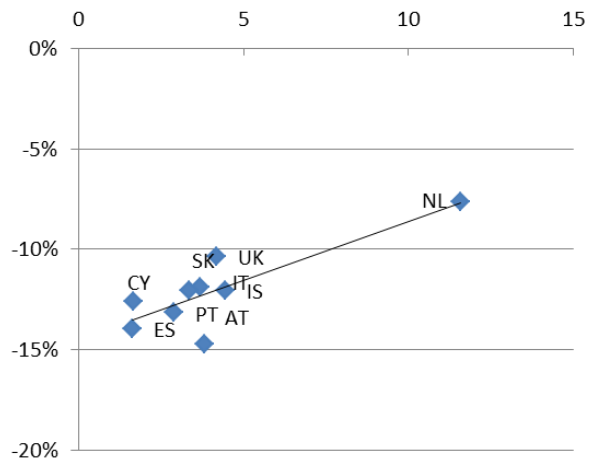
Source: EIOPA

180. Inflation-linked bonds provide a hedge against the rise in break-even inflation rates in the low return scenario 2 (Figure 97 and Figure 98). The fall in real interest rates results in this scenario in a corresponding fall in real yields on government and corporate bonds. DC plans in IS, the NL and to a lesser extent in IT and the UK make allocations to inflation-linked bonds. In the NL the inflation hedge is most effective due to the relative high duration of the fixed income portfolio.

Figure 97: Low return scenario 2 – % change weighted average replacement rates (vertical axis) and proportion of inflation-linked assets (horizontal axis) – 5-year member profile from all participating IORPs

Figure 98: Low return scenario 2 – % change weighted average replacement rates (vertical axis) and proportion of inflation-linked assets (horizontal axis) – 5-year member profile averaged per country
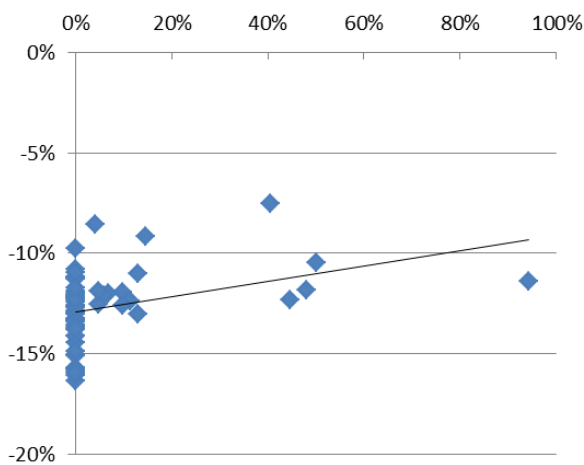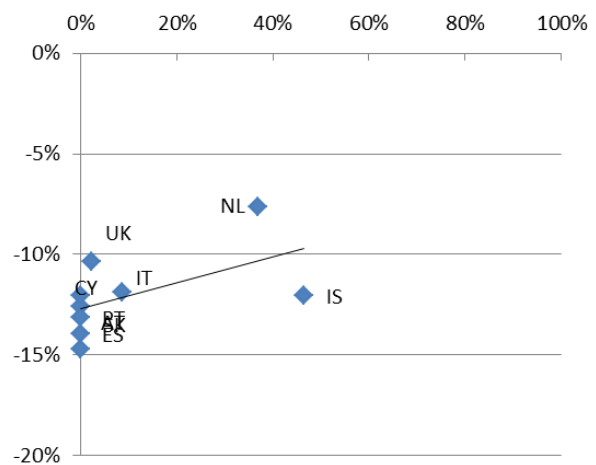
Source: EIOPA

Source: EIOPA

3.4.2.1.   Impact in terms of additional contributions and postponing retirement

181. **To absorb the negative impact of the low return scenario 1 on replacement rates, contributions would have to be increased. The increase would be around 21% for the young plan member up to 30% for the plan member closest to retirement. Under the more severe low return scenario 2, contributions would have to rise by 38% for the 35-year member profile and by 75% for the 5-year member profile.** The differences between Member States can be explained by the different impacts of the low return scenarios on the replacement rate of the three representative plan members. In addition, the effectiveness of raising contributions depends on the degree to which replacement rates are determined by contributions, instead of initial wealth and investment returns to mention some examples.

182. **Even though the plan members closest to retirement are least affected by the low return scenarios, the necessary contribution increases are often higher than for the younger plan members.** This is the case in AT, ES, IS, PT under low return scenario 1 and in all Member States under low return scenario 2. Increasing contributions becomes less effective closer to retirement since there is less time for these contributions to generate investment returns.

Figure 99: Low return scenario 1 – Weighted average % increase in contributions to achieve pre-stress replacement rate - Typical pay-out method
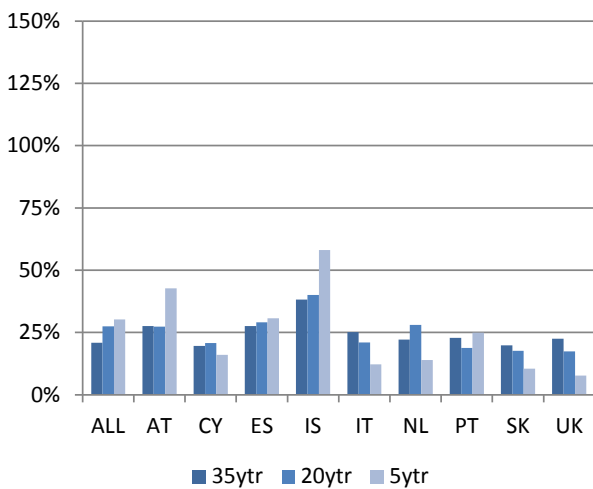
Figure 100: Low return scenario 2 – Weighted average % increase in contributions to achieve pre-stress replacement rate - Typical pay-out method

% difference from baseline

% difference from baseline
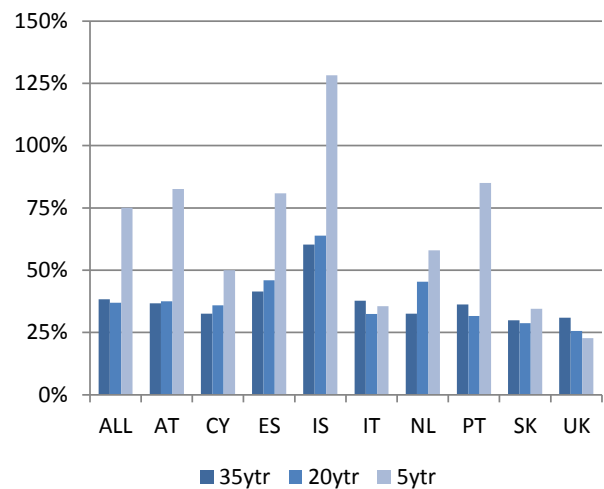
Source: EIOPA

Source: EIOPA

183. **The negative impact of the low return scenarios can also be neutralised by delaying retirement.** This would imply an increase in the retirement date under the low return scenario 1, ranging from 12 months for the 5-year member profile to 44 months for the 35-year profile. Under low return scenario 2, retirement would have to be postponed by 28 months for the plan member closest to retirement and 60 months for the youngest plan member.

184. The number of months of delaying retirement depends on the impact of the low return scenarios on the replacement rate. However, it is also determined by the size of investment returns and contributions (relative to the replacement rate) of the DC scheme during the months the retirement is postponed.

Figure 101: Low return scenario 1 – Weighted average increase in retirement age to achieve pre-stress replacement rate - Typical pay-out method

difference from baseline in months
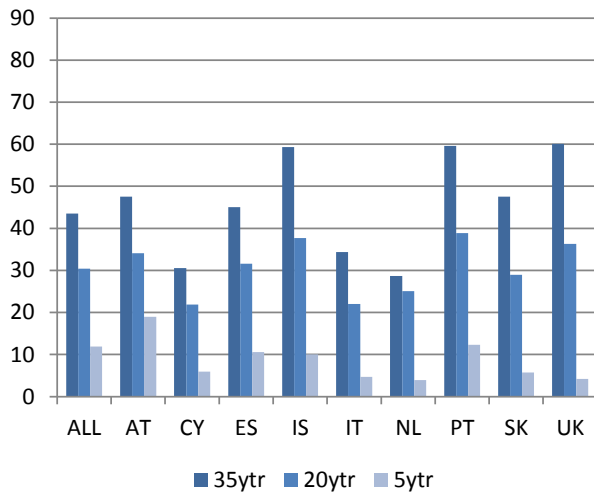
Source: EIOPA

Figure 102: Low return scenario 2 – Weighted average increase in retirement age to achieve pre-stress replacement rate - Typical pay-out method

difference from baseline in months
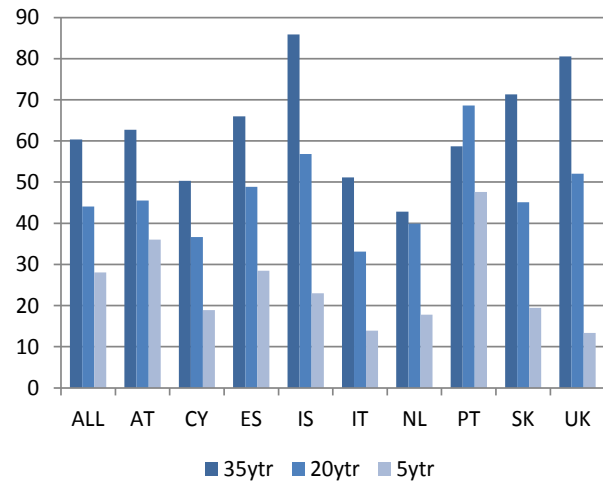
Source: EIOPA

3.4.2.2. Impact on alternative measures of retirement income

185. The most representative pay-out method can also be expressed in terms of a nominal value, instead of a replacement rate. This increases the negative impact of the low return 1 scenario by 2.5% to 4%, as the beneficial effect of lower inflation on the retirement income measure is no longer taken into account. Conversely, the negative impact in the shock 2 scenario would be reduced by 3% to 4% as the detrimental effect of inflation is not included.

186. Instead of assuming that lump-sum payments are converted into nominal annuity, lump-sum payments can be included as one of four typical pay-out methods. This would reduce the negative impact of the shock scenarios in countries where lump-sums are a regular pay-out method, i.e. most notably CY, ES and the UK and to a lesser extent IT and PT[31]. The reason is that the adverse impact of lower interest rates on annuity rates would no longer be taken into account.

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[31] See Annex 1. Introduction to the DB/hybrid IORPs sector.

Figure 103: Low return scenario 1 – Weighted average retirement income - Typical pay-out method (excl. lump sum)

% difference from baseline
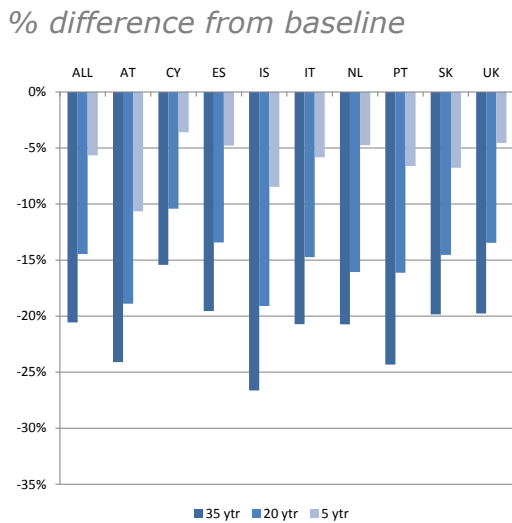
Source: EIOPA

Figure 104: Low return scenario 1 – Weighted average retirement income - Typical pay-out method (incl. lump sum)

% difference from baseline
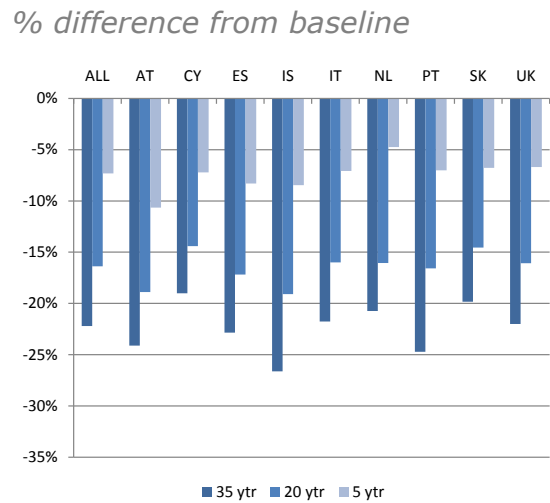
Source: EIOPA

Figure 105: Low return scenario 2 – Weighted average retirement income - Typical pay-out method (excl. lump sum)

% difference from baseline
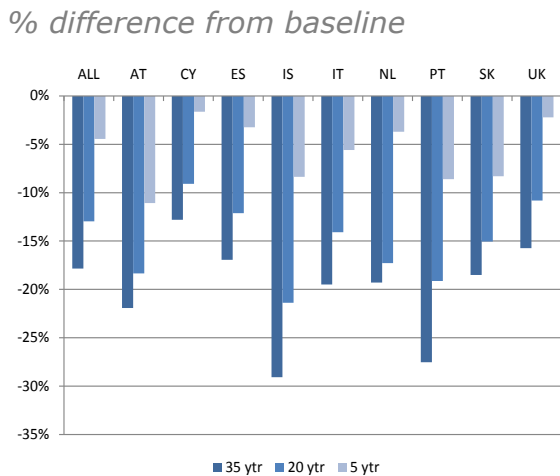
Source: EIOPA

Figure 106: Low return scenario 2 – Weighted average retirement income - Typical pay-out method (incl. lump sum)

% difference from baseline
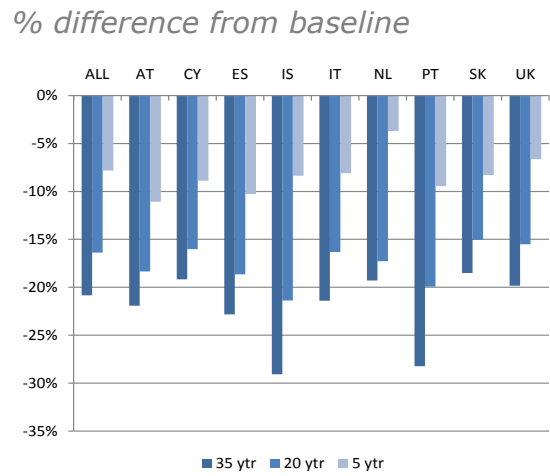
Source: EIOPA

3.5. Longevity scenario

3.5.1. Stress assumptions

187. **A member's pension income is driven by life expectancy at retirement. The longevity scenario stresses this aspect, assuming that members will live for longer than assumed in the baseline scenario, namely by reducing mortality rates of all three representative plan members by 20%.** The longevity scenario will impact replacement rates via the change in annuity prices and the drawdown period.

3.5.2.   Stress results

188. **In the baseline scenario, life expectancy is projected to increase by 3 years on average until 2049.** The longevity scenario reduces mortality rates by around 20% for all members in all countries. This is equivalent to an increase in life expectancy in the range between 3.5 and 4.5 years.

189. Replacement rates decline on average by about 12% to 15% for all member profiles in most countries. The exception is AT where the replacement rate decreases by 9% to 11% (Figure 107). In AT the most representative pay-out method consists of a programmed drawdown, instead of a (real) annuity in the other countries. The difference is caused by the different approaches to calculating the value of both types of pay-out methods. The value of the scheduled withdrawal is based on the life expectancy at retirement. The annuities are valued on a market-consistent basis, taking into account the annual mortality rates of the pensioner following retirement. The reduction in mortality rates during the years following retirement has a relatively large effect on the price of the annuity.

Figure 107: Longevity scenario – Weighted average replacement rates - Typical pay-out method
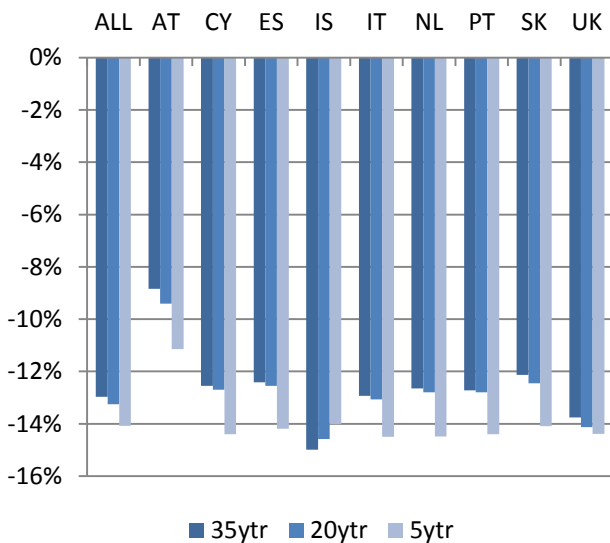
Source: EIOPA

Note: Decrease of replacement rates, in relative terms. Index built as follow: (Replacement rate stressed - Replacement rate baseline)/Replacement rate baseline.

3.5.3. Impact in terms of additional contributions and postponing retirement

190. **The higher life expectancy can be compensated by increasing the amount of contributions.** This would imply a rise in contributions ranging from 17% for the young plan member to as much as 76% for the plan member closest to retirement. Clearly, increasing contributions is not very effective for the older plan members, since these additional contributions have little time to generate returns. The differences between countries depend to a large extent on the degree to which replacement rates are determined by contributions, instead of for example initial wealth and investment returns. (Figure 108)

191. **The increase in life expectancy can also be absorbed by delaying retirement.** This would necessitate an increase in the retirement date of on average 27 months for the 35-year member profile and 23 months for the 5-year member profile. The variation between countries and representative plan members depends predominantly on the size of investment returns and contributions (relative to the replacement rate) of the DC scheme during the months that the retirement is postponed. (Figure 109)

Figure 108: Longevity scenario – Weighted average % increase in contributions to achieve pre-stress replacement rate - Typical pay-out method

% difference from baseline
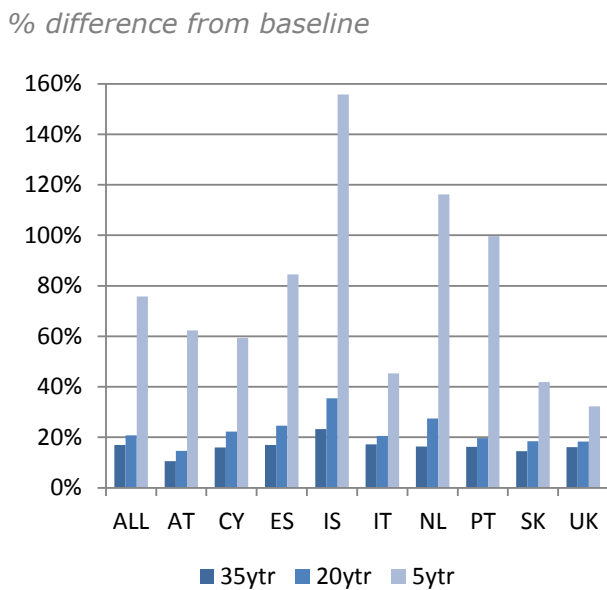
Figure 109: Longevity scenario – Weighted average increase in retirement age to achieve pre-stress replacement rate - Typical pay-out method

Difference from baseline in months
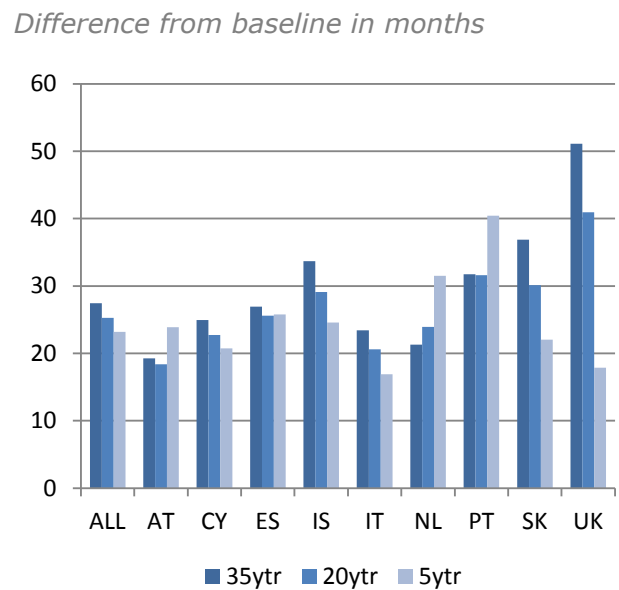
Source: EIOPA

Source: EIOPA

3.6. Additional remarks on assumptions on the asset allocation and the use of derivatives

192. The DC satellite module applied a top-down approach assuming that fixed proportions of pensions wealth are allocated to different asset classes where the proportions can vary over the life-cycle, but in a pre-specified way. This ignores any discretionary changes in the asset allocation or dynamic investment strategies where the portfolio weights depend on the state of the financial markets.

193. Participating IORPs were asked whether the assumption of fixed asset allocations provided an adequate representation of their DC scheme. More than 70% of IORPs answered that this was the case. Especially, DC IORPs in AT responded having a dynamic, Constant Proportion Portfolio Insurance (CPPI-type) of investment strategy. This means that the risk exposure of the investment portfolio is reduced following an adverse market scenario by selling risk-bearing assets or through derivative instruments. (Figure 110)

Figure 110: Adequacy of assuming fixed asset allocations over the life-cycle, % IORPs
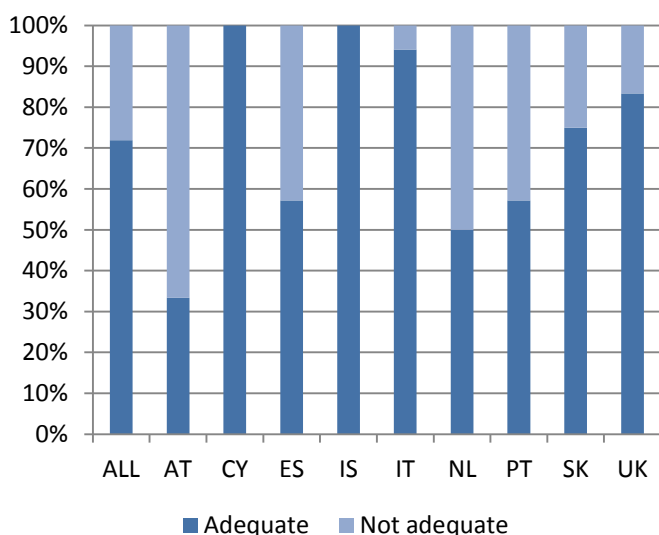
Source: EIOPA

194. The DC satellite module ignored the use of derivatives in hedging specific risks. Around 75% of IORPs indicated through the questionnaire that they use derivative instruments to hedge foreign exchange risk. As this answer is not surprising, the EUR-USD stresses in the shock scenarios were not included.

195. However, IORPs also indicated that they used derivatives to hedge interest rate risk (41%), inflation risk (9%), equity risk (38%) and spread risk (13%). This is especially the case in AT, ES and the NL (Figure 111). The use of derivatives to hedge interest rate risk implies that the negative impact of the shock and low return scenarios probably has been overestimated. Not considering the use of equity risk hedges may have overestimated the negative impact of the asset shock scenarios.
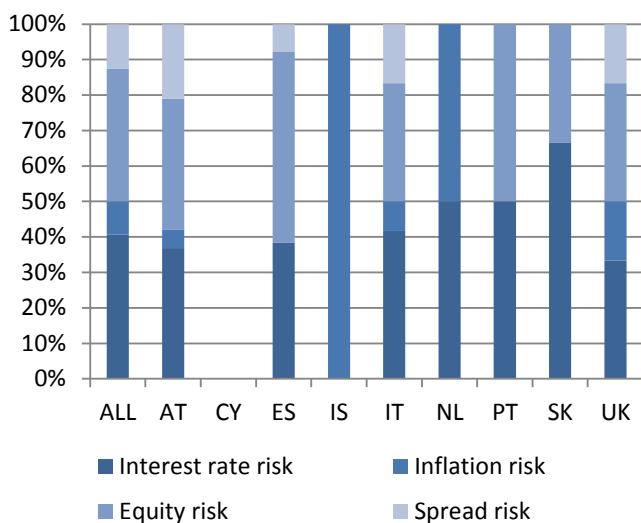
Source: EIOPA

4. Second round effects on financial markets

196. **The extent to which IORPs transmit the shocks to the rest of the financial sector and the real economy is limited due to a number of factors.** Direct linkages to other financial institutions are limited for IORPs when compared to other financial institutions. One reason is that the IORP Directive prohibits IORPs from borrowing[32]. IORPs are only allowed to borrow for liquidity purposes, albeit only on a temporary basis and to some extent. Hence, IORPs are not exposed to liquidity risk like banks. They have long-term pension commitments which may usually not be redeemed as a cash lump-sum and only be transferred to other pension institutions under specific conditions. In some Member States, any cash lump-sum or transfer value may be reduced to reflect the funding position of the scheme, which limit the impact of financial shocks on these IORPs.

197. **Nevertheless, IORPs are large institutional investors with total assets of EUR 3.4trn representing about 10% of the European debt and equity market capitalisation of EUR 31trn, according to IMF statistics.**[33] The UK IORP sector, with around EUR 2.25trn of assets represents about 7%. While 10% is a significant proportion of the total, IORPs asset allocations are relatively stable over time. Hence, in conditions of market turmoil it is rather unlikely that IORPs may further destabilize financial markets.

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[32] Article 18.2 of the IORP Directive 2003/41/EC.

[33] Source: IMF Global Financial Stability Report (October 2014), Table 1. Capital Market Size: Selected Indicators, 2013. Data refer to stock markets capitalization and total debt securities in the EU, excluding bank loans.

198. However, the extent to which IORPs may act as stabilizers of markets depends on their investment behaviour. Second round effects on the real economy may also be considered: many IORPs rely on sponsor support and benefit adjustments to absorb stressed market situations over the lifetime of their liabilities. Unless appropriately managed, increases in sponsor contributions and decrease in retirement benefits may contribute to aggravating a contraction in the real economy by raising labour costs and reducing life-time disposable income of households.

4.1. Questionnaire DB/hybrid stress test exercise

199. **As part of the DB/hybrid stress test exercise, IORPs' expected investment behaviour in response to the two adverse market scenarios was analysed**. The reporting template automatically calculated the asset allocation in the baseline. Following the price changes in the adverse scenarios with respect to 14 asset (sub-) categories. IORPs were requested to indicate to what extent they would change the asset allocation. Broadly speaking, three possible reactions were presented:

- Rebalancing of the investment portfolio towards its pre-stress/strategic asset allocation to maintain the original risk-return characteristics;
- Keeping the post-stress allocation unchanged, reflecting a buy-and-hold approach or passive strategy by following the relative weights of different asset classes on financial markets;
- Reducing the exposure to assets that fall in price to prevent further worsening of the IORP's financial position or a situation of not meeting national funding requirements.

200. **Participants were given the option to provide a quantitative estimate regarding changes in the allocation of asset classes within the year following the stress scenarios**. Alternatively, IORPs had the opportunity to provide a qualitative indication as to whether the allocation to a certain asset class would increase, stay the same or decrease. Only 16% of participating IORPs completed the quantitative part. However, this represents 53% of the sample size in terms of assets, consisting for the most part (85%) of IORPs assets in the NL. Almost half of the participating IORPs either provided a quantitative estimate or a qualitative indication of the likely investment behaviour in the wake of the stress scenarios. This represents most of the sample with the exception of IORPs in IE and the UK.

201. In the UK TPR asked participating IORPs how they would respond if the stress test scenarios occurred in practice. In summary IORPs reported qualitatively that the type of actions they will take depends on the timing, nature and impact of the stress. But also other actions such as the position of the sponsor and existing funding and investment strategies were mentioned. Factors taken into account were e.g. conditions that are likely to persist or bring along other risks and whether the schemes are hedged or not. In addition, declining sponsor support is reported as well.

202. The listed equity allocation of IORPs responding to the quantitative part of the questionnaire declined from 34% to 26% in adverse scenario 1 and to 32% in adverse scenario 2 as a consequence of the falling equity prices. At the same time, the fixed income allocation would increase from 39% to 46% and 43% in adverse scenario 1 and adverse scenario 2 respectively. The value of bonds and loans were also assumed to decline, but the price falls are much more moderate than for equities. As a result, the relative portfolio weight of equities decreases and fixed income securities increases. The category "other investments" category includes alternative asset classes like private equity and hedge funds as well as real estate, which experience substantial price falls. However, the category "other" also contains derivative instruments with appreciating values. These are to a large extent used to hedge risks materialising in the stress test. On balance, the proportion of other investments slightly increases in the adverse scenario 1 and slightly decreases in adverse scenario 2 (Figure 112 and Figure 113).

203. IORPs which provided a quantitative estimate, expect a full rebalancing of the investment portfolio during the year following the stress. This means that these IORPs would act as sellers of government and corporate bonds and buyers of non-fixed income assets, which are hit hardest in the adverse market scenarios. As such, these IORPs act as stabilisers of financial markets. The changes mentioned below (Figure 112 and Figure 113) are asset-weighted, which is the most relevant measure from a financial stability perspective. The outcome is dominated by the large pension sector in the NL, but excludes the even larger UK IORP sector.

Figure 112: Changes in asset allocation following adverse market scenario 1

% total investments
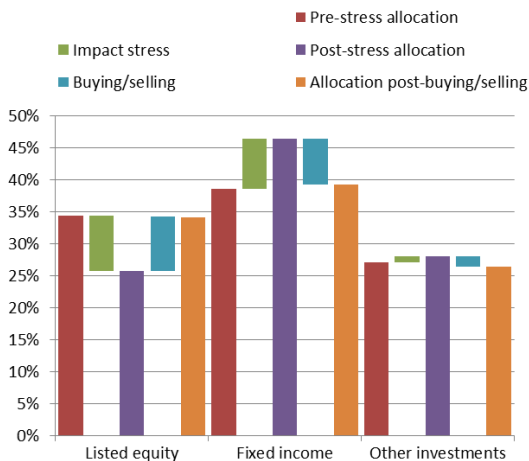
Source: EIOPA

Figure 113: Changes in asset allocation following adverse market scenario 2

% total investments
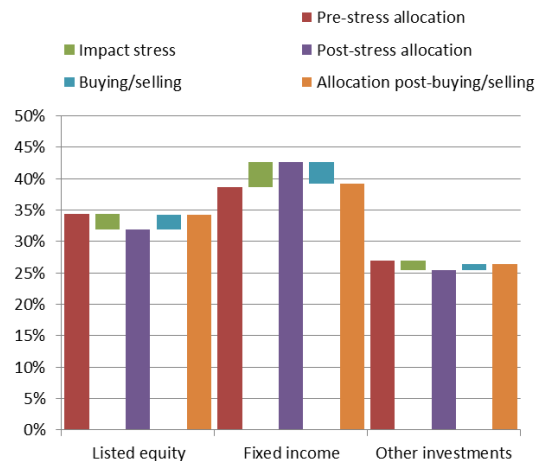
Source: EIOPA

Figure 115: Changes in asset allocation due to buying/selling following adverse market scenario 2.

% responding IORPs (unweighted)
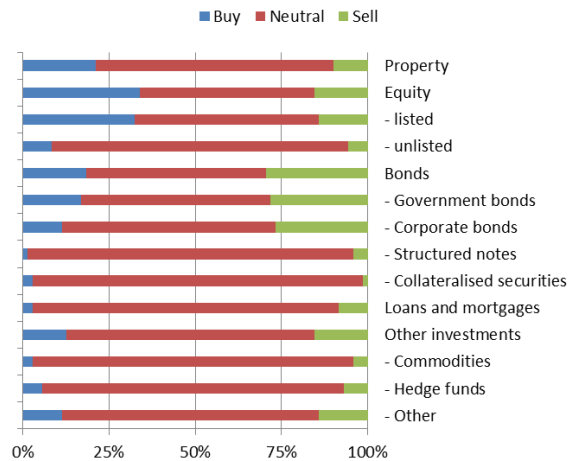
204. A small percentage of IORPs (below 15%) expects to sell non-fixed income assets after the substantial price falls. However, these are comfortably outnumbered by IORPs buying equities, property and alternative asset classes. In general, IORPs are more inclined to buy/sell listed equities than the more illiquid alternative asset categories. The reverse is true for fixed-income securities. The proportion of IORPs expecting to sell bonds and loans exceeds the proportion expecting to buy them.

205. The proportion of IORPs pursuing a buy-and-hold strategy is substantially lower when responses are weighted with assets (Figure 116 and Figure 117). The only exceptions are structured notes and collateralised securities, but allocations to either of these fixed-income classes account for only half percent of total investments. The (vast) majority of IORPs weighted by assets foresees to buy non-fixed income and sell fixed income assets. In contrast to adverse market scenario 1, most IORPs expect to sell commodities and hedge funds in adverse market scenario 2. Due to the strong increase in commodity prices and a relatively benign fall in the value of hedge funds, the proportion of both asset classes increases following the instantaneous stress in scenario 2.

Source: EIOPA

Source: EIOPA

4.2. Contextual work: studying IORPs' investment behaviour

206. In preparation for this stress test EIOPA carried out a data collection to study the actual investment behaviour of IORPs to enable a broad assessment of IORPs' impact on the financial markets and their stability. The aim of the study was to gain a better understanding of IORP investment behaviour, especially during the 2008 financial crisis. The data collection exercise considered the wider IORP sector including DC. Moreover, the sample covers IORPs from FI and the UK which were not included in the analysis based on the stress test questionnaire, but excludes IORPs from CY. However, the sample of IORPs and the asset allocations reported by IORPs in this sample may differ in nature to those reported for the stress test exercise. This should be borne in mind when trying to compare results of the two separate exercises.

207. EIOPA prepared a data template and accompanying questionnaire to be completed by IORPs in countries with material IORP sectors. Institutions were asked to provide annual time series data covering the period 2004-2013 on allocations and net buying/selling of broad asset categories. In addition to the quantitative data, IORPs were requested to fill in a qualitative questionnaire, providing background information on the institution's investment behaviour and policy.

208. The data collection was carried out in close cooperation with the national competent authorities, who selected and approached the sample of IORPs in their country. Fifteen countries participated in the exercise: AT, BE, DE, DK, ES, FI, IT, LU, the NL, NO, PT, SE, SI, SK and the UK. The coverage rate of the IORP sector in the EEA amounts to 23% of assets, compared to an EIOPA ambition of 40%. The coverage rates in AT, DE, DK, IT, NO, PT, the NL, SE, SI and SK (substantially) exceed 40%, while BE, ES, FI and LU achieved a coverage rate of 35% to 40%. The sample from the large UK IORPs sector is small. Hence, the data relating to the UK participants cannot necessarily be extrapolated to the rest of the UK market. All in all, 88 IORPs participated - on a best effort basis - in the exercise, of which 59 are DB/hybrid IORPs (including BE, DE, DK, ES, FI, LU, the NL, NO, PT, SE, SI, the UK) and 29 are DC IORPs (including AT, ES, IT, PT, SK, the UK).

209. The IORPs in the sample experienced a decline in the percentage of assets held in listed equity and a rise in fixed income and other investments in the year of the financial crisis (Figure 119*)*. The impact of the market stress on allocations to listed equities, fixed income assets and other investments during 2008 bears most resemblance with the impact of the price shocks in adverse scenario 1. The estimated price changes in 2008 amounted to -44% for listed equities, -5% for fixed income securities and +6% on other investments. This compares to an average price change reported by IORPs in adverse scenario 1 of -42% on listed equities, -3% on fixed income assets and -26% on other investments. Obviously, the biggest difference relates to the other investments category. This category experiences a substantial price fall - instead of a price increase - in the adverse scenarios due to the stresses on real estate and alternative asset classes. The average price change in the adverse scenario 2 equals -21% on listed equities, -4% on fixed income and -20% on other investments. The stock market fall during the financial crisis in 2008 was twice as large as in adverse scenario 2.

210. On aggregate for IORPs in the sample the asset price developments during 2008 led to some rebalancing of listed equity and fixed income assets. The increase in the equity allocation due to net buying amounted to a 1 percentage point, the decrease in the fixed income proportion due to net selling amounted to 2 percentage points. In addition to the endogenous rise of other investments, IORPs in the sample increased allocations to this remaining category by a 2 percentage point by increasing cash positions.

211. In interpreting these outcomes, it is worth remembering that, depending on their member profile, funding arrangements and funding position, some IORPs need to be net buyers of all asset classes just in order to keep the asset allocation constant. IORPs have to re-invest proceeds from dividend and coupon payments as well as maturing fixed income assets if these are not used to meet ongoing benefit payments. Moreover, relatively immature IORPs have to invest the net cash flows resulting from contributions received which are in excess of retirement benefits paid out. Overall net buying in the sample amounted to 4% of assets.

Figure 118: Change in asset allocation of sample European IORPs, end-2007 to end-2008

% total investments
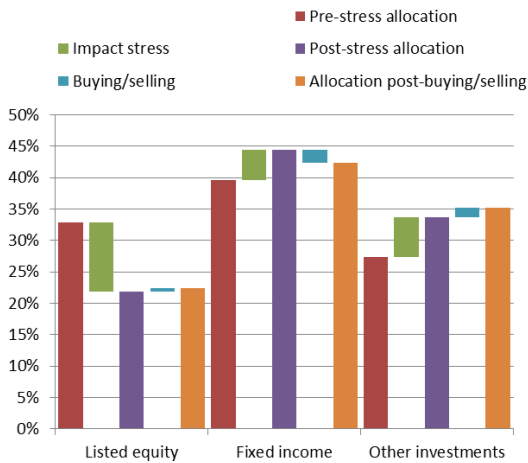
Figure 119: Development asset allocation of sample European IORPs, 2004-2013

% total investments
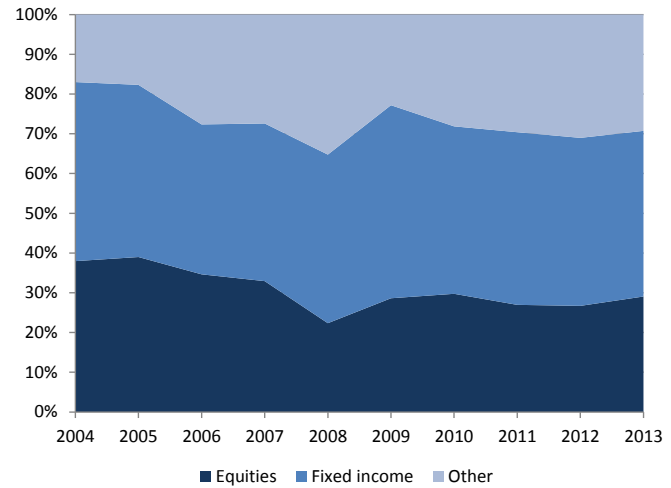
Source: EIOPA, Data collection on investment behaviour of IORPs

Note: The results exclude 14 out of the 88 IORPs because data on net buying/selling were not provided. This equals 6% in terms of asset sample size.

212. Investment behaviour between the IORPs in the sample for different countries varies significantly. However, in all countries the percentage of assets held in equity declined from year-end 2007 to 2008 due to the fall in stock markets. In some countries the sample of IORPs acted as buyers of equities, in others the sample of IORPs acted as sellers of equities (Figure 118). DB IORPs in the NL reacted to the fall in stock markets by rebalancing their investment portfolios towards the end-2007 allocations. IORPs in AT, ES and SI responded by selling equities. In all other countries IORPs more or less pursued a buy and hold strategy.

213. UK IORPs in the sample were modest net sellers of equities in 2008, which is in line with a study of the Bank of England[34]. Data from a sample of 108 corporate DB pension funds shows that UK IORPs sold equities during the financial crisis in order to de-risk the investment portfolios by shifting allocations from equities to fixed income assets. The largest corporate DB IORPs appear to have accelerated the pace of selling equities during 2008, but the investment behaviour of IORPs on the aggregate level shows a deceleration in the shift away from equities.[35]

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[34] See Bank of England (2014): Procyclicality and structural trends in investment allocation by insurance companies and pension funds: A Discussion Paper; July 2014.

[35] Interestingly, the same study found that a sample of 81 local government pension schemes acted as net buyers of equities during 2008. UK local government pension schemes are not considered IORPs and therefore not within the scope of the data collection on investment behaviour of IORPs.

214. Part of the Dutch sample indicated that equity exposure was increased by taking (temporary) synthetic long-positions using future contracts. As a consequence, the degree of rebalancing in the NL and, given the size of the sector, the European aggregate may be underestimated. On the other hand, part of the German sample reported to have implemented derivative hedges to protect down-side risk on equity portfolios, which were in some cases extended during the financial crisis. Such put-option-like derivatives are equivalent to selling, as counterparties generally hedge them by taking short-positions in equities.

Figure 120: Change in equity allocations (y-axis) and net buying/selling of equities (x-axis) of sample of European IORPs, 2008

% investments
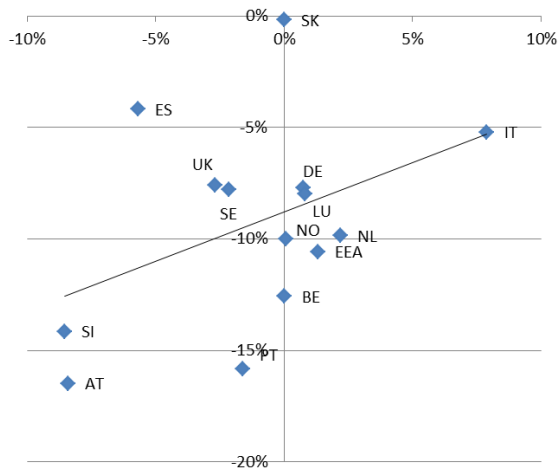
Figure 121: Net buying/selling of equities of sample of European IORPs in 2008 expressed on a scale between -100% (selling entire end-2007 equity portfolio) and +100% (full rebalancing towards end-2007 equity allocation)
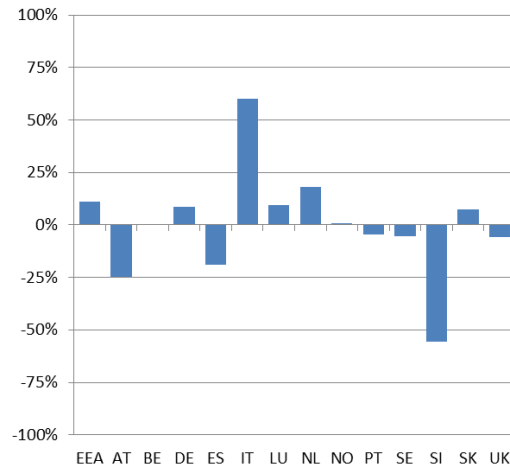
Source: EIOPA, Data collection on investment behaviour of IORPs

Note: The change in equity allocation in the left-hand figure is defined as the equity allocation end-2008 (% investments) minus the equity allocation (% investments) end-2007. The net buying/selling of equities in the left-hand figure is defined as total net buying (+) or selling (-) during 2008 divided by the value of investments end-2007.

The country results for DK and FI have not been depicted to prevent that information of individual IORPs would be revealed. For the same reason, the country results for the NL and SE constitute aggregate, sector-wide data compiled by the respective NCAs. The individual IORP results in these four countries are included in the EEA-aggregate. The UK results are based on a small sample of IORPs whose behaviour may not be wholly representative of the universe of IORPs in the UK.

215. Investment behaviour also varies significantly when looking at the individual IORPs in the sample. In line with the aggregate results from the sample of IORPs, most IORPs experienced a decline in equity allocations over the course of 2008 and an increase in fixed income allocations (Figure 122 and Figure 123). Around half of IORPs in the sample were net buyers of equities, around half were net sellers. While on aggregate European IORPs sold fixed income securities, on the individual IORP level two-third of the sample were net buyers of bonds and loans and one-third were net sellers.

Figure 122: Change in equity allocations (y-axis) and net buying/selling of equities (x-axis) of sample of European IORPs, 2008
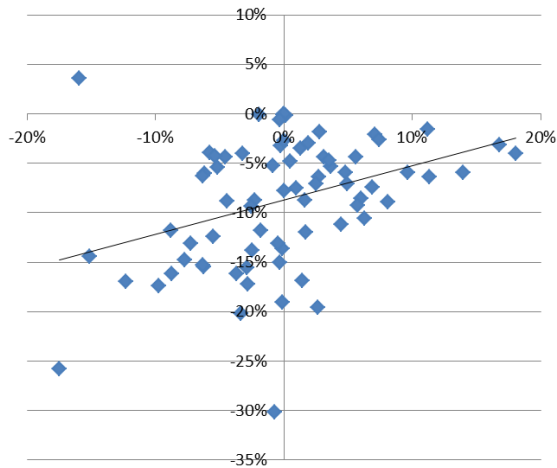
% investments

Figure 123: Change in fixed income allocations (y-axis) and net buying/selling of fixed income assets (x-axis) of sample of European IORPs, 2008
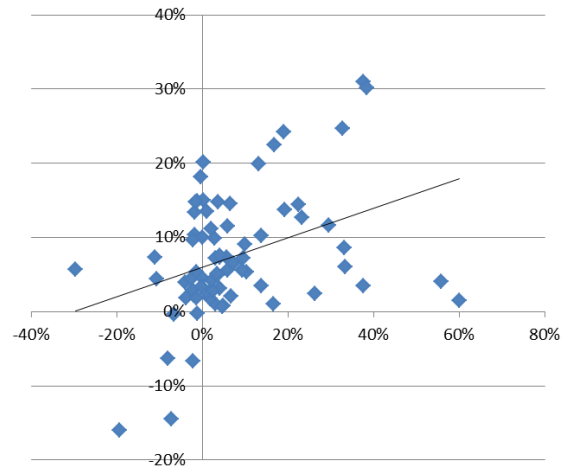
% investments

Source: EIOPA, Data collection on investment behaviour of IORPs

Note: The change in equity/fixed-income allocations is defined as the equity/fixed-income allocation end-2008 (% investments) minus the equity/fixed-income allocation (% investments) end-2007. The net buying/selling of equities/fixed-income is defined as total net buying (+) or selling (-) during 2008 divided by the value of investments end-2007.

216. The variation in investment behaviour between IORPs and countries may be related to different investment policies. IORPs are required to have in place a written statement of investment policy principles (SIPP) in place, which has to be reviewed at least every three years. The SIPP should also specify the strategic asset allocation with respect to the nature and duration of pension liabilities. More than 80% of IORPs in the sample indicated that the SIPP is reviewed on an annual basis.

217. In general, IORPs in the sample specify the strategic asset allocation as a target within a bandwidth or, alternatively, just as a range with minimum and maximum allocations to the various asset classes. Many DB IORPs indicate that the strategic asset allocation is based on an ALM analysis, where the strategic asset allocation is determined by optimising expected returns subject to a risk constraint of not meeting liabilities. Some IORPs implement a liability driven investment (LDI) strategy, distinguishing between a 'matching' and 'growth'/'return' portfolio. Especially, some IORPs in DE explicitly point out that the asset allocation takes into account regulatory constraints, prohibiting a situation of underfunding. Part of the UK sample indicates e.g. that the strategic asset allocation includes a trend of de-risking that is conditional on the funding level. Although DC IORPs in AT do not provide any (minimum) guarantees, part of the sample determines the strategic asset allocation using ALM considerations. In IT many DC IORPs establish the strategic asset allocation (of investment options) by optimising risk-return characteristics. A number of Italian DC funds maximise expected replacement rates subject to a risk constraint of not meeting a minimum replacement rate.

218. IORPs often specify a range for the strategic asset allocation for tactical asset allocation. These tactical allocation decisions may be taken by the IORP itself, but often it is delegated to the asset manager/management company. The bandwidths for allowed assets allocations diverge very significantly. IORPs mentioned bandwidths of ±5%, ±7.5%, ±10% and even ±20%. Under a wide range - depending on the risk exposure - the actual asset allocation will very much depend on discretionary, tactical decisions of the IORP management or the external manager. A narrower bandwidth implies less scope for tactical considerations and a need for more regular re-balancing. In all countries, except for ES (DB sector), FI and PT, did at least a part of the IORP sample report a regular re-balancing frequency below three months. Overall, this was the case for a little over one third of the sample. IORPs in some other countries (DE, IT) rebalance the portfolio by redirecting free cash flows to lower weighted asset classes before, if at all, embarking on actual buying and selling. The strategic target can often be overridden by the IORP's management board. A couple of IORPs indicated that the target ranges for the strategic asset allocation were widened to prevent that equities had to be bought during the market turmoil.

219. The specification of a range for the strategic asset allocation does not necessarily mean that the IORP aims for tactical allocation decisions. IORPs in NO - and to a lesser extent in LU and SI - follow a passive, buy-and-hold strategy. A significant share of the German sample follows a buy-and-hold approach to the fixed income portfolio, often as part of dynamic, CPPI-type strategies to ensure a minimum level of assets to prevent a situation of underfunding. IORPs can switch between a set of pre-defined asset allocations with different risk budgets and/or have implemented derivative hedging strategies to protect downside risk. AT, FI and NO also report dynamic approaches to setting the asset allocation. IORPs in SI followed a *de facto* dynamic approach by selling equities to prevent underfunding and ensure minimum guarantees. In AT minimum guarantees were abolished in 2003, but DC IORPs still widely sold equities to stabilise investment portfolios and reduce risk in 2008.

4.3. Overall assessment of the impact on financial stability

220. This section considers the investment behaviour of IORPs in the two adverse market scenarios and during the financial crisis in 2008. The extent to which investment behaviour is counter-cyclical or pro-cyclical was assessed using the measure of net buying/selling of securities, in particular equities. I.e. it was analysed whether IORPs would alleviate or aggravate selling pressure during stressed market conditions. Based on such an assessment it is not possible to make inferences on the impact of net buying/selling on asset price developments on financial markets, which would - at least - have required information on buying/selling of other types of investors and the elasticity of asset prices to the amount of buying and selling. Since the analysis is based on annual data, it is not possible to draw conclusions on the role of IORPs in stabilising (very) short-term market movements.

221. A conclusion which may be drawn from the analysis is that there is likely to be a variety of responses from IORPs to the adverse market scenarios considered in the stress test. Most IORPs who responded to the quantitative and qualitative questionnaire follow a passive buy-and-hold investment strategy. A small proportion intends to reduce risk under stressed market conditions. A larger share of IORPs expects to rebalance allocations to assets that have suffered the steepest price falls, most notably listed equities.

222. The aggregate investment behaviour of IORPs is relevant from a financial stability perspective. Taking into account size, a majority of asset-weighted, predominantly Dutch IORPs indicated that they expect to pursue a counter-cyclical investment policy by fully rebalancing their investment portfolios following the adverse market scenarios.

223. The analysis of the 2008 financial crisis assesses real buying and selling of IORPs instead of expected investment behaviour in hypothetical stress scenarios. Investment decisions of IORPs will also incorporate financial market conditions, the state of the economy, and the financial position of the IOPR/sponsor.

224. The sample of IORPs in the data analysis is more representative in the sense that UK IORPs are included. However, the sample is not fully representative and only covers a quarter of the IORP sector. In addition, there are limitations to the data, as only direct buying/selling of securities is considered, whilst indirect buying/selling through derivative contracts is not.

225. The analysis of the 2008 data indicates that a full rebalancing of investment portfolios may not be realistic. The sample of IORPs moderately re-balanced investment portfolios by buying equities during the financial crisis. This means that investment behaviour was on aggregate counter-cyclical, but to a lesser degree than indicated by IORPs through the stress test questionnaire.

Annex 1. Introduction to the DB/hybrid IORPs sector

226. **With assets under management of EUR 2.9trn, DB and Hybrid IORPs dominate the European occupational pension market (EUR 3.5trn).** The UK and the NL account for the majority of the European DB and HY occupational pension sector (Figure 124). The differences across countries' market share are mainly a consequence of the relative sizes of the populations' share of private and public provision of pensions but also due to the legal requirements that are in place for employers to offer and provide occupational pension benefits via IORPs.

Figure 124: Market share DB/Hybrid IORP sector by country

(in % of total assets, end 2014)
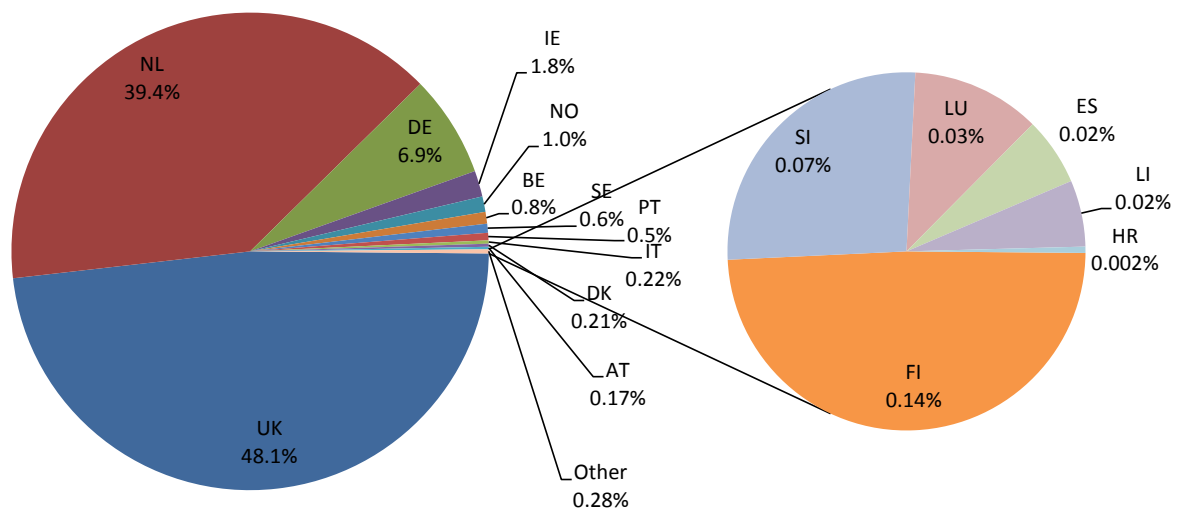
Source: EIOPA Pension Statistics IORP Database and Data submitted during ST

Notes:

a. This graph represents the market share based on total assets in the DB/HY IORP sector per country.

b. Non-IORP pension provision and public pensions are not covered by this figure, and are also not relevant for the stress test. Moreover, this figure is based on the total DB/HY IORP market and therefore also includes countries that do not participate in the DB/HY part of this stress test (AT, FI, LI, HR)

227. The membership of IORPs in the sample consists on average of 45% active members, 35% deferred members and 20% beneficiaries (Figure 125). The share of beneficiaries in BE and SI is negligible. IORPs in BE usually only provide lump-sum payments at retirement[36], IORPs in SI started to tend to the pay-out phase since 2011 only. DK, IT and PT have the most mature IORPs sector with the percentage of beneficiaries ranging from 60-75%.

228. All IORPs in DK and IT are closed to new members. Around two-thirds of participating IORPs in PT finance schemes that are closed to new members and/or new accruals.[37] On average 50% of DB/HY schemes is still open to new members, the other half is closed.

229. The IORPs in the sample are sponsored for 60% by private company/groups (incl. subsidiaries), for 30% by multiple employers and for 10% by not-for-profit and other organisations, such as government institutions.

Figure 125: Breakdown of membership of IORPs

(in % of total number of members and beneficiaries (retired persons) in the sample)
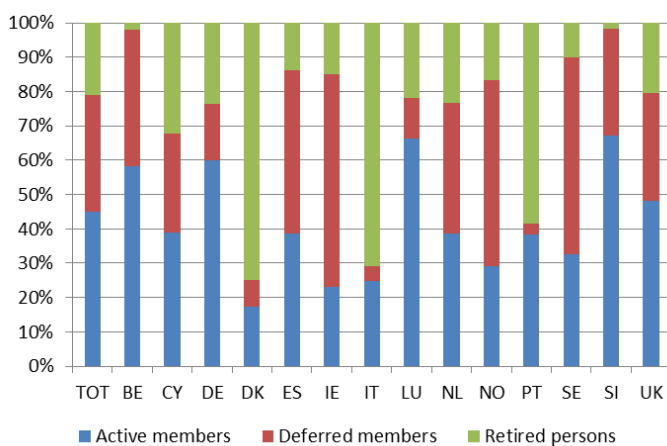
Source: EIOPA

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[36] Although members usually have the right to ask for an annuity instead of accepting a lump sum payment.

[37] IORPs can provide multiple DB/HY/DC schemes.

230. **Even though the minimum harmonisation requirements of the IORP Directive allows for different national approaches regarding the valuation of assets and liabilities, there are in fact much more similarities in the treatment of assets than in the treatment of liabilities.** Indeed, assets are usually valued on a market consistent basis in most countries. However, there are some exceptions: in DE for instance assets of some DB IORPs (e.g. Pensionskassen) are valued using book values which cover the major part of total assets of the participating IORPs. While the valuation of assets is quite similar across Member States, different methods are used for the valuation of liabilities and in particular for setting discount rates (Table 5). It should be noted that in a number of Member States more than one approach is selected. In some cases this can be explained by the fact that different IORPs or different types of IORPs apply different approaches in setting the discount rate. In a few cases the discount rate is set by a combination of approaches, for instance considering the RFR plus a margin, which may vary from valuation to valuation.

Table 5: Type of discount rate used in liability valuation			
	Current market risk-free rates	Expected return on assets	Fixed discount rates	Other
BE		X	X	X
CY	x	X		
DE		X	X	
DK	x		X	
ES				X
IE			X	X
IT		X		X
LU		X	X	X
NL	X			
NO			X	
PT			X	X
SE				X
SI				X
UK	X	X		

Source: EIOPA Mapping Exercise for Further Work on Solvency of IORPs, 13 October 2014. Updated with new information.

231. Unconditional benefits in DK, the NL and SE are more or less the same as technical provisions on the NBS and are valued on a market-consistent basis. In other countries IORPs use a fixed discount rate (BE, DE, LU, NO, SI) or a discount rate allowing for the expected return on assets (BE, DE, CY, IE, IT, LU, the UK). IORPs in ES use the yield on national government bonds and also assets yields when some requirements are fulfilled. IORPs in PT usually use the yield on "AA"-rated corporate bonds as a reference. Depending on the difference between the national discount rate and the RFR, this increases technical provisions. In NO, this increase is a mere 4% (unconditional + conditional benefits), whilst in IE the increase is as high as 75% (unconditional benefits). It should be noted, however, that part of IORPs in DE and IT only reported pure conditional benefits (and not unconditional benefits) because future pensions are subject to an ex-ante benefit reduction mechanism.

232. The inclusion of mixed benefits in DE and the NL and pure discretionary benefits in BE and ES has an upward effect on technical provisions under the Common Methodology compared to the NBS. IORPs in SI only recognised unconditional benefits in the Common Methodology and not benefits which are conditional on excess returns over the guaranteed interest rate. As conditional benefits are included under the national framework, the value of technical provisions is considerably lower in the Common Methodology. The incorporation of the risk margin also increases technical provisions in a number of countries, most notably in IE and LU.

233. Especially in IE and the NL *ex-post* benefit reductions reduce the value of technical provisions. Part of IORPs in DE and IT recognised *ex-ante* benefit reductions and some IORPs in BE and PT *ex-post* benefit reductions and/or reductions in case of sponsor default.

234. The value of liabilities is also dependent on biometric risks, namely mortality assumptions. In most Member States a standard mortality table based on experience to date and including an assumption for the future trend of mortality (which incorporates an allowance for prudence) is considered.

235. Figure 126 shows that 20% of IORPs participating in the stress test do not include any allowance for trends in life expectancy. This is especially the case in PT, LU and to a lesser extent in BE, DE and ES.

Figure 126: Inclusion of trend in mortality rates in the technical provisions on the NBS (in % IORPs in the sample)
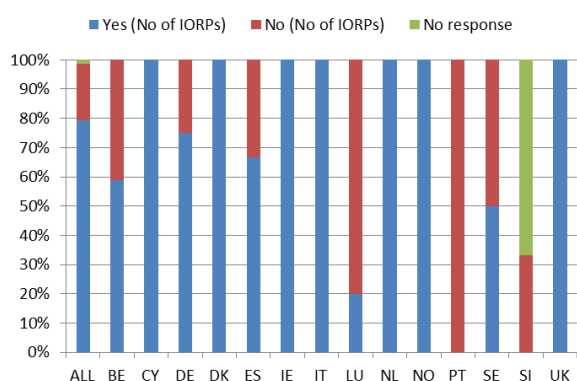
Source: EIOPA

236. In addition, pension promises between Member States and even between schemes in the same Member State can also differ widely in terms of indexation of pension rights. Benefit adjustments based on inflation and / or salary increases are often the case. Including these may have a significant impact on the level of liabilities. Table 6 below provides an overview of the need to allow for future inflation / salary increases in the valuation of liabilities per Member State.

Table 6: Inclusion of inflation and / or salary indexation in the valuation of liabilities				
	No inflation / salary indexation	Inflation	Inflation and salary indexation	Other
BE				X
CY			X	
DE	X			
DK				X
ES			X	
IE		X		
IT				X
LU			X	
NL	X			X
NO	X			
PT[38]			X	
SE	X			
SI	X			
UK[39]		X		
Source: EIOPA				

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[38] IORPs in PT considered inflation / salary increases in both NBS and Common Methodology (as unconditional benefits).

[39] For the UK, valuations should allow for relevant salary inflation for active and deferred members where their accrued entitlements will be increased at such a level. Where relevant for deferred (and perhaps active) members, relevant inflation increases are included. The valuation should also include the relevant level of annual increase for pension in payment, which is usually in line with inflation of some rate linked to inflation.

237. Due to the differences in national regulatory frameworks, IORPs across Europe are not subject to the same funding requirements. In addition to the differences in valuation of liabilities, national regulatory frameworks across Europe also impute different funding requirements on IORPs. While the participating IORPs in most Member States have a funding requirement of around 100% of the total liabilities (calculated in accordance with national valuation standards), some IORPs have a higher funding requirement. A detailed table listing the different Funding requirements applied is shown in Table 7.

Table 7: Funding requirement				
	'Fully funded', in % of total liabilities[40]	*Additional assets required, in accordance with article 17(1) of the IORP Directive (~4% of total liabilities)*	*National funding requirement, in accordance with article 17(3) of the IORP Directive*	*Circumstances for the additional assets required or the national funding requirement*
BE	100%	Solvency margin	Solvency margin	The solvency margin is only required when an IORP bears mortality and/or disability risks itself or (as per the requirements of Solvency I) when an IORP itself guarantees a return or a given level of benefits and other liabilities. There are special solvency margins for IORPs with no sponsors.
CY	100%	- (IORP bears no risks)		
DE	100%	Solvency I capital requirement[41]		
DK	100%	Solvency I capital requirement		

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[40] The liabilities are calculated in accordance with national valuation standards.

[41] In this table some references to capital requirements are in fact equal to the Solvency I requirements however they are based on IORP I and not on Solvency I.

ES	100%	A solvency margin equal to 2% of technical provisions plus 0.3% of capital at risk associated to disability and death, and has an absolute minimum of EUR 225.000.		IORPs with DB schemes or a guarantee of returns in the capitalization of contributions or guarantee in benefits unless the scheme is completely insured in which case the solvency margin is required at the insurance company.
IE	100%	A risk based reserve	A risk based reserve	In IE, from 1 January 2016, the funding requirement for Defined Benefit schemes is equal to technical provisions plus a risk reserve.
IT	100%	Solvency I capital requirement		
LU	100%	- *(IORP bears no risks)*		The social and labour law has put in place a minimum funding requirement imposing a mortality table as well as a discount rate of 5%. This minimum funding requirement equals the value of the members' accumulated rights in case the affiliated member leaves the IORP or in case of the dissolution of the IORP. All pension schemes imposed themselves a higher minimum funding requirement using e.g. other (more conservative) mortality tables and/or using much lower discount rates.
NL	100%	DB IORPs are subject to a minimum own fund requirement, in accordance with article 17(1) of the IORP Directive.	On average, risk based funding requirements amounts to approximately 25% of technical provisions. The risk-based funding requirement cannot be lower than the minimum own fund requirement.	

NO	100%	Solvency I capital requirement		
PT	100%	- *(IORP bears no risks)*		In PT, there are general and additional sector specific rules that establish the main assumptions for the calculation of the amount of liabilities and the minimum level of liabilities that needs to be funded. The regulatory framework does not foresee a solvency margin at the level of the pension funds.
SE	100%	Solvency I capital requirement		
SI	100%	Solvency I capital requirement		
UK	100%	- *(IORP bears no risks)*		
Source: EIOPA				

238. **The situation among participating countries is quite heterogeneous regarding the recovery plans to remove an underfunding situation**. The current IORPs Directive requires IORPs to calculate total assets and total liabilities and to fully fund this net position and have a recovery plan in place if this is not the case. The way in which recovery plans are implemented, updated and whether they are short-term or long-term plans varies between jurisdictions. Over 40% of IORPs in the sample are subject to a recovery plan. The average recovery period reported by IORPs in the stress test sample amounts to 10 year: 8 years in IE, 10 years in IT and 11 years in the NL and the UK

239. **DB/hybrid IORPs in different Member States have a wide range of security and benefit adjustment mechanisms, and the approach used in the Common Methodology allows IORPs to recognise those**. The security and benefit adjustment mechanisms are not always explicitly recognised in the NBS, although they may be taken into account implicitly in valuing the technical provisions. Therefore, the Common Methodology allows IORPs to recognise security and benefit adjustment mechanisms available, on a market consistent basis.

240. Security mechanisms can be divided in two categories: sponsor support (unlimited, limited, non-legally enforceable) and pension protection schemes (PPS):

- For Member States where sponsor support is available, there are differences with regard to its nature and form. The technical specifications distinguish three main types of sponsor support: unlimited, limited and non-legally enforceable sponsor support. Sponsor support may take various forms but primarily consists of sponsor's means. Moreover, it could be possible that even within a country not all IORPs could use sponsor support. This typically depends on the legal requirements and/or the employer.

- Pension protection schemes exist only in the UK and DE. In the UK, there is a Pension Protection Fund (PPF) that provides compensation to the members of eligible DB IORPs in case of the employer's insolvency event and insufficient available assets in the IORP to cover the level of PPF compensation. In DE, there is a Pensions-Sicherungs-Verein aG (PSVaG), which is applicable for the Pensionfonds, but not for the Pensionkasse and hence not all IORPs have access to this mechanism[42].

241. Over 80% of IORPs in the sample are covered by unlimited, legally enforceable sponsor support. IORPs in IE only have non-legally enforceable sponsor support. The incidence of sponsor support is low in the NL and NO and not available at all in SI. In BE, there is a group support beyond the support from the sponsoring undertaking, which is legally enforceable on the basis of the Social and Labor Law.

242. Three types of non-unconditional benefits – as opposed to unconditional benefits – are distinguished in the Common Methodology: pure conditional benefits, mixed benefits and pure discretionary benefits. These non-unconditional benefits can absorb losses incurred by the IORP. Pure conditional benefits are granted based on certain objective conditions without a realistic discretionary power of the IORP to deviate from that policy. Pure discretionary benefits are only granted based on a subjective decision-making process. Mixed benefits are a combination of both, being based on objective conditions as part of a subjective decision-making process. Unconditional benefits can absorb losses through last resort *ex-post* benefit reductions and benefit reductions in case of sponsor default, pure conditional benefits encompass *ex-ante* benefit reductions.

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[42] The German PPS, the Pensions-Sicherungs-Verein aG (PSVaG), is an institution responsible, based on German law, for protecting corporate pension schemes against insolvency of the sponsor. Employers who have selected certain types of corporate pension schemes (not only Pensionsfonds) are required by law to pay contributions to the PSVaG. These employers encompass the major part of the German economy, inter alia all major corporate enterprises in Germany, including companies listed on the DAX. The PSVaG kicks in in case of the default of an employer and takes over pension liabilities and corresponding assets.

243. Very few IORPs in the sample reported non-unconditional benefits: 16% pure conditional benefits, 11% mixed benefits and 1% pure discretionary benefits (Figure 127). All IORPs in NO have pure conditional benefits, all IORPs in the NL have mixed benefits. A majority of DE IORPs report both. Pure discretionary benefits can only be found in BE and ES.

Figure 127: Incidence of pure conditional, mixed and pure discretionary benefits

(in % IORPs in the sample)
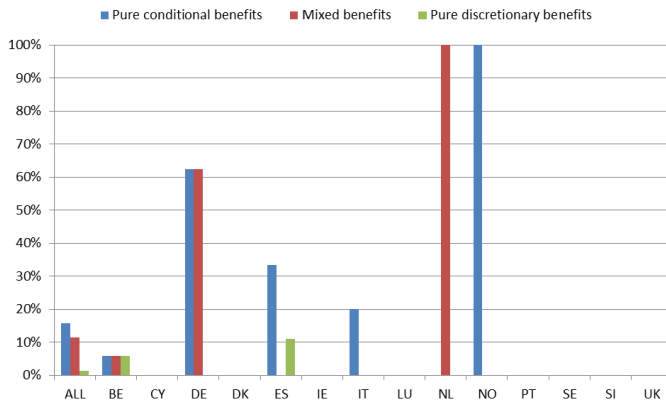
Source: EIOPA

244. Three types of benefit reduction mechanisms exist, namely 1) *ex-ante* benefit reductions, those reductions based on contracts or by-laws which conclude in advance the conditions under which reductions will take place, 2) *ex-post* benefit reductions, those to be used as a last resort, when no other means is available and 3) benefit reductions in case of sponsor default. In this context, sponsor default should be interpreted as sponsor insolvency or bankruptcy. For most Member States benefit reductions are only allowed under certain circumstances. Moreover, there are some Member States where the *ex-post* benefit reduction mechanism is in place but has never been used in the past. Table 8 displays an overview of the benefit reduction mechanisms in place in each Member State, distinguishing also the mechanisms that were or were not considered by the participating IORPs in the stress test exercise:

Table 8: Benefit reduction mechanisms per country			
	Ex-ante	Ex-post	In case of sponsor default
BE			AE*
CY		A	
DE	AE (most IORPs)	AE	
DK	A		A
ES	A	A	A
IE		AE	A
IT	AE (some IORPs)	A	A
LU			A
NL	A	AE	
NO			
PT		AE	A
SE			
SI		AE	
UK		*	AE

Source: EIOPA

Notes:

A - Allowed

E - Considered in the stress test

AE* - As a measure of last resort, after bankruptcy of the sponsor and when the assets after liquidation of the sponsor are not sufficient to cover members' acquired rights.

UK* - Ex-post benefit reductions are only possible if all IORP members consent.

Annex 2. Presentation of the adverse market scenarios for the DB exercise

245. **The first market adverse scenario would subsequently propagate to other asset classes**: **emerging market equities, corporate and sovereign debt, real estate and commodities.** Corporate and financial credit spreads would increase, with the most pronounced impact being expected in the high-yield segments where market liquidity would become impaired. Sovereigns which benefited from a "safe haven" status during recent episodes of market stress would no longer be assumed to do so. In particular, the yield on German government bonds is assumed to remain unchanged. This implies a widening of spreads relative to the swap rates. The yield spreads of other EU sovereigns relative to the German sovereign would widen, reflecting country-specific vulnerabilities and past sensitivities of sovereign funding conditions to financial market stress. In this environment of tightening financing conditions, consumption and investment in the European Union would weaken and unemployment would increase, while real wages would remain sticky, with nominal wages growing in line with expected inflation. This, combined with general stress on financial asset prices, would result in a steep fall in real estate prices and would depress markets for private equity, hedge funds and unlisted infrastructure projects. The expected fall in global demand would also push commodity prices down. In turn, market-based inflation expectations over the short to medium term would continue to fall, while the expected timing of the return of inflation to central bank targets would remain unchanged. In the United States, market expectations of increasing short-term interest rates would dissipate. This would make carry trades less attractive, leading to an appreciation of the euro against the US dollar. Financial turmoil, weakened macroeconomic conditions and an accommodative monetary policy are assumed to push RFR in the European Union, as proxies by interest rate swap rates, further below the current low levels.

246. **Under the second market adverse scenario, the US economy, as an oil producer and being in a stronger cyclical position than the EU economy, is assumed to be less affected by global financial turmoil and an oil price shock.** This leads the euro to depreciate against the US dollar. Higher oil prices and import prices would lead to a sharp increase in inflation in the short term. Simultaneously, market expectations that the current non-standard central bank policies would be effective in bringing inflation back to target levels over the medium run would strengthen, and market-implied medium and long-term inflation rates would increase. As in the first scenario, real wages would remain sticky, with nominal wages growing in line with inflation.

247. The scenarios have been calibrated using historical data covering the period 2007-2014. Based on this period, the probability that the prescribed scenarios would materialize is small, and hence the scenarios are designed to be severe in a historical context.

248. Both scenarios would impact IORPs in two ways (i.e. double hit). First of all, equities and property together account for a large part of IORP's assets. This makes them vulnerable to a situation in which prices and interest rates decrease at the same time. Second, a further decrease in interest rates would also directly lead to an increase in the technical provisions, and thereby worsen the solvency position of an IORP even further.

249. The stress test specifications[22] contained simplifications for assessing the impact of the detailed sovereign bond and corporate bond stresses. The use of these simplifications is discussed in Annex 4. Simplifications for government and corporate bond stresses.

Annex 3. Introduction to the DC IORPs sector

a) Role of IORPs in providing retirement income

250. **The role of DC IORPs in providing adequate income during retirement varies significantly between the nine countries.** In six countries (AT, CY, ES, IT, PT and SK), State pensions in the first pillar are the dominant source of retirement income with replacement rates ranging from about 45% of final earnings in SK (incl. the funded pillar 1bis) to as much as 60% to 85% in the other countries. Still, population ageing is expected to put downward pressure on public pay-as-you-go arrangements. This means that DC plans will become more important in supplementing State pensions. To stimulate pension savings through the second pillar, IT introduced auto-enrolment in 2007; this had an immediate and relevant effect in the same year, but was largely immaterial in the following years. As of 2013 (i.e. in the voluntary pillar of supplementary pension savings in SK), the possibility for participants to make withdrawals during the accumulation phase was largely abolished.

251. In IS, the NL and the UK, there is traditionally a heavy reliance on occupational pensions in providing retirement income. In IS, pension funds in the private sector provide DC schemes to supplement basic, flat rate State pensions, while DB schemes are only available in the public sector. In the NL the first pillar also consists of a basic, flat rate pension arrangement, but most workers are still enrolled in a DB scheme. DC plans tend to be used to top-up DB arrangements in the second pillar. However, DC plans are increasingly being offered as a full alternative to DB schemes.

252. The UK is in the process of reforming the State pension from a dual fixed and earnings-related pension to a single-tier flat rate provision. Automatic enrolment legislation of 2012 obliges employers to enrol all eligible workers into a workplace IORP, where employers previously only had to provide access to a workplace pension.

b) Nature of membership and contributions

253. In some countries (AT, CY, ES, IT, the NL, PT), DC plans are provided on a voluntary basis by the employer or by an agreement between employers and unions in the labour bargaining process. In such cases, the employees are often automatically enrolled into the pension scheme of their employer. The contribution rates paid by employers and/or employees are determined by the employer or through labour agreements. The voluntary nature implies that occupational pension schemes usually do not cover the whole workforce. An exception is the NL where centralised labour bargaining has led to near-universal coverage by mostly DB schemes, but increasingly DC plans.

254. In IS occupational pension provision is also embedded in collective labour bargaining. However, national pension law also prescribes that all employees and self-employed aged 16-69 should contribute 12% of their salaries to an approved pension fund. The DC schemes should be designed in order to achieve a minimum replacement rate of 56% after a contributory period of 40 years.

255. In SK participation and contributions in the supplementary pension savings pillar are also voluntary for employers and employees. Supplementary pension saving is compulsory for some categories of hazardous jobs and professions in the arts sector to allow for retirement below the standard retirement age.

256. In the UK employers are required to automatically enrol in a workplace pension. This applies to all workers who are not already in a suitable workplace pensions, at least 22 years old but below the State pension age and who earn more than GBP 10k a year. This requirement has already been in place for larger employers since October 2012 and will apply to all employers by 2018. Eligible earnings consist of a floor of GBP 5.824 and are capped at GBP 42.385.

257. Figure 59 shows the weighted average contribution rates in the nine participating countries. Most countries apply an Exempt-Exempt Taxation (EET) approach to the taxation of pension savings. This means that contributions are exempt from taxation, investment income is exempt and retirement income is taxed. However, many countries also impose ceilings on the amount of contributions that is exempt from taxation. In the NL these ceilings are expressed in terms of the annual accrual of benefits. Contributions accrue less pensions when the plan member gets closer to retirement since they generate fewer years of investment returns. As a consequence, the average contribution schedule has a distinct upward slope. The UK uses a system of allowances concerning contributions paid into pension schemes for tax relief purposes. The annual allowance for an individual is currently capped at GBP 40,000 and the life time allowance is GBP1.25m.

258. The contribution rate in the NL is applied to the part of salary above a certain threshold. In the NL the floor is derived from tax regulation. In the UK the contribution rates may be applied in different ways including to separate the salary according to the automatic enrolment regulation.

c) Accumulation phase

259. All DC IORPs in IT and SK offer their plan members a choice out of a limited number of investment options. In the NL and the UK this is the case for the (large) majority of IORPs although schemes used for automatic enrolment in the UK must also have a default fund (Figure 128 and Figure 129). In SK there is no default option which is automatically selected when the plan members fail to make a choice. In IT, the NL and the UK such a default is mostly included. In the remaining countries either no IORPs (CY, ES, IS) or a minority of IORPs (AT, PT) provide plan members with the possibility to choose the risk-return profile of investments in the accumulation phase.

260. In the NL and the UK, IORPs mostly take a life-cycle approach to investing; in SK this is the case for half of IORPs. A life-cycle approach means that allocations to risky assets – such as equities – are reduced as the plan member gets closer to retirement. The rationale is that young members have a greater capacity to absorb shocks than older members since they dispose of more, relatively riskless human capital, i.e. the discounted value of future wages. In the NL it is compulsory for DC IORPs to follow a life-cycle approach as part of the prudent person rule. In SK life-cycling is not inherent to one investment option, but plan members can switch from a risky investment profile when they are young to a more conservative profile when they are older.

261. In the other countries either no DC IORPs (CY, ES, IS) or a small proportion of DC IORPs (AT, IT, PT) applies a life-cycle approach. Plan members in AT are permitted to choose a different investment strategy up to three times – i.e. move from a relatively risky mix to a less risky mix – when the IORPs allows for a life-cycle model.

Figure 128: Choice of plan members in investment options (in % IORPs in the sample)

Figure 129: Incidence of life-cycle approach (in % IORPs in the sample)
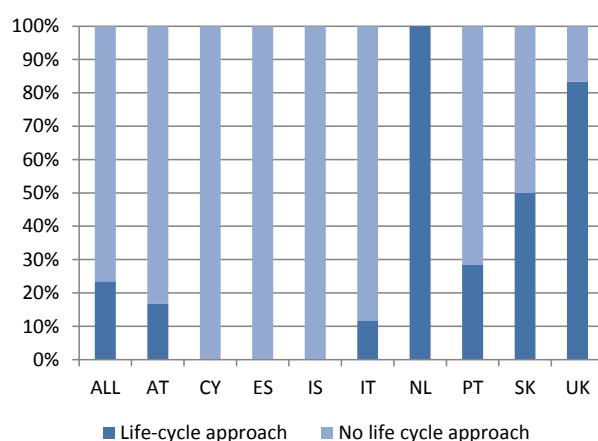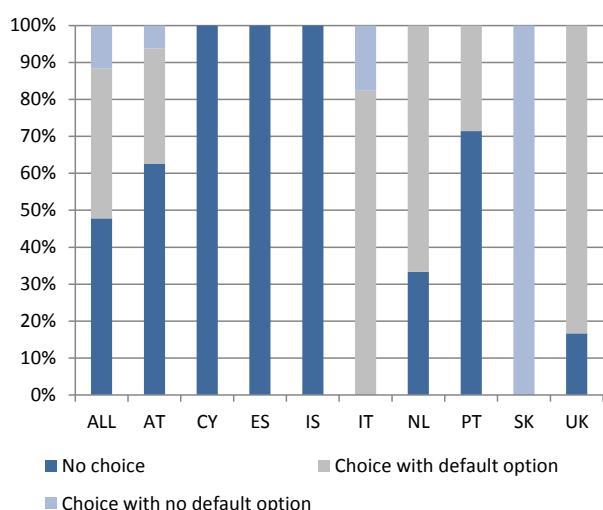
Source: EIOPA

262. **Relatively high allocations to non-fixed income assets – at least at the early stage of plan members' careers – are often combined with a life-cycle approach.** This is the case for the average asset allocation over the life-cycle of DC IORPs in AT, the NL, SK and the UK (Figure 130). An exception is IS where DC pension funds do not apply a life-cycle approach, while total allocations to equities, real estate and property amount to 43% of investments. DC IORPs in CY, ES, IT and PT adopt a relatively conservative investment strategy with non-fixed income allocations ranging from 25% to 32%.

Figure 130: Average asset allocation over the life-cycle for representative plan member 35 years before retirement, % investments, weighted by members

Austria
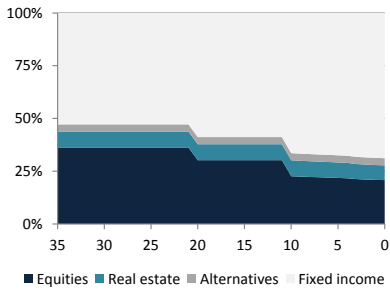
Cyprus
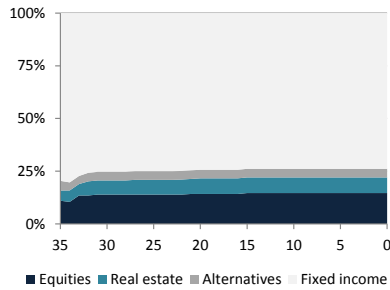
Spain
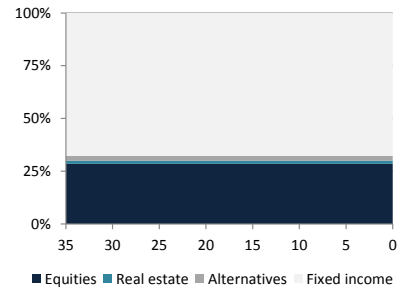
Iceland
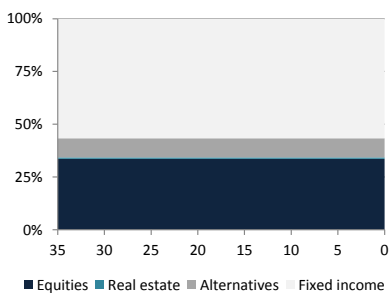
Italy
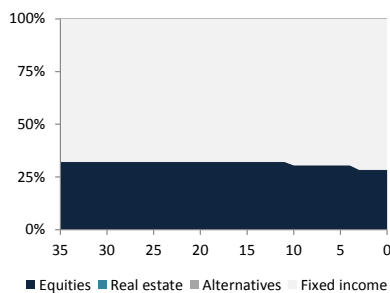
Netherlands
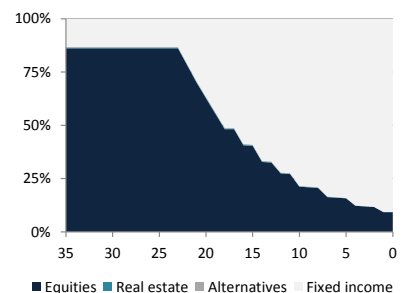
Portugal
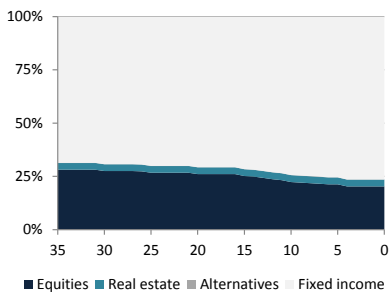
Slovakia
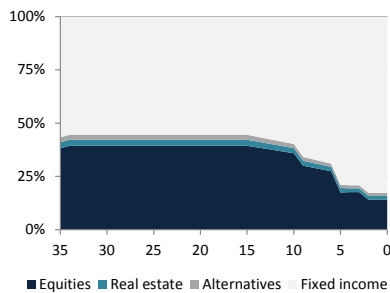
United Kingdom
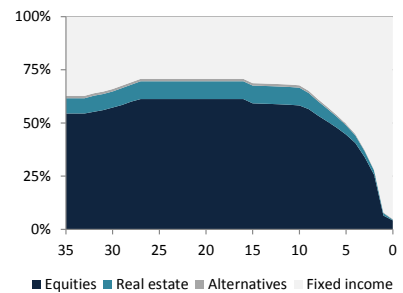
ALL
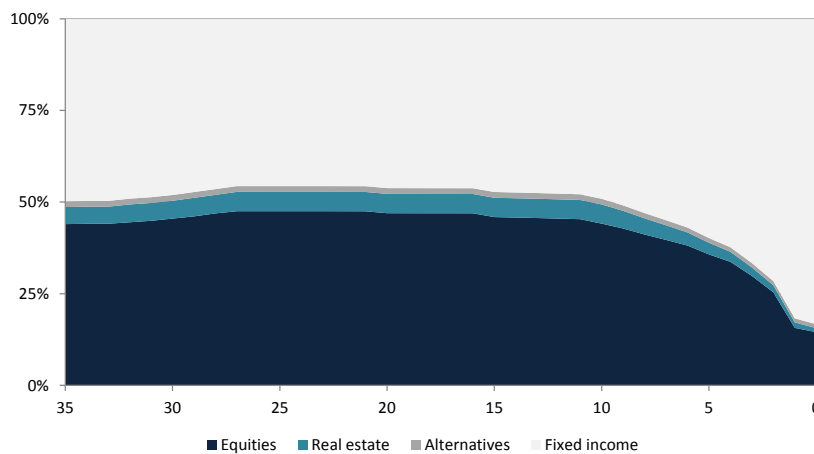
Source: EIOPA

Note: ALL is calculated as a simple average of the participating countries.

263. **The duration of fixed income assets is relatively low compared to the investment horizon of DC IORPs.** In most countries the average duration of fixed income assets (incl. cash) is around five years or less (Figure 131). In IS and the UK the average duration amounts to about 7.5 years. In the NL DC plans significantly increase the duration of fixed-income assets as plan members get closer to retirement, reflecting that plan members are required to convert accumulated assets in a life annuity at retirement.

264. **Only in four countries DC IORPs invest in inflation-linked bonds.** Most notably, pension funds in IS allocate as much as 80% of the fixed-income portfolio to index-linked bonds. A likely explanation is that DC schemes in IS provide inflation-linked annuities and are required to meet a minimum replacement rate, which by itself is very sensitive to inflation risk (Figure 132).

Figure 131: Average duration of fixed-income assets (incl. cash) by years to retirement, years, weighted by members

Figure 132: Inflation-linked bonds by years to retirement, % fixed income assets, average weighted by members
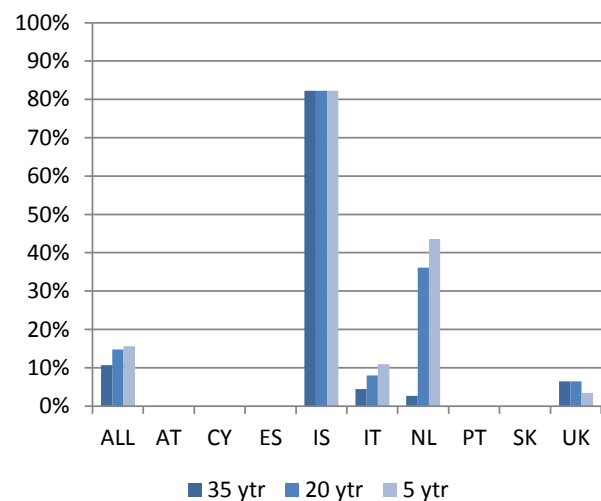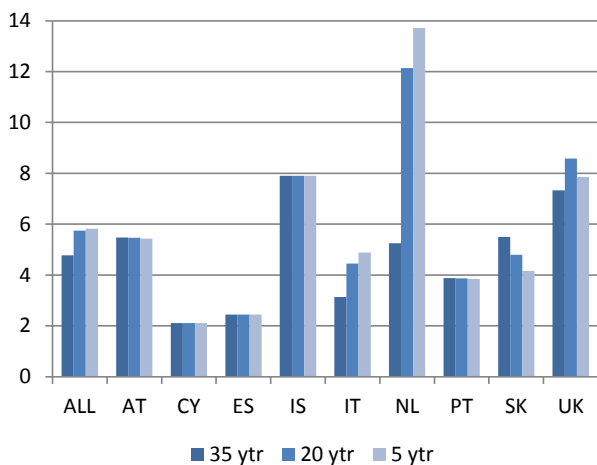
Source: EIOPA

265. **The aggregated asset mix for the DC sample differs substantially from the DB sample (Figure 133).** In particular the share of equity and property is smaller in DC as the risk differs in comparison to DB schemes. The share of fixed income assets is consistently bigger for all the categories of DC members in terms of the years to retirement and also in the weighted average, than the aggregate share observed in the DB schemes. This difference is accentuated for those DC members who are closer to retirement.

Figure 133: Comparison of Investments as % of total investments DB vs DC
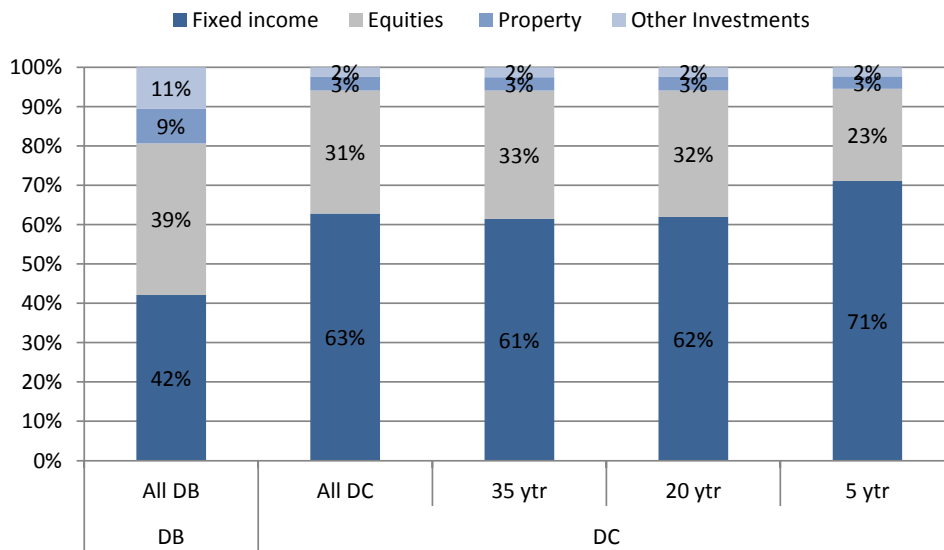
Source: EIOPA

Note: All DC is based on the weights of the 3 representative members (35, 20 and 5 years to retirement)

266. In most countries, member profiles further from retirement are expected to build up bigger pension pots than those closer to retirement, i.e. in real terms. This does not apply to IS though. The salary increase, contribution rates and expected returns on assets do not enable member profiles further from retirement to accumulate assets equal to the reported wealth of those profiles closer to retirement.

d) Decumulation phase

267. **The countries participating in the DC satellite module take different approaches to regulating the decumulation phase.**

- The strictest rules apply in AT, IS and the NL where accumulated assets have to be converted in a life-long annuity.
- In IT and PT part of the final pension pot has to be converted in an annuity, while the remaining part may take the form of a lump-sum payment. In IT the maximum lump-sum is 50% of the account value. In PT one third of accumulated assets relating to employer contributions may be paid out as a lump-sum and all accumulated assets relating to employee contributions.
- In SK the regulation on supplementary pension savings allows for annuities, temporary annuities and lump-sum payments. However, at the minimum retirement income has to be spread over a period of at least five years.
- CY and ES allow for full lump-sum distributions to the plan members. The UK allows for the possibility of taking "flexible benefits" (including money purchase or cash balance) as small cash sums, the whole pot as cash, using funds to buy a guaranteed income through an annuity or a flexible retirement income.

268. Replacement rates of these pay-out methods are driven by the retirement age and life expectancy at the time of retirement. A higher life expectancy will reduce the value of the regular income stream in which final pension wealth is converted. Conversely, a higher retirement age will lower the life expectancy at retirement.

269. The Eurostat 2013 population projections assume that life expectancy at 65 will increase by 1½ years between 2019 and 2034 and by another 1½ years between 2034 and 2049. The 5-year plan member with a retirement age of 65 will retire in 2019, the 20-year plan member with a retirement age of 65 in 2034 and the 35-year plan member with a retirement age of 65 in 2049. In ES, IS and IT life expectancy at 65 is higher, in CY, PT and in particular SK life expectancy is lower than for the nine-country average.

270. There is a positive correlation between life expectancy and the expected retirement age reported by IORPs for the three representative plan members. IORPs in IS and IT report relatively high retirement ages, while the retirement age in SK is relatively low. Only in IT, PT and partially in AT is the retirement age expected to increase in line with the number of years the representative plan members are from retirement.

Figure 134: Life expectancy at 65 in 2049, 2034 and 2019

Years
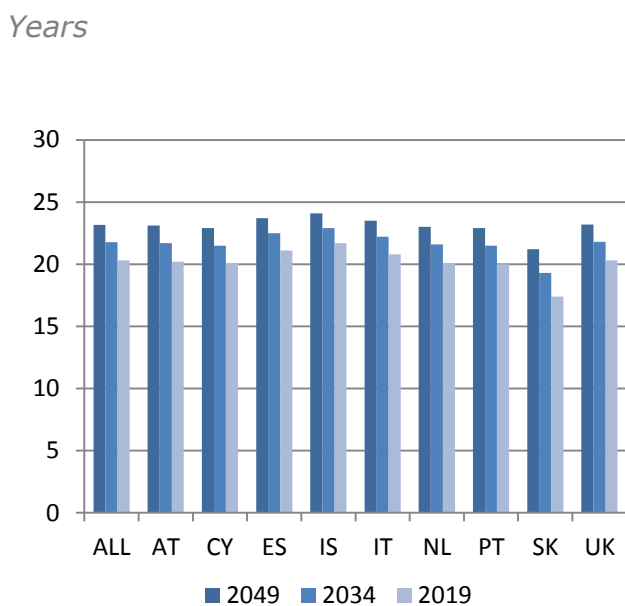
Figure 135: Average retirement age for three representative members

Years

Source: Eurostat
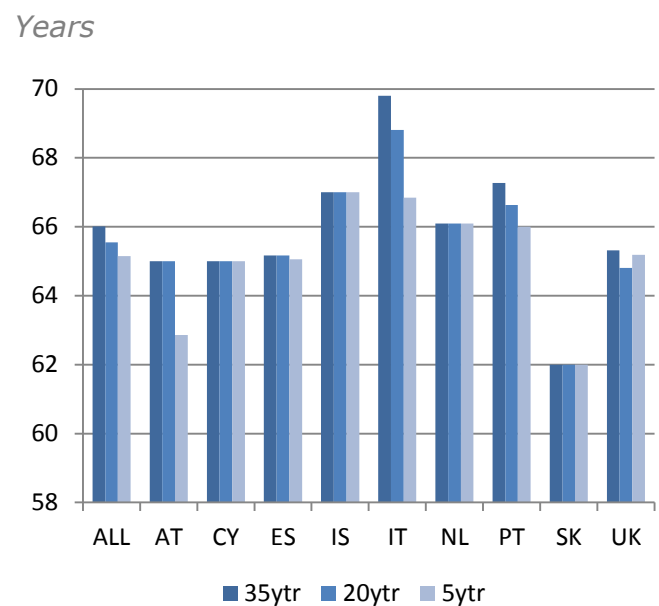
Source: EIOPA

271. In ES lump-sum payments receive favourable tax treatment in comparison to the decumulation methods providing regular income streams. It used to be possible to receive 40% of accumulated assets as a lump-sum free of tax. However, this tax advantage is being phased out but still applies to assets arising from contributions made before 2007. In the UK, the taxation of lump sum payments depends on the decumulation option chosen. With all options other than an uncrystallised fund pension lump-sum, it is normally possible to take up to 25% of the fund value as an untaxed lump-sum, with regular income payments and other withdrawals subsequently being taxed as income. With an uncrystallised fund pension lump-sum, 25% of each withdrawal is untaxed, with the rest of the withdrawal being taxed as income.

272. The DC satellite module allows for nominal annuities, inflation-linked annuities and income drawdowns.

273. **The average replacement rates for the inflation-linked annuities and the programmed drawdown are lower than for the nominal annuity.** The inflation-linked annuity increases with inflation during retirement, whereas the nominal annuity pays a constant amount. This implies that the starting value of the inflation-linked annuity will be lower. Due to the differences in inflation rates for EUR, GBP and ISK, the inflation-linked replacement rates are on average 20%, 23% and 34% lower in the Eurozone, IS and the UK respectively.

274. The programmed drawdown is calculated as a constant nominal amount that is withdrawn over the period up to the expected lifetime. It is assumed that 25% of assets is invested in equities, generating a risk premium of 3% over the RFR. As a consequence, one could expect that the replacement rate for the programmed drawdown would be higher than for the nominal annuity which is based on the RFR.

275. **Most IORPs in the sample expect that plan members will use a combination of lump-sum and annuity (39%) as a pay-method followed by only a lump-sum (27%), only an annuity (17%), an income drawdown (14%) and combination of lump-sum and income drawdown (3%) (Figure 136).**

276. The expected decumulation methods in the nine Member States are in line with national regulation of the pay-out phase: annuities in IS, the NL and SK; a combination of lump-sums and in IT and PT; lump-sums in CY, ES and the UK possibly in combination with an annuity or income drawdown. Most DC IORPs in AT labelled the compulsory, lifelong old-age pensions as income drawdowns. The reason is that the pension payments are subject to investment risk and systemic longevity risk. A small proportion of IORPs in AT and IT reported that they expected accumulated assets to be distributed as a lump-sum only. In both countries – like in many other countries – pension regulation allows for trivial commutation of small pension pots. Apparently, these IORPs expected that accumulated assets would remain below that threshold.

277. IORPs in most countries (AT, CY, ES, IS, IT) indicated that they provided retirement income during the pay-out phase (Figure 137). In case of CY that is kind of trivial since all IORPs distribute accumulated assets as a lump sum. In IT annuities are typically paid out by insurance companies. In PT and the UK the pay-out phase is typically provided for by other institutions. In the NL and SK retirement income during the pay-out phase can be provided by the IORP itself or by other providers. In SK temporary annuities can be provided by the IORP while life annuities have to be provided by insurance companies.

Figure 136: Expected pay-out method used by plan members (in % IORPs in the sample)
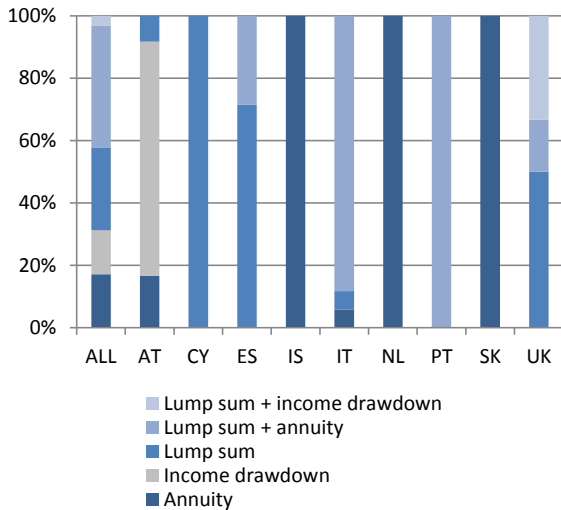
Figure 137: Institution providing retirement income (other than lump sums) during the pay-out phase (in % IORPs in the sample)
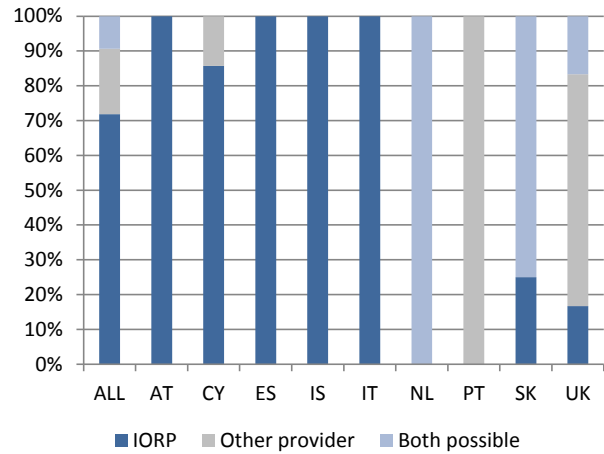
Source: EIOPA

e) Costs and charges

278. Costs and charges can have a significant negative impact on members' estimated replacement rates. However the situation in every jurisdiction is so heterogeneous that strong conclusions or direct comparisons cannot be derived at all. For instance without additional information on investment and risk management strategies, returns or guarantees or knowledge about the differences in national occupational pension systems it cannot be concluded that IORPs are in some countries more expensive than in other countries. Further work is needed to get a holistic understanding of the differences among countries on this matter. The reporting template allowed participants to report charges in various formats, including as a percentage of total assets, percentage of annual contributions, or a flat annual fee. In each case the scheme could distinguish between administration and the investment costs. The below Figure 138 shows the reduction in the replacement rate by participating country and across member profiles arising as a result of costs and charges.
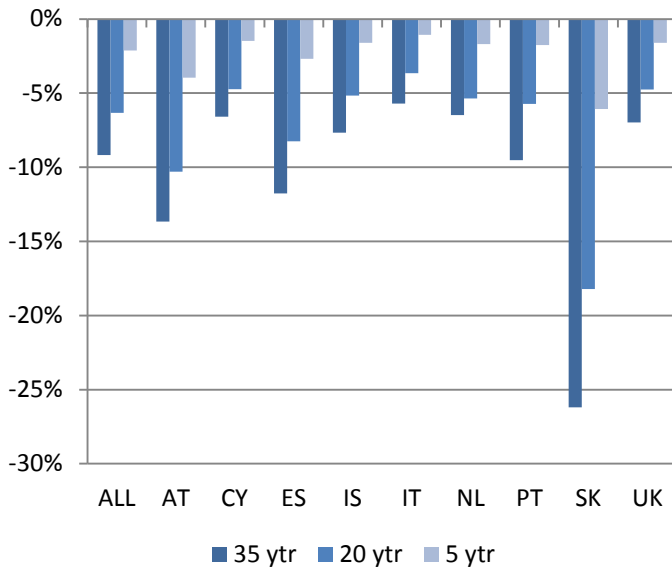
279. **The further the member profile is from retirement, the bigger the impact on the final pension assets due to charges.** People close to retirement have already been subject to past charges. Therefore it is misleading to conclude that they actually have suffered lower charges through their period of accumulation. This impact is present in all countries. The weighted average impact on replacement rates in all nine countries equals -9%, which is equivalent to the total annual administrative and investment costs of 50-60 bps of assets. Six of the nine countries have very similar effects from their costs and charges levied: their weighted average replacement rates at the retirement date reduce by 5% to 10% for those currently furthest from retirement.

Annex 4. Simplifications for government and corporate bond stresses

a)   Government bond stresses

280. The adverse market scenarios contained detailed government bond stresses for 27 EU Member States. The stress test specifications provided for simplified shocks for the market capitalisation weighted "euro area" and "Europe" government bond aggregates.

281. One third of IORPs calculated the impact of the adverse market scenarios using the detailed government bond stresses (Figure 139). A little over 20% made use of the simplification or a combination of simplification and individual stresses. TPR used its own simplification in completing the template for part of the UK sample. The supervisor applied the stress relating to UK government bonds to all sovereign bond holdings of IORPs.

Figure 139: Use of simplifications for government bond stresses

% IORPs
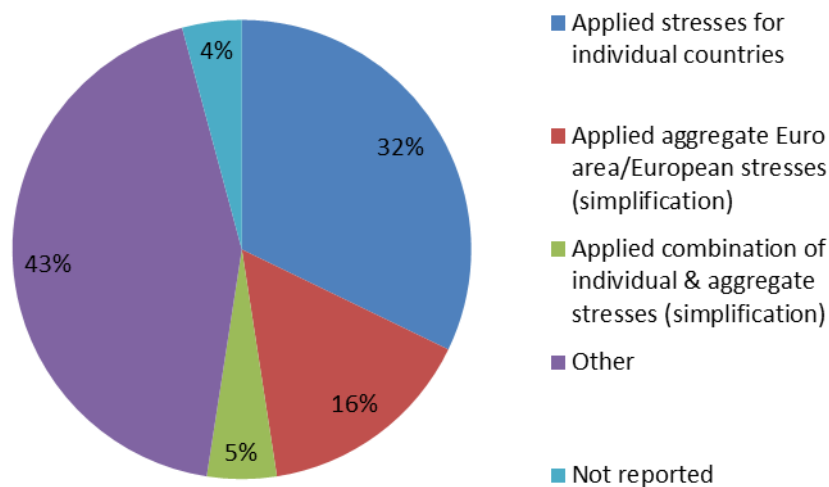
Source: EIOPA

282. As an additional simplification, the stress test specifications expressed the shocks for the two government bond aggregates in terms of a percentage change in value assuming a 10-year duration. This additional simplification was aimed at IORPs who could not retrieve the actual, IORP-specific duration of the government bond portfolio(s). Out of the 20% of IOPRs that applied the simplified, aggregate bond stresses, three quarters used an IORP-specific duration and one quarter used the simplified 10-year duration (Figure 140). TPR also assumed a 10-year duration in assessing the impact of the UK government bond stress for part of the sample of UK IORPs.
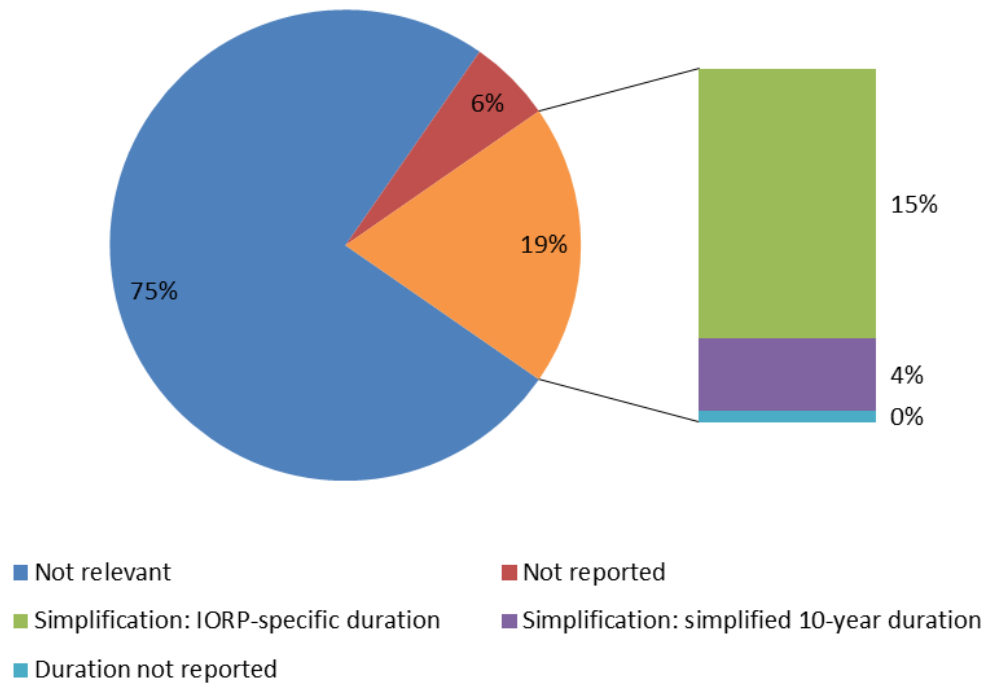
% IORPs

283. Total government bond holdings of IORPs in the stress test sample amount to EUR 221bn. Figure 141 provides a breakdown of government bond holdings by the issuing EU Member States and the aggregates used to assess the impact of sovereign bond stresses. Detailed government bonds stresses distinguishing the 27 EU Member States were applied to 55% of total government bond holdings. The specifications prescribed a zero stress for other European and non-European government bonds, which accounts for 10% of total government bonds holdings. The simplified "euro area" and "Europe" aggregate shocks were applied to 15% of the value of government bonds. Finally, government bonds that were subject to the simplified "UK aggregate" shock amounted to 20% of the total.

Figure 141: Breakdown government bond holdings by country/simplified aggregate

% total government bond holdings
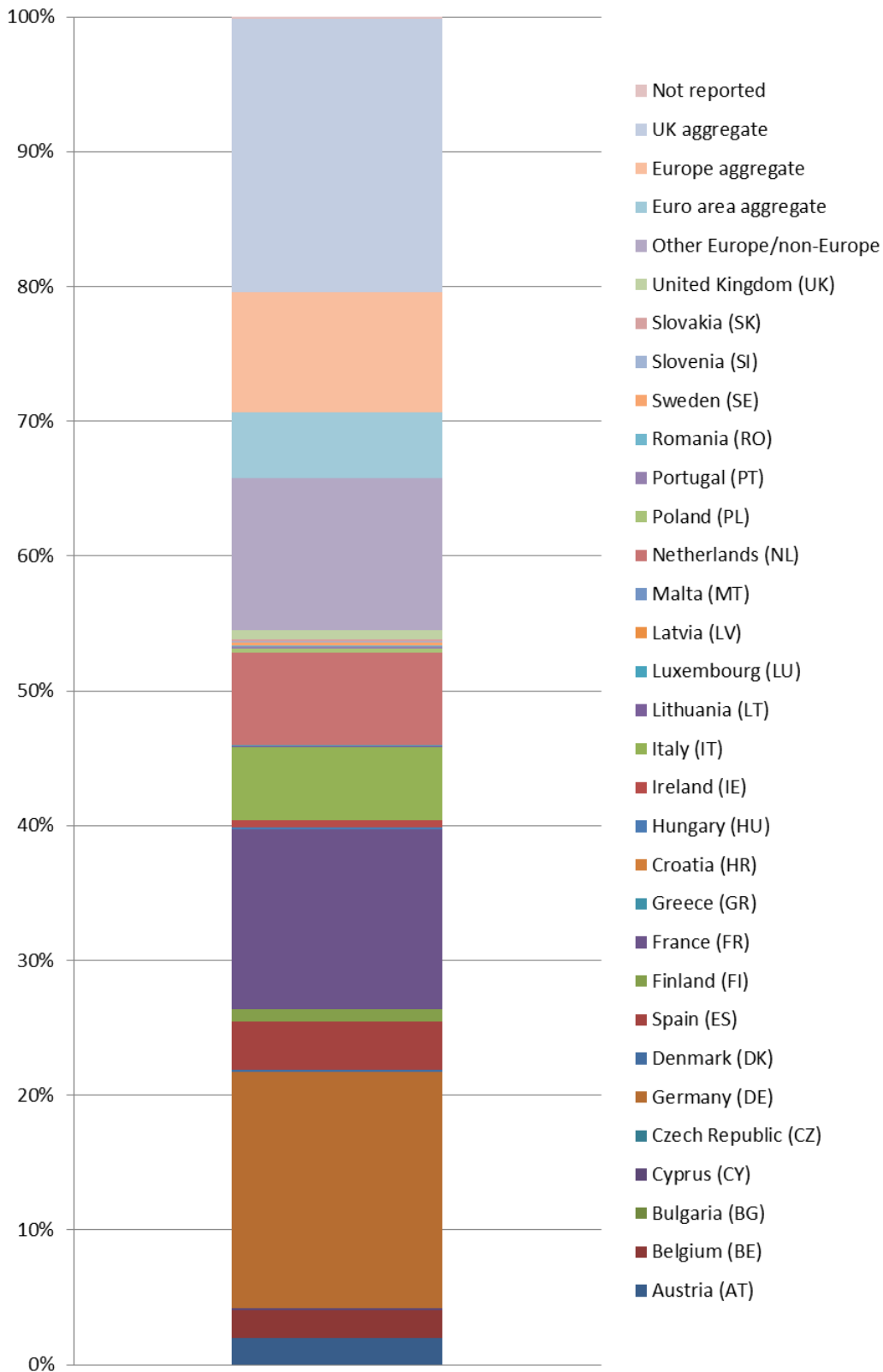
Source: EIOPA

b) Corporate bond stresses

284. The adverse market scenarios contained detailed corporate bond stresses, distinguishing between non-financial corporate bonds, financial covered bonds and financial unsecured bond in combination with seven rating classes. The stress test specifications provided simplified shocks for five corporate bond aggregates (total, non-financial, financial, financial covered and financial uncovered) with a further breakdown of these aggregates into investment grade and high yield.

285. Almost one third of IORPs applied the detailed standard stresses, distinguishing types and rating of corporate bonds (Figure 142). 63% of IORPs applied the simplified, aggregate stresses, in some cases in combination with the detailed standard stresses. This includes the part of the UK sample for which TPR completed the reporting template. The UK supervisor applied the shock for the total corporate bond aggregate, assuming a split of 70% investment grade and 30% high yield corporate bonds. Figure 143 gives the breakdown of the corporate bond aggregates that were applied by IORPs using the simplification. Participants using the simplification applied on average 1.7 different aggregates. TPR distinguished between investment grade and high yield bond in completing part of the UK sample of IORPs. A small minority of other IORPs using the simplification also applied the split, a small majority did not make the distinction.

286. As an additional simplification, the stress test specifications expressed the shocks for the corporate bond aggregates in terms of a percentage change in value assuming a 5-year duration. This additional simplification was aimed at IORPs who could not retrieve the actual, IORP-specific duration of the corporate bond portfolio(s). TPR made use of the simplified 5-year duration in assessing part the sample of IORPs in the UK. Three quarters of other IORPs using the simplified aggregates applied an IORP-specific duration.

Figure 142: Use of simplifications for corporate bond stresses

% IORPs
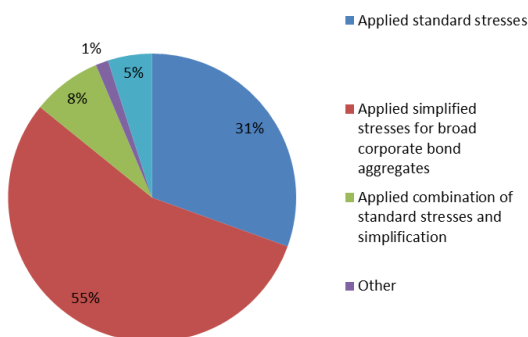
Figure 143: Corporate bond aggregates used by IORPs applying a simplification

% IORPs applying simplification
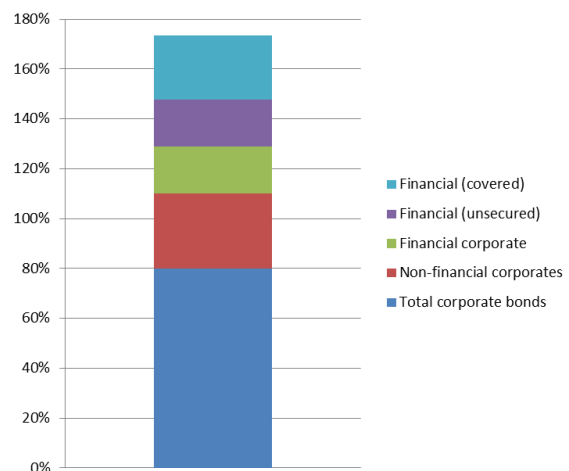
Source: EIOPA

287. Total corporate bond holdings of IORPs in the stress test sample amount to 223 billion euro. Figure 144 and Figure 145 provide a breakdown of the corporate bond holdings by type (non-financial, financial covered, financial unsecured) and by rating or risk class (investment grade, high yield).

Figure 144: Breakdown of corporate bond holdings by type, if provided

% total corporate bond holdings
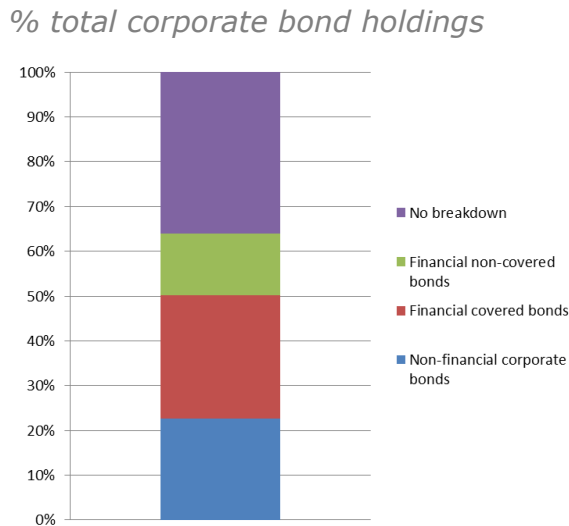
Figure 145: Breakdown of corporate bond holdings by rating/risk class, if provided

% total corporate bond holdings
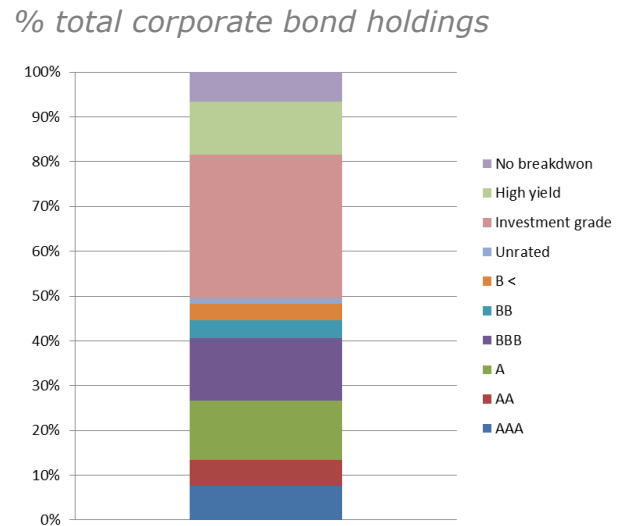
Source: EIOPA

Annex 5. Table of abbreviations used

A/L   Assets / Liabilities

BP   Basis Point

BN   Billion (10^9)

CPPI   Constant Proportion Portfolio Insurance

DB   Defined Benefit

DC   Defined Contribution

EAL   Excess of assets over liabilities

ECB   European Central Bank

EEA   European Economic Area

EET   Exempt-Exempt Taxation

EIOPA   European Insurance and Occupational Pensions Authority

ESRB   European Systemic Risk Board

EU   European Union

BGP   Great Britain Pound

GDP   Gross Domestic Product

HBS   Holistic Balance Sheet

HY   Hybrid

IORP   Institutions for Occupational Retirement Provision

ISK   Island Krona

LDI   Liability driven investment

LR   Low Return

LTG   Long Term Guarantee

MN   Million

NBS   National Balance Sheet

NCA   National Competent Authority

PPF   Pension Protection Fund

PPS   Pension Protection Schemes

SCR   Solvency Capital Requirement

SIPP   State of investment policy principles

TPR   The Pensions Regulator

TRN   Trillion (10^{12})

UFR   Ultimate Forward Rate

Annex 6. List of country abbreviations

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GB	Great Britain
GR	Greece
HR	Croatia
HU	Hungary
IE	Ireland
IS	Iceland
IT	Italy
LT	Lithuania
LU	Luxemburg
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia

Annex 7. Table of figures