



EIOPA-19/673
17th December 2019

2019 Institutions for Occupational Retirement Provision (IORPs) Stress Test Report

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Executive Summary

With almost 4 trillion Euros of assets under management, the EEA's Institutions for Occupational Retirement Provision (IORPs) sector is an important actor on financial markets with implications for financial stability. The diversity of the frameworks for occupational pensions in Europe – in conjunction with the sector's relative importance for private pension savings and in relation to national social security frameworks, have to be considered to reach reasonable conclusions for the assessment of potential impacts on financial stability of - and on - the sector.

The 2019 occupational pension stress test very clearly reflects on the changing European – and in that regard: global – private pension landscape, which has been challenged by:

- Low interest rates and low yield environment,
- Heightened market volatilities in US and global stock markets,
- Demographic and labour market changes.

Those challenges probably accelerated the manifestation of the 'new normal' of shifting the investment risks from the IORP or sponsoring undertaking to the members or beneficiaries of the IORP.

Moving away from the traditional Defined Benefit (DB) pension system, where the financial risks lie with the Institution for Occupational Retirement Provision (IORP) or the sponsoring undertaking –potentially supported by pension protection schemes -, to a framework where members and beneficiaries bear the investment risks in full – via Defined Contribution (DC) pension schemes or through sharing any shortfalls within the population via benefit reductions – puts the investment and asset risks at the core of the analysis of IORPs' impact on financial stability and vice versa.

The 2019 stress test exercise

The adverse market scenario for the 2019 stress test built on the narrative of a sharp reassessment of risk premia and an increase in yield curves in the short-term. Consequently, the shock stressed the investment assets of the EEA IORP sector, whilst decreasing the pressure of the low discount rates on technical provisions.

The adverse market scenario meant a substantial shock to IORPs' investment assets and particularly their equity exposures, which were subject to heightened market volatility at the end of 2018. The stress would have wiped off almost 250bn Euros of asset values in the EEA DB sector in the sample and 16bn Euros in the EEA DC sector in the sample. This loss in values represents around 2% of the 2018 GDP of the participating countries.

The results of the 2019 stress test show that the EEA pension sector is – on average - better funded in the baseline compared to previous exercises. That is to some extent resulting from the absence of the UK sector from the exercise, which has been facing significant challenges in recent years, and which - due to its sheer size - had dominated previous EIOPA pension stress tests. Yet also the second largest IORP sector in the EEA, the Netherlands, was affected by the relatively high exposure to US equities and the heavy US market volatilities in the baseline at end-2018, which subdued in the course of 2019.

		Baseline scenario	Adverse scenario	%-difference
		(EEA aggregate figures in billion Euros)	(EEA aggregate figures in billion Euros)	
National methodologies	Assets	1,057	824	-22%
	Liabilities	1,039	1,004	-3%
	Excess of assets over liabilities	19	-180	
Common methodology	Assets (excl. sponsor support)	1,076	826	-23%
	Liabilities (excl. benefit reductions)	1,117	1,042	-7%
	Excess of assets over liabilities	-41	-216	

The liabilities of the DB IORPs in the sample decreased by 7% in the common methodology as a consequence of the adverse market scenario, which is a slightly higher decrease than the 3% observed for the national methodologies. The EEA aggregate figure is highly influenced by the IORP sector in the Netherlands, where pension liabilities are valued using a risk-free rate term structure, similar to the one applied in the common methodology. However, the prudential regimes in many other EEA countries build on fixed discount rates of up to 4%. The adverse scenario resulted in an aggregate shortfall between total assets and total liabilities of -180bn Euros under national frameworks and -216bn Euros according to the common methodology. Under the assumptions of the common methodology, the shortfall would result in expected sponsor support (49bn Euros in the adverse scenario) and benefit reductions (173bn Euros in the adverse scenario) in the common balance sheet.¹

The applied, extended cash flow analyses provided important insights in the effects of the stress on sponsors, members and beneficiaries. The effect of sponsors is high in the first years after the stress, yet the stress' effects on benefit reductions are dragged on over several decades. Compared to previous exercises, the impact of the adverse market scenario on the real economy via the burden on sponsoring undertakings is lower, yet the impact on the real economy via cuts in benefits to members and beneficiaries - and consequently substantially lower disposable income in retirement - would impact the affected populations for decades.

The stress test was complemented by two important analytical areas, which for the first time assesses both DB and DC sectors together: investment behaviour and the integration of ESG factors. The interesting results of that horizontal assessment will be very good starting points for further research in terms of sustainability and understanding the particularities of IORPs' investment allocation and investment

¹ The values of sponsor support and benefit reductions do not exactly add up to the shortfall on the common balance sheet, excluding sponsor support and benefit reductions, as the aggregate excess of assets over liabilities, including sponsor support and benefit reductions, is slightly positive (EUR 6bn).

behaviour. The new reporting of EEA IORPs' information will substantially improve EIOPA's capabilities to do that.

The analysis of the IORPs' expected investment behaviour after the stress event shows strong and quick re-balancing to pre-stress investment allocations, which indicates counter-cyclical investment behaviour, yet potentially exacerbating the financial loss in case of continued reassessment of risk premia. The observed high exposures to US equities and home sovereign bonds are appreciated against the long-term horizon of the investments and pension obligations of IORPs. The exhibited 'stickiness' of the investment allocation, paired with IORPs' individual investment allocations, may lead to vulnerabilities, which deserve further monitoring once EIOPA's improved pension reporting applies from 2020.

The assessment of ESG factors' integration in IORPs' risk management and investment allocation – as well as the preliminary quantitative analysis of investments prone to greenhouse gas-intensive business sectors - showed that a significant part of the IORPs can identify such exposures and allocate their investments by NACE codes. Based on that analysis to quantify the potential carbon dioxide exposures, the findings would indicate significant exposures of the IORPs in the sample to business sectors prone to high greenhouse gas emissions. Particularly high exposures can be found in SI and SK due to significant investments in the energy sector.

Procedural and methodological aspects

The 2019 IORP stress test exercise was initiated in June 2018 and benefitted from more efficient processes so that more time was allocated for IORPs to carry out the actual stress test and for NCAs to validate the national results.

The ambitious participation rate of 60% of DB and at least 50% of the DC sectors – in terms of assets under management - in the participating twenty countries was mostly overachieved. However, two countries did not reach the required level: Ireland due to missing legal powers, as a result of the significantly delayed transposition of the IORP II Directive and the UK which may have been due to the complications of Brexit.

The new elements and the expanded cash flow analysis were adequately applied and reached very high response rates. Nevertheless, the exercise could be described as complex, as it covered a number of different tools and analytical elements, which may deserve some follow-up work to identify the most efficient tools to be employed in future pension stress tests and to complement EIOPA's methodological framework for stress testing pension funds.

Following up on the conclusions of previous exercises

The 2019 IORP stress test results are to a large extent determined by the potentially severe effects of an adverse market scenario to the investments of EEA IORPs and with that on the future retirement income of their members and beneficiaries. This emphasises – resulting from the changing pension landscape in Europe – the common effects of the stress on DB and DC IORPs, compared to previous exercises: the 2015 and 2017 EIOPA occupational pension stress tests showed areas of risks and vulnerabilities concerning particularly the DB/hybrid IORP sector, which experienced in aggregate substantial pre- and post-stress shortfalls, both on the national and the common balance sheet. Such shortfalls would have to be covered by future sponsor support, which includes increased contributions by the sponsor or the member, and/or benefit reductions.

The 2017 IORP stress test indicated that more than a quarter of IORPs providing DB/hybrid pension schemes were backed by a sponsor that may not be able to (fully) support the pension promise following the adverse scenario. Moreover, pension obligations may exert substantial pressure on the solvency and future profitability of companies with a potential spill-over to the real economy. For 25% of participating IORPs, the value of sponsor support on the common balance sheet exceeded 42% of the sponsors' market value under the pre-stress and 66% under the adverse scenario.

IORPs in financial difficulties are usually subject to recovery plans, acknowledging their long-term obligations and payment horizons, which often rely on uncertain future asset performance. Such prudential tools dampen the effects on the IORP, the sponsoring entities, members and beneficiaries and, hence, the real economy. The downside is that the necessary adjustments to resolve shortfalls may fall disproportionately on future, younger generations, especially if investment returns fall short of expectations.

One of the deliverables stemming from the conclusions of the 2017 exercise was to continue assessing potential shortfalls between investment assets and technical provisions, using market-sensitive methodologies, and so to assess the capabilities of sponsors to provide support and the effects of benefit reduction mechanisms. This has been implemented in the 2019 stress test by enhancing the cash flow analysis in order to gain further insights into the expected timing of the effects.

The 2019 stress test also addressed the conclusion of the 2017 exercise to assess the implications of IORPs' specific activities and common behaviours regarding potential systemic risk drivers, such as search for yield, flight to quality or herding behaviour to explore potential indirect impacts on financial stability.

For the first time a European stress test assesses IORPs' potentially generated externalities to the rest of the EEA financial system and the real economy by considering the environmental, social and governance (ESG) aspects of the IORPs' investments, including its sustainability relating to climate change and greenhouse gas emissions.

Conclusions

The stress test results showed that the persistently challenging economic environment in recent years has taken its toll on the European IORPs: Whilst still generally meeting national funding requirements – to varying degrees: from comfortably to marginally, the significant exposures to market risks may pose a threat to the European IORPs that exhibit vulnerabilities, which eventually may substantially affect the future retirement income of their members and beneficiaries. Of course, due to the long-term nature of IORPs' pension obligations, IORPs may be capable of sustaining short-term market volatilities in their investment portfolios for longer time periods than other types of financial institutions.

Sustainable finance and the consideration of ESG risks are core to making pension provision future-proof in Europe. The majority of the IORPs in the sample have taken steps to integrate those considerations in their risk-management and investment allocations, yet further work will be needed to implement the ambitious objectives of the IORP II Directive and other legislative initiatives.

The findings of the exercise in terms of detected vulnerabilities strengthen EIOPA's determination to continue monitoring the sector's developments in particular regarding the potential impact of the investment allocations and investment behaviours on the private pension sector's financial stability.

Going forward, and in addition to novelties introduced in this year's exercise, EIOPA plans to further refine its stress testing methodology in order to address all specificities and current challenges of the IORPs sector. EIOPA expects that participants of the 2019

stress test will use the acquired experience and foster their stress testing and risk management capacity. National Competent Authorities (NCAs) are in turn expected to oversee and promote these improvements.

1. Introduction

1.1. Objective

In light of a persistently challenging economic environment and the public's attention to its effects on private pensions, EIOPA's 2019 IORP Stress Test was an important, highly relevant and particularly timely exercise to bring much needed transparency to the financial situation, the sustainability, resilience and potential vulnerabilities of IORPs in Europe.

Considering the important role of pension provisions for a sustainable environment, for the first time, a European stress test includes an assessment of Environmental, Social and Governance (ESG) exposures. This analytical area focusses on IORPs' current exposures and risk management practices regarding ESG factors, which will provide a relevant starting point for ESG-related financial stability assessments of the European financial sector.

The core assessment refers to the direct impact of a stressed market scenario on the sustainability and funding of Defined Benefit (DB) IORPs and on the projected future retirement income of members of Defined Contribution (DC) IORPs.

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

EIOPA carried out its first stress test for IORPs in 2015² and its second one in 2017³. Both exercises assessed the impact of a so-called 'double-hit' scenario, which is a combination of a fall in asset prices with a decline in risk-free interest rates, resulting in an increase in the market value of pension obligations.⁴ The previous EIOPA stress tests showed areas of risks and vulnerabilities of the occupational pensions sector in Europe. In particular the DB/hybrid IORP sector experienced in aggregate substantial pre- and post-stress shortfalls, both on the national and the common balance sheet. Such shortfalls would have to be covered by future sponsor support, which includes increased contributions by the sponsor or the member, and/or benefit reductions. The DC IORP sector experienced a considerable drop in the market value of investment assets in the adverse scenario, reducing the individual accounts of DC pension scheme members and, in case the scenario persists, leading to lower pension income when the members enter retirement.

The 2017 IORP stress test indicated that more than a quarter of IORPs providing DB/hybrid pension schemes are covered by sponsor that may not be able to (fully) support the pension promise following the adverse scenario. Moreover, pension obligations may exert substantial pressure on the solvency and future profitability of

² EIOPA, IORPs Stress Test Report 2015, 26 January 2016: <https://eiopa.europa.eu/Publications/Surveys/EIOPA%20IORPs%20Stress%20Test%20Report%202015%20bookmark.s.pdf>

³ EIOPA, 2017 IORP Stress Test Report, EIOPA-BoS-17/370, 13 December 2017: <https://eiopa.europa.eu/Publications/Reports/2017%20IORP%20Stress%20Test%20Report.pdf>.

⁴ The 2015 IORP stress test assessed two distinct double-hit scenarios: one triggered by a demand shock resulting in lower inflation swap rates and one triggered by commodity supply shock resulting in higher inflation swap rates. The 2015 exercise also investigated the effects of a longevity scenario with increased life expectancy as well as two low long-term return scenarios in the DC satellite module.

companies with a potential spill-over to the real economy. For 25% of participating IORPs, the value of sponsor support on the common balance sheet exceeded 42% of the sponsors' market value under the pre-stress and 66% under the adverse scenario. Other security mechanisms include benefit reductions reducing household income and consumption and may have severe effects on the real economy.

A mapping of national recovery mechanisms demonstrated that sponsor support and benefit reductions may be spread over substantial timeframes. IORPs in financial difficulties are usually subject to long-term recovery plans. Moreover, national discount rates exceeding the risk-free rate may skew the presentation of the funding situation of IORPs and consequently may delay recovery plan measures. As such, these prudential mechanisms will contribute to mitigating spill-over effects to the real economy and financial stability. However, in case the necessary adjustments are postponed too far, restoring the financial position of IORPs may only be achieved by imposing a disproportionate burden on the younger generations.

1.2. EIOPA's mandate

EIOPA is required⁵, in cooperation with the ESRB, to initiate and coordinate European stress tests of IORPs and insurance undertakings, assessing:

- the resilience of IORPs and insurance undertakings to adverse market developments;
- the potential for systemic risk that may be posed by financial institutions to increase in situations of stress.

For application by the competent authorities, EIOPA has to develop:

- criteria for the identification and measurement of systemic risk;
- common methodologies for assessing the effect of economic scenarios on an institution's financial position;
- common approaches to communication on the outcomes of these assessments of the resilience of financial institutions.

1.3. Narrative and the tested adverse market scenario

Since the last IORP stress test exercise in 2017, the global economic and financial environment has changed towards a weaker and more vulnerable conjuncture. In order to assess the vulnerability of IORPs and plan members to the risks emerging with the most recent dynamics of the macro-financial environment, EIOPA has decided to carry out an IORP stress test in 2019 with the corresponding features of the adverse market scenario, which was developed in cooperation with the ECB and with the ESRB.⁶ The

⁵ See Art. 32 of EIOPA Regulation: Regulation (EU) No 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 (OJ L 331, 15.12.2010, p. 48).

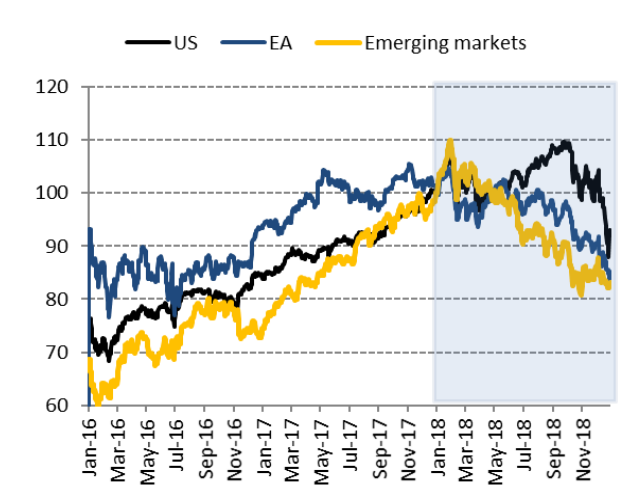
⁶ The assumptions about long-term risk premia were developed by EIOPA. Nor the assumptions nor the narrative should be interpreted as either forecasts or as the institutions' expectations about future economic and financial developments. The adverse market scenario is limited to both the EIOPA and the ESRB assessment on the key vulnerabilities of the pensions and the prevailing sources of systemic risk for the European financial system.

2019 stress test uses end-2018 as the reference date. Therefore, all the assessments and the narrative were based on the macro-financial developments up to this period.

Following a prolonged period of rising stock prices and low volatility, stock markets started to decrease and volatility peaked after a sharp sell-off in the US stock market in the beginning of February 2018 (figures 1.1 and 1.2). Although this episode was short-lived with no relevant implications for financial stability, it revealed a fragile financial system, clearly vulnerable to shocks of macroeconomic and political order.

The high volatility in US equity markets substantially impacted the euro area markets. After this event, the European volatility exhibited a series of renewed spikes along 2018, while the EURO STOXX 50 Index was down in end December by roughly 14% since January. These developments reflected rising uncertainties about several policy outcomes, adverse developments in some EMEs and the slight deterioration of the economic outlook.

Figure 1.1: Equity market performance

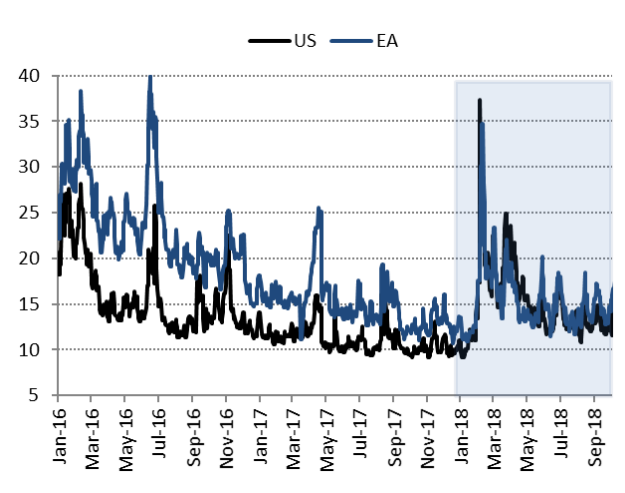


Source: Bloomberg (Index, where 100 corresponds to the values on 01.01.2018)

Last observation: 31 December 2018

Note: US: S&P 500 Index, EA: Euro Stoxx 50 Index, Emerging markets: MSCI EMERGING

Figure 1.2: Market volatilities

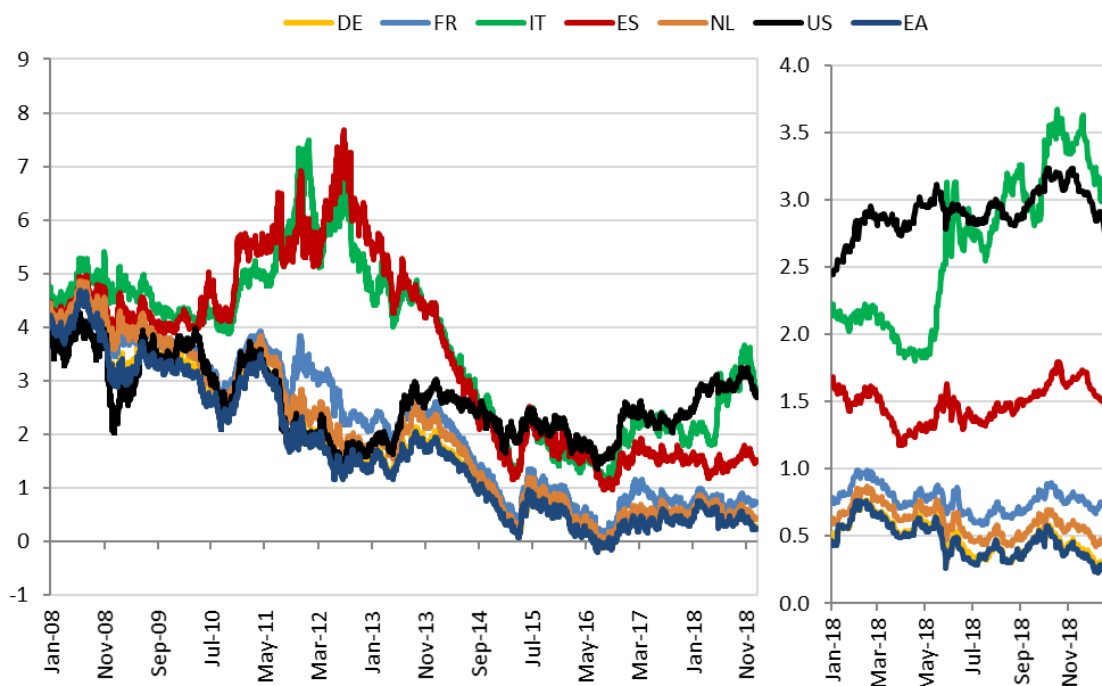


Source: Bloomberg

Last observation: 31 December 2018

Despite higher market volatilities and wider spreads in the European financial markets, bond markets remained steady in 2018, with long-term government bond yields exhibiting slight but gradual increases, before starting declining in the end of the year (figure 1.3).

Figure 1.3: 10-year government bond yields



Source: Bloomberg

Last observation: 31 December 2018

Although the risk of protracted low interest rates has been posing significant challenges to IORPs, the main purpose of the adverse market stress scenario is to capture the resilience of IORPs to a sudden reassessment of risk premia, reflecting the observable macro-financial trends highlighted above. This scenario is the outcome of several simulations reflecting the main sources of financial stability risks, with a special focus on the repricing of swap rates (in the EU, the United States and emerging market economies), government credit spreads and equity prices in the EU and other advanced economies, as well as bid-ask spreads on government bonds.

The starting point of the scenario is the assumption of an abrupt reversal in global risk premia. The shocks to interest rates are higher on short maturities giving the greater uncertainty and risks to growth caused by political tensions. In contrast, concerns in the euro area about growth in the long term (for demographic reasons, for example) would result in lower shocks for long-term maturities.

The overall increased risk premia would lead to increased yields and widening of credit spreads, amid concerns about the debt sustainability of some EU Member States. Government bond yields respond both to the increase in risk-free rates and to the widening of the spreads owing to concerns about debt sustainability. Equity prices would also fall substantially, amplified by a general sell-off of equities by the non-banking sector. Residential and commercial real estate prices would also decline significantly, while the risk free rate curve would move up mainly for the short-end and to a lesser extent for the long-end. Additionally, a significant increase in a few euro sovereign bond spreads paired with a substantial impairment of those sovereign bond market values could be observed.

The size of the stresses to the variables in the stress scenario show a severe yet plausible scenario that could arise if a risk environment aligned with the developments above were to materialise. The methodology underlying the calibration of the financial shocks is based on the same models used in previous stress tests. The shocks reported

should be interpreted as one-off, instantaneous and permanent shifts in asset prices relative to their end-2018 levels.

1.4. Sample

1.4.1. Participating EEA Member States

The 2019 IORP stress test is a European-wide exercise, including all EEA countries with material IORP sectors and covering all types of IORPs. The IORP stress test covered all EEA member states with material IORP sectors, which was determined as exceeding EUR500 million in assets by year-end 2018⁷. Consequently, the 2019 stress test exercise had to be carried out in 20 countries: AT, BE, CY, DE, DK, ES, FI, FR, GR, IE, IT, LI, LU, NL, NO, PT, SE, SI, SK and UK.

EIOPA requested to reach a coverage rate of at least 60% of assets of the DB/hybrid IORP sector and of at least 50% of assets of the DC IORP sector per participating country in the EEA. A lower coverage than 60%, yet not lower than 50%, was deemed acceptable if, after including the largest IORPs, IORPs with less than EUR25 million balance sheet total or less than 100 members and beneficiaries would need to be included in the exercise. This proportionate approach was to address extreme national specificities, for example the very high number of very small IORPs in IE.

Most participating countries reached higher participation and relative coverage of their respective pension sectors (in assets) compared to the 2017 or 2015 stress tests and overachieved the required coverage. IE did not reach the required coverage due to lacking supervisory powers⁸ to enforce participation in the stress test. UK IORPs did not participate in the 2019 IORP stress test.

Member State	Coverage national DB/HY sector (in assets)	Coverage national DC sector (in assets)
AT	n/a	91%
BE	60%	n/a
CY	78%	60%
DE	61%	n/a
DK	92%	n/a
ES	62%	55%
FI	62%	n/a
FR	100%	n/a
GR	n/a	70%
IE	17%	4%

⁷ In absence of end-2018 data, the participating Member States have been determined by using end-2017 data. Equally, NCAs were allowed to use end-2017 data to determine the representative sample of participating IORPs.

⁸ It is expected that the IE NCA will gain the needed supervisory powers through the national transposition of Directive (EU) 2016/2341.

Member State	Coverage national DB/HY sector (in assets)	Coverage national DC sector (in assets)
IT	67%	53%
LI	81%	n/a
LU	73%	100%
NL	62%	59%
NO	62%	n/a
PT	75%	52%
SE	61%	n/a
SI	100%	n/a
SK	n/a	100%
UK	0%	0%

1.4.2. DB and DC IORPs

The stress test consists of a part for IORPs providing DB or hybrid schemes and a part for IORPs providing DC schemes. DB/hybrid IORPs assessed their resilience to the adverse market scenario by applying the scenario to the national balance sheet and the market-consistent common methodology balance sheet, which includes all security and benefit adjustment mechanisms.⁹

IORPs may transfer shocks to the real economy through sponsor support and benefit adjustments, which may affect labour costs and disposable income of households. Elaborating on the limited cash flow analysis in the previous stress test, the DB/hybrid-part of the exercise assessed how the adverse market scenario impacts on sponsor support and pension benefits over time.

DC IORPs assessed the impact of the adverse market scenario on the market value of assets, recognising that for DC IORPs the value of liabilities moves in tandem with assets since all risks are borne by the plan members. The impact of the adverse market scenario is also tested for the future retirement income of three representative plan members.

The stress test includes all types of IORPs, i.e. IORPs that provide defined benefit (DB) schemes, hybrid schemes and defined contribution (DC) schemes.¹⁰ Insurers subject to Article 4 of the IORP Directive are not within the scope of the IORP stress test.

99 DB IORPs from 16 countries and 77 DC IORPs from ten countries participated in the exercise. The number of participating IORPs per country varies from one to over 20.

⁹ EIOPA (2016): EIOPA Opinion to the European Institutions on a Common Framework for Transparency and Risk Assessment for IORPs; https://eiopa.europa.eu/Publications/Opinions/EIOPA-BoS-16-075-Opinion_to_EU_Institutions_Common_Framework_IORPs.pdf.

¹⁰ For other applicable definitions, please do refer to EIOPA (2018): Decision of the Board of Supervisors on EIOPA's regular information requests towards NCAs regarding provision of occupational pensions information, April 2018, https://eiopa.europa.eu/Publications/Protocols/Decision%20on%20Consultation%20Paper_EIOPA-CP-17-005.pdf, paragraph 1.17.

Consequently, not all results can be presented in aggregate manner per country, so to ensure full confidentiality of individual IORPs' results.

The particularities of the national sectors – and the relative significance of IORPs providing pensions within the national social security systems, both the European DB and DC sectors are clearly dominated by a few EU Member States – in terms of investment assets under management:

2019 -DB/HY IORPs:

relative weight in terms of total assets in the sample

NL	DE	NO	BE	DK	IE	PT	SE	Other
77%	13%	2%	2%	1%	1%	1%	1%	2%

The 'Other' category includes IORPs from CY, ES, FI, FR, IT, LI, LU and SI.

2019 - DC IORPs:

relative weight in terms of total assets in the sample

IT	AT	ES	NL	SK	IE	CY	PT	Other
52%	20%	12%	9%	2%	2%	1%	1%	1%

The 'Other' category includes IORPs from GR and LU.

And establishes a completely different sample allocation compared to the 2017 IORP stress test, in particular due to the absence of UK IORPs¹¹:

2017 - DB/HY IORPs:

relative weight in terms of total assets in the 2017 sample

UK	NL	DE	IE	NO	BE	PT	SE	Other
52%	37%	5%	1.7%	1%	0.8%	0.5%	0.5%	1.5%

The 'Other' category included IORPs from CY, DK, ES, FI, IT, LI, LU and SI.

2017 - DC IORPs:

relative weight in terms of total assets in the 2017 sample

IT	UK	IE	ES	AT	IS	NL	SK	Other
35%	19%	18%	11%	7%	6%	2.3%	0.7%	1%

The 'Other' category included IORPs from CY, GR and PT.

1.5. Process

Following an open dialogue with stakeholders in 2018 until March 2019, EIOPA developed the objective of the 2019 stress test, its technical specifications and reporting templates.

Stakeholders generally supported EIOPA's objective and narrative to carry out the 2019 stress testing and to address new areas like ESG. Many stakeholders raised reservations on the approach to the stress test using a common methodology based on risk-free assumptions. There were remaining concerns that the exercise may be too complex and too burdensome - in particular the quantitative analysis of past investment behaviour

¹¹ The UK IORP sector is the biggest one in the EEA with around EUR 1,600 billion of assets in the DB sector in 2018, representing around half of the total assets in the EEA DB sector.

– and that the ESG analysis had to be appropriately carried out not to trigger unintended consequences in actual investments.

Also addressing stakeholders' feedback, the 2019 IORP Stress Test was initiated on an expeditious timeline to allow IORPs significantly more time to carry out the exercise and for National Competent Authorities (NCAs) to evaluate the results.

The resilience of both DB/hybrid and DC schemes and the subsequent second round effects on the real economy and financial markets are assessed using one adverse market scenario provided by the ESRB¹², as part of the strong cooperation between the two institutions. The ECB, in cooperation with EIOPA and the ESRB, has developed the narrative and calibrated the adverse scenario for the stress test. The scenario includes an appropriate number of individual risk factors designed to cover the investment exposures of IORPs' assets and also includes shocks to risk-free interest rates that are used for applying EIOPA's common methodology for valuing Defined Benefit (DB) liabilities.

The stress test exercise started on 2 April 2019. National Supervisory Authorities (NSAs) and participating IORPs were invited to a launch event to clarify the suggested methodologies and approaches on 16 April 2019.

NSAs chose the national, representative samples of participating IORPs, which had to carry out the exercise and submit the results to the corresponding NSAs by 19 June 2019. A dedicated Q&A process with timely publications and a centralised validation procedure had further enhanced the practicability and quality of the exercise. The national results were submitted to EIOPA by 29 August 2019, were centrally validated during the course of September and analysed throughout October and November 2019.

2. Impact of the stressed market scenario

2.1. Financial situation and funding of DB IORPs

IORPs providing DB/hybrid schemes have to assess the resilience to the adverse market scenario by applying the scenario to the national balance sheet as well as to the common balance sheet.

An important distinction between IORPs and other financial institutions is that funding requirements and valuation standards are largely determined at the national level. The IORP II Directive lays down minimum requirements for the valuation of liabilities, the funding of technical provisions and regulatory own funds, which may be supplemented through national prudential regulation. Consequently, IORPs were requested to calculate the impact of the adverse scenario on their national balance sheet in order to assess compliance with the funding requirements.

National prudential regimes often do not require IORPs to explicitly take into account the security and benefit adjustment mechanisms in case of underfunding or breaching the national requirements. Rather, the relative value of financial assets to the national funding requirement is used as a trigger for a recovery plan, which determines e.g. additional sponsor support or benefit adjustments.¹³

¹² See ESRB: Adverse scenario for the European Insurance and Occupational Pensions Authority's EU-wide pension fund stress test and for the European Securities and Markets Authority's money market fund stress-testing guidelines in 2019, 21 March 2019.

¹³ EIOPA will publish updated information on national methodologies on its website, separately to this report.

In addition, IORPs had to apply the adverse market scenario to the common balance sheet valued on a market-consistent basis.¹⁴ The common balance sheet includes all security and benefit adjustment mechanisms available to IORPs in the different Member States. The common balance sheet facilitates a comparable and transparent view on the pension obligations, which are supported by financial assets, sponsor support and pension protection schemes, and shows the extent to which additional security or benefit adjustment mechanisms may be needed in the future.

2.1.1. Funding ratio

2.1.1.1. Baseline: national and common methodologies

National methodologies

The national balance sheet at the reference date of end 2018 serves as the baseline for assessing how the adverse scenario affects the ability of IORPs to meet their funding requirements. Funding requirements and the corresponding valuation standards are to a large extent determined at the national level. As a result, funding and valuation standards vary significantly between Member States and are therefore difficult to compare.

Based on the national balance sheets, European IORPs providing DB/hybrid schemes have - on aggregate basis - sufficient assets to cover liabilities at year-end 2018. The funding ratio of all IORPs included in the sample amounts to 102% (figure 2.1) and the excess of assets over liabilities is 2% of the liabilities or EUR 19 bn.

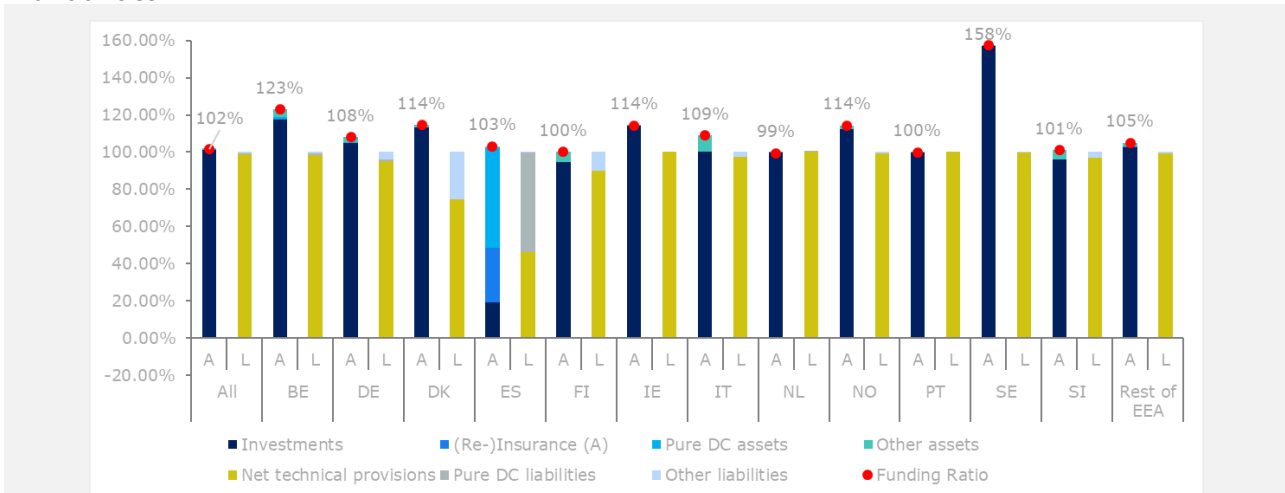
In almost all countries, assets exceed liabilities based on the national valuation standards. SE stands out with aggregate assets equal to 158% of liabilities. BE has a funding ratio of 123%, DK, IE and NO have funding ratios of 114%. DE, ES, FI, IT, PT, SI and the rest of EEA have funding ratios between 100% and 110%. Only the NL have a funding ratio just below 100%. The dominance of NL's results in the stress test sample explains the relative low coverage at aggregate level.

IORPs participating in the DB/hybrid part of the stress test may – besides DB and/or (part of) hybrid schemes – also provide pure DC schemes¹⁵. IORPs in ES have sizeable assets for pure DC schemes and corresponding pure DC liabilities, making up about half of the balance sheet total. The DB/hybrid schemes provided by IORPs from ES are mostly reinsured with insurance undertakings.

¹⁴ See EIOPA: Opinion to EU Institutions on a Common Framework for Risk Assessment and Transparency for IORPs, EIOPA-BoS-16/075, 14 April 2016, https://eiopa.europa.eu/Publications/Opinions/EIOPA-BoS-16-075-Opinion_to_EU_Institutions_Common_Framework_IORPs.pdf

¹⁵ IORPs only providing pure DC schemes are not within the scope of the DB/hybrid part of the stress test but included in the DC part.

Figure 2.1: Assets (A) and liabilities (L) on the national balance sheet in baseline scenario by country, % liabilities¹⁶



The values of liabilities, and to some extent of assets, on the national balance sheet are not comparable between countries due to different valuation standards. The IORP Directive does not contain requirements on the valuation of assets, only high-level principles on the valuation of technical provisions. Discount rates have to be determined by taking into account the market yields of high-quality or government bonds, the yield on IORPs' projected future investment returns or a combination of both. Member States may supplement these principles by specifying more detailed valuation requirements in national prudential regulation.

In many countries IORPs report the market (or marked-to-market) values of assets on their national balance sheets. Exceptions are, for example, Pensionskassen in DE, part of IORPs in IT and IORPs in FI and SI, where (part of) the assets are reported using measurement approaches like historical values, acquisition costs or amortised costs.

National valuation standards for technical provisions are more heterogeneous, especially due to differences in the nationally applicable discount rates. About half of the IORPs included in the sample use a fixed discount rate, especially in DE, ES, FI, IE, NO, SI and the rest of EEA (figure 2.2).¹⁷ About a quarter of the IORPs in the sample employ an expected return on assets, most notably in BE and IT. The expected return on assets can either be determined as a long-term estimate or as a risk-free rate plus a risk premium relating to market yields. In DK, the NL and SE IORPs have to use a risk-free interest rate curve based on a so-called ultimate forward rate (UFR) approach.¹⁸ IORPs in PT valued technical provisions on the national balance sheet with a high-quality bond yield.

The heterogeneity in discount rate conventions results in substantial differences in discount rates between and sometimes within countries. The average national discount rate for all IORPs amounts to 1.7%, representing a mark-up of 0.5% over the risk-free

¹⁶ The 'other assets' category in IT includes sponsor support.

¹⁷ The discount rates for IORPs in NO and the majority of IORPs in DE (Pensionskassen) depend on the starting date/year of pension contracts/schemes, mostly because they are equal to or based on the agreed interest rate. In IE the discount rate depends on whether technical provisions relate to active/deferred members or retired persons. In SI the technical provisions are calculated as the accumulated value of paid contributions, which should not be smaller than the value calculated using the guaranteed interest rate.

¹⁸ This means that risk-free rates with maturities beyond the last liquid point are derived under the assumption that forward rates converge towards the UFR.

rate, which consequently leads to a lower value of liabilities when compared to a mark-to-market approach (figure 2.3).

Figure 2.2: Type of discount rate used to establish technical provisions by country, % respondents



Figure 2.3: National discount rate by country, liability weighted average, %¹⁹



Surplus over funding requirement

National prudential regulations in Europe do not only feature a variety of valuation standards but also differences in funding requirements and corresponding supervisory responses across and within countries. The IORP Directive stipulates that IORPs should have sufficient assets to cover technical provisions. IORPs that underwrite the risk of providing DB/hybrid schemes themselves, but the sponsor, are subject to the regulatory own funds requirement in Art. 15(1) of the IORP Directive, representing over 4% of technical provisions. However, Art. 15(3) of the IORP Directive allows Member States to specify additional buffer requirements through national prudential regulation.

All IORPs in DK, the NL, NO, SE and SI are subject to the Art. 15(1) regulatory own funds requirement, yet not any IORPs from BE, DE, ES, FI, IE and PT. In IT some IORPs have to meet this regulatory own funds requirement and some IORPs do not, depending

¹⁹ The discount rates illustrated in chart 2.3 should not be used for direct comparison between countries and must be seen in the context of the entire national supervisory framework.

on the strength and availability of sponsor support. In BE, DE, ES, IE and NL, some or all IORPs have to comply with additional national buffer requirements in line with Art. 15(3).

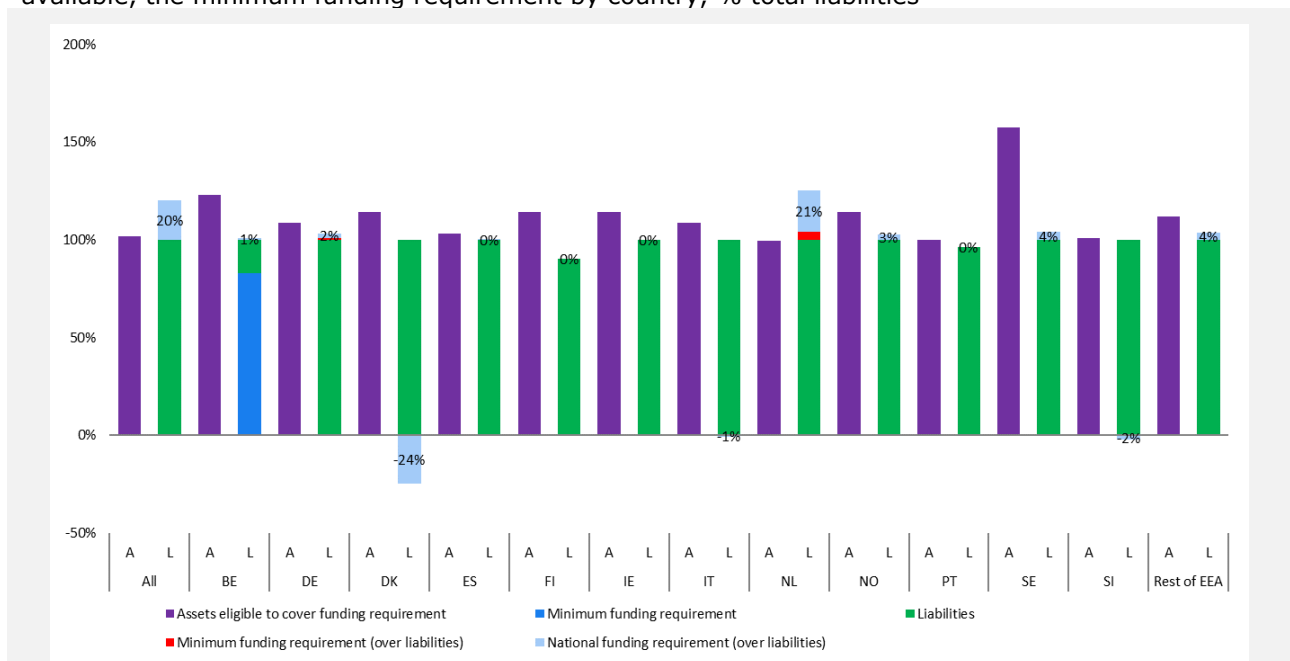
The aggregate funding requirement over liabilities amounts to 20% of the total liabilities (figure 2.4). Since eligible assets to cover the funding requirement amount to 102% of liabilities, IORPs carry a shortfall of 18% of liabilities in aggregate. IORPs in all countries, except for NL, have in aggregate sufficient eligible assets to cover the funding requirement. Most IORPs in the NL are subject to a recovery plan.

IORPs in three Member States reported a minimum funding requirement (figure 2.4). The minimum funding requirement in BE is related to the so-called short-term technical provisions, which amount to around 80% of the long-term technical provisions. NL imposes the regulatory own funds requirement from Art 15(1) of the IORP Directive as a minimum funding requirement. IORPs in BE and DE have a surplus of respectively 1% and 2% of liabilities, while IORPs in the NL have a shortfall of 21% of liabilities relative to the required funding ratio.

For PT the liabilities presented in figure 2.4 correspond to the national funding requirement, which is lower than the value of liabilities presented on the national balance sheet. In PT, depending on the applicable funding rules, the difference is due to the use of different assumptions or to the definition of the minimum level of liabilities that needs to be funded (e.g. in the case of IORPs from the banking sector, 100% of the present expected value of pensions in payment and 95% of the present expected value of liabilities related to past service).

National funding requirements over liabilities are calculated as: $\frac{\text{National funding requirement (higher or unique)} - \text{Total liabilities}}{\text{Total liabilities}}$, so that the reserves and capital in DK IORPs are shown with a negative sign over the national funding requirement (of zero percent) over liabilities.

Figure 2.4: Total assets, total liabilities, national funding requirement (over total liabilities) and, where available, the minimum funding requirement by country, % total liabilities



Common methodology

The common balance sheet provides a more comparable view of the financial situation of IORPs in the EEA than the national balance sheets. However, it should be highlighted that the common balance sheet is not in place for European IORPs and national funding requirements are not based on it.

Both sides of the common balance sheet are valued on a market-consistent basis and include all available security and benefit adjustment mechanisms, such as sponsor support, pension protection schemes, conditional and discretionary benefits as well as benefit reductions. This provides a consistent and transparent view of IORPs' pension obligations.

With regard to investment assets, IORPs had to apply a look-through approach to investments funds and other indirect exposures when assessing the impact of the shocks included in the stress scenario and report the results accordingly.

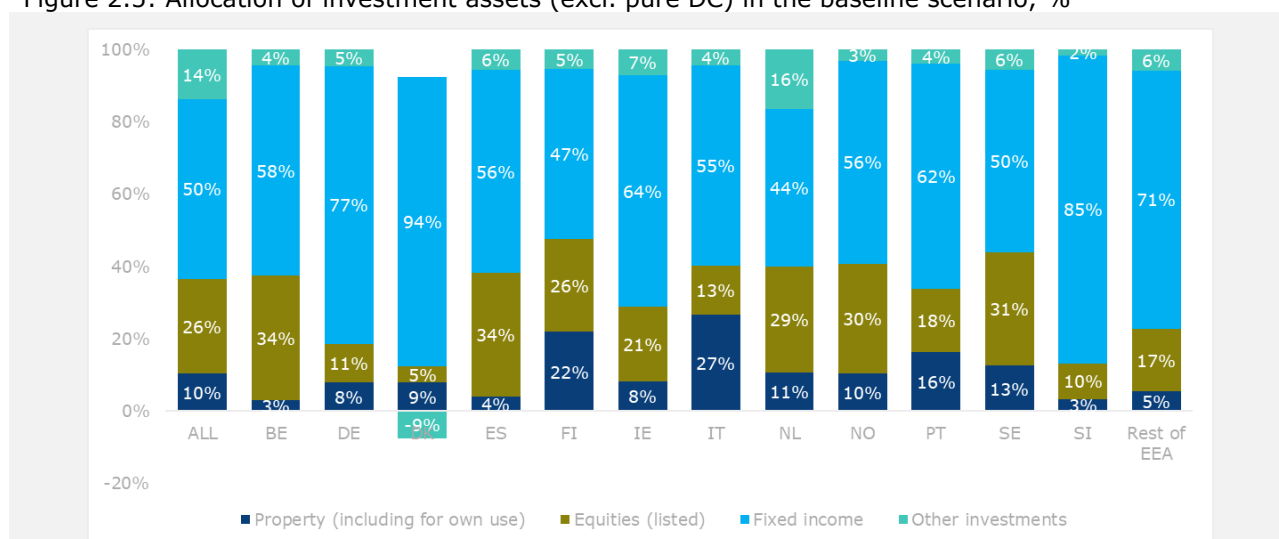
The aggregate value of investment assets (excluding pure DC) of the participating IORPs at the end of 2018 amounted to EUR 1,061 bn. Figure 2.5 illustrates the allocation of investment assets for the whole sample and per country. On average, half of the investment assets are allocated to fixed income assets, 45% of which comprised of EEA government bonds (figure 2.7). At the country level, the share of fixed income ranges from 44% in NL to 94% in DK.

BE and ES have the highest exposure to equities (listed), in both cases equal to 34%. On the other hand, in DK this category represents only 5% of the total investment assets. According to figure 2.6, 41% of the exposure to equities refers to the US, while the allocation to EEA represents 24% of this category.

Property investments are more significant in IT and FI, with weights of 27% and 22%, respectively. On average, this category represents 10% of the total investment assets, 75% of which relates to REITs (figure 2.8).

At the aggregate sample level, the remaining 14% is allocated to other investments, including mainly equities (non-listed) (38%), derivatives²⁰ (23%) and hedge funds (17%) (figure 2.9). In aggregate, DK reported negative values in other assets stemming from derivatives used for hedging.

Figure 2.5: Allocation of investment assets (excl. pure DC) in the baseline scenario, %



²⁰ Some IORPs reported derivatives within the underlying categories, for example options on shares would be reported in 'equities'.

Figure 2.6: Breakdown of listed equities by region

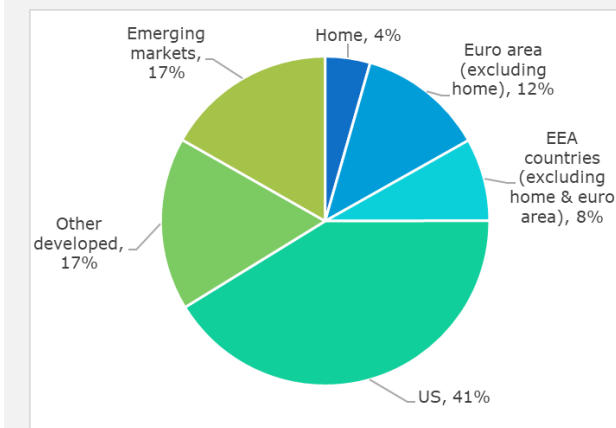


Figure 2.7: Breakdown of fixed income investments

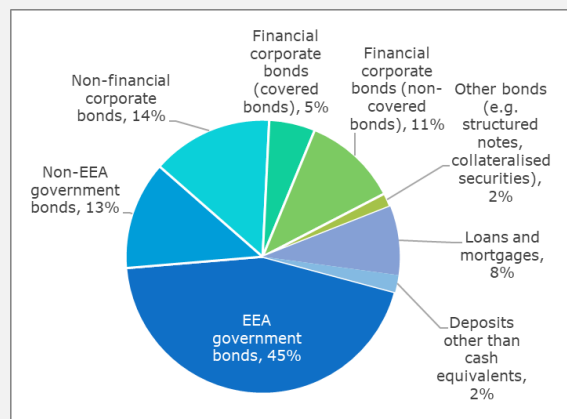


Figure 2.8: Breakdown of property investments

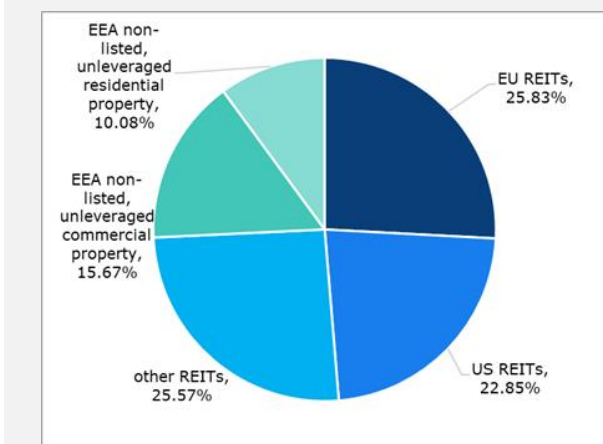


Figure 2.9: Breakdown of other investments

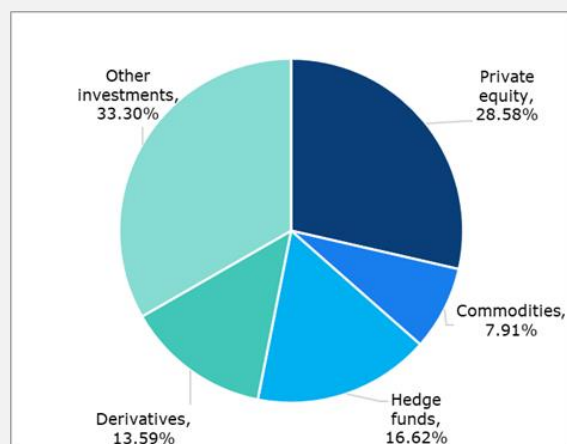


Figure 2.10 presents the overall picture of the common balance sheet in the various countries: On average, investment assets (excluding pure DC) cover almost the entire amount of liabilities (98%) but different realities can be observed at individual country level. In BE, DK, NL, NO and SE, the value of investment assets exceeds the amount of liabilities, especially in SE, where it represents around 160% of the liabilities. In FI and SI, the sum of investment and other assets, mainly in the form of cash and cash equivalents, slightly exceeds the value of liabilities.

The common balance sheet allows the recognition of the value of sponsor support and pension protection schemes on the asset side. Sponsor support was considered in all countries except for DK, NO, SE and SI. While in BE, DE, ES, FI, IT and PT only legally enforceable sponsor support was reported, in IE and the rest of EEA both legally and non-legally enforceable sponsor support were considered, although in IE the latter type is the most representative, corresponding to about 11% of the liabilities. In NL only non-legally enforceable sponsor support was included, but it represents a very small proportion of liabilities. The countries with the strongest reliance on legally enforceable sponsor support are DE, PT and the rest of EEA, with weights of 11%, 9% and 7% of the liabilities, respectively. Recoverables from (re)insurance are particularly significant in ES, covering around 45% of the liabilities.

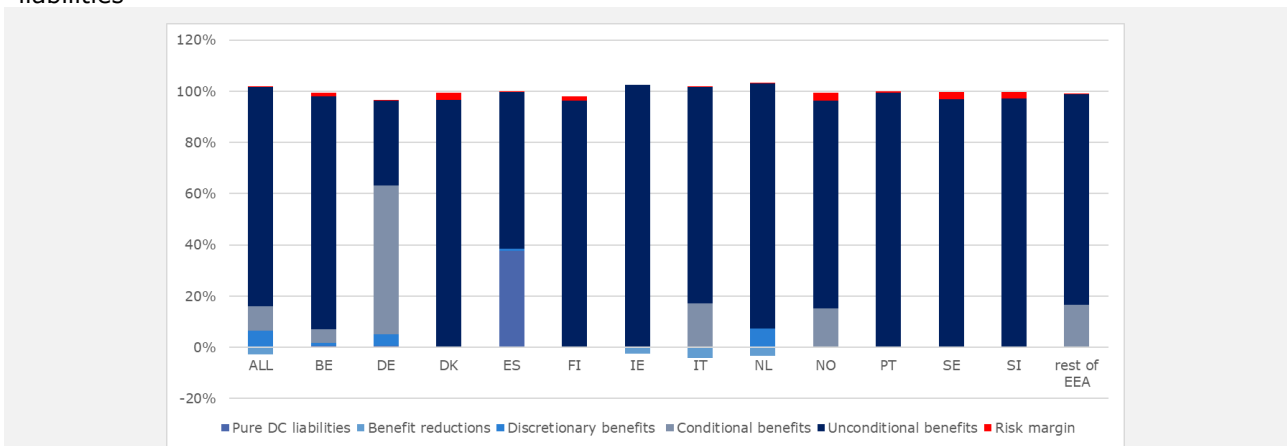
Figure 2.10: Assets (A) and liabilities (L) on the common balance sheet in the baseline scenario by country, % liabilities



On the liability side, unconditional benefits are, at aggregated level, the largest component, corresponding to 85% of the liabilities. In addition, the common balance sheet foresees the valuation of conditional and discretionary benefits as well as benefit reductions, where applicable. In the common balance sheet, IORPs had to apply the risk-free discount rates in the calculation of liabilities.

Participating IORPs in PT only considered unconditional benefits. Conditional benefits represent more than half of the liabilities in DE and more than 15% of the liabilities in IT, NO and the rest of EEA. Discretionary benefits were included in BE, DE, ES, IE and NL, being most significant in NL (7% of the liabilities) and DE (5% of the liabilities). In ES, 38% of the liabilities relate to pure DC arrangements. Benefit reductions were recognised in IE, IT and NL, with a weight of 3% to 4% of the liabilities.

Figure 2.11: Technical provisions on the common balance sheet in the baseline scenario by country, % liabilities



Note: The category "benefit reductions" includes ex post benefit reductions and benefit reductions in case of sponsor default. Ex-ante benefit reductions are part of conditional benefits.

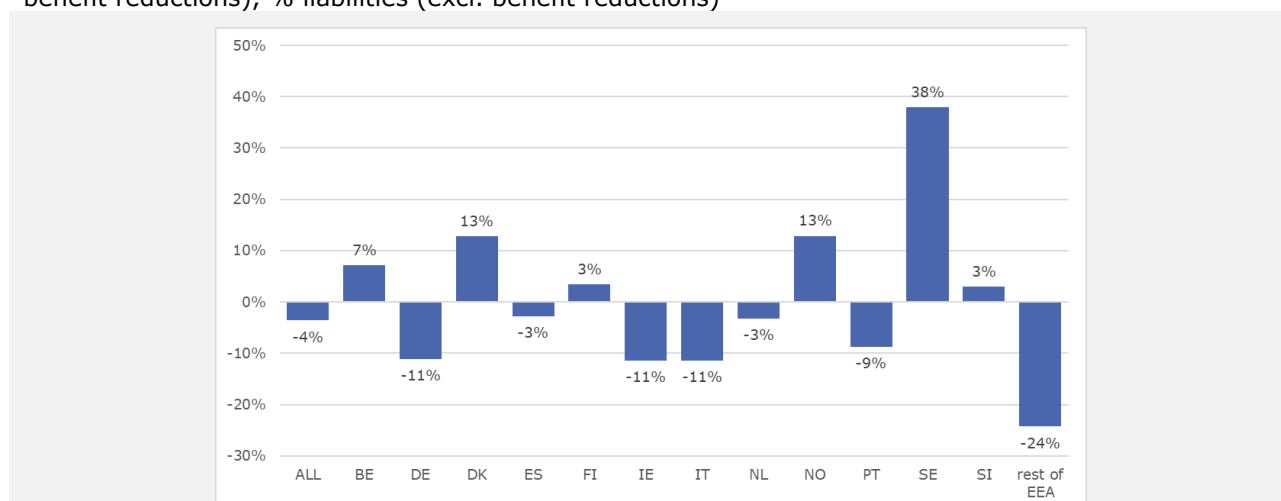
The value of unconditional benefits on the common balance sheet is, on average, 2% smaller than the value of technical provisions on the national balance sheets due to the observations in NL, NO, SE and the rest of EEA. On the other hand, in the remaining countries, the value of unconditional benefits on the common balance sheet is, in most cases, substantially higher than the value of technical provisions on the national balance sheets. This is partly due to the fact that the risk-free discount rate on the common balance sheet (combined with a relative high duration of the liabilities) is lower than the discount rate used for most national balance sheets.

The excess of assets over liabilities (EAL) on the common balance sheet is, by construction, non-negative. Any shortfall between financial assets and liabilities (excl. benefit reductions) needs to be covered by sponsor support, pension protection schemes and/or benefit reductions. If available security and benefit adjustment mechanisms are insufficient to solve a possible deficit on the balance sheet, it is assumed that the assets and liabilities are balanced by including a value for ex post benefit reductions²¹.

The EAL excluding sponsor support, pension protection schemes and benefit reductions can be used as a measure of the current value of these mechanisms that would be required to absorb a possible deficit on the common balance sheet.

While in figure 2.12 a positive EAL can be observed for all countries, albeit different magnitudes, after excluding sponsor support, pension protection schemes and benefit reductions, the common balance sheet shows, on average, a shortfall of 4% of the liabilities. Nevertheless, it should be noted that, at individual country level, the EAL without these mechanisms ranges from a deficit of 24% of the liabilities in the rest of EEA to a surplus of 38% of the liabilities in SE.

Figure 2.12: Excess of assets over liabilities (excl. sponsor support, pension protection schemes and benefit reductions), % liabilities (excl. benefit reductions)



Note: Assets include all assets on the common balance sheet except sponsor support and pension protection schemes and liabilities include all liabilities, including conditional and discretionary benefits, except benefit reductions.

2.1.1.2. Adverse market scenario: national and common methodologies

The adverse market scenario impacts both the investments and the measurement of IORPs' pension liabilities. For the DB/HY IORPs in the sample the shock would wipe off 249bn in their asset market values (23% of the total investment assets) in aggregate, which represents 2.1% of the 2018 GDP of the countries participating in the stress test.

In aggregate, the adverse market scenario has a 'positive' impact on the IORPs' pension obligations, i.e. the pension liabilities decrease due to the short-term increase in discount rates. The extent of this decrease depends on the valuation method applied.

²¹ See paragraph 1.1.7. of EIOPA, Annex to IORP Stress Test 2019 Specifications – Technical Specifications Common Balance Sheet, EIOPA-BoS-19/135, 29/03/2019.

		National methodologies (EEA aggregate figures in Euros)	Common methodology (EEA aggregate figures in Euros)	%-difference
baseline	Investment assets	1,049bn	1,061bn	+1.2%
	Technical provisions	1,028bn	1,071bn	+4.1%
	Excess or shortfall	21bn	-10bn	
adverse scenario	Investment assets	815bn	812bn	-0.3%
	Technical provisions	994bn	860bn	-13.5%
	Excess or shortfall	-179bn	-48bn	

National methodologies

The adverse market scenario leads to a decline of the aggregate national funding ratio from 102% to 82% of liabilities (figure 2.13). This corresponds to a fall in the excess of assets over liabilities from +2% to -18% of liabilities or from EUR +21bn to EUR -179 bn.

Figure 2.13: Funding ratio in baseline and adverse market scenario, % liabilities

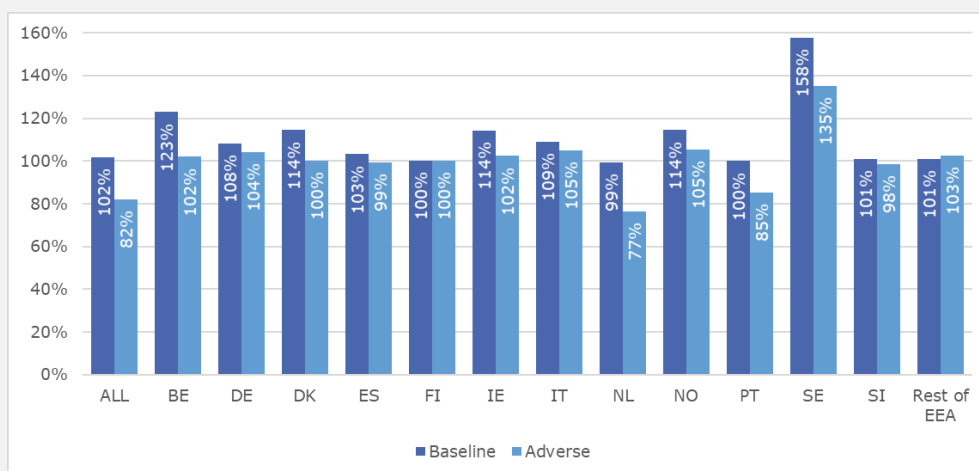
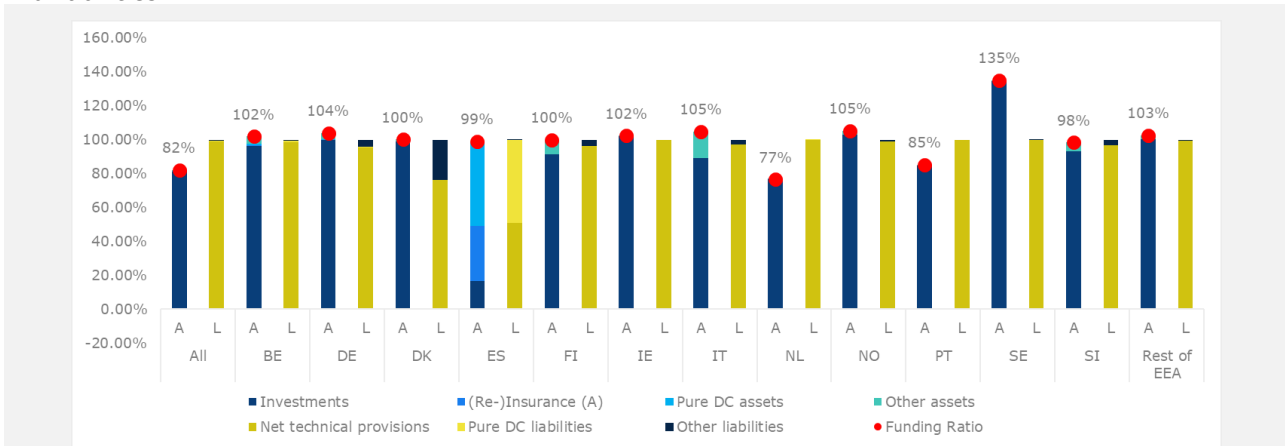


Figure 2.14: Assets (A) and liabilities (L) on the national balance sheet in adverse scenario by country, % liabilities

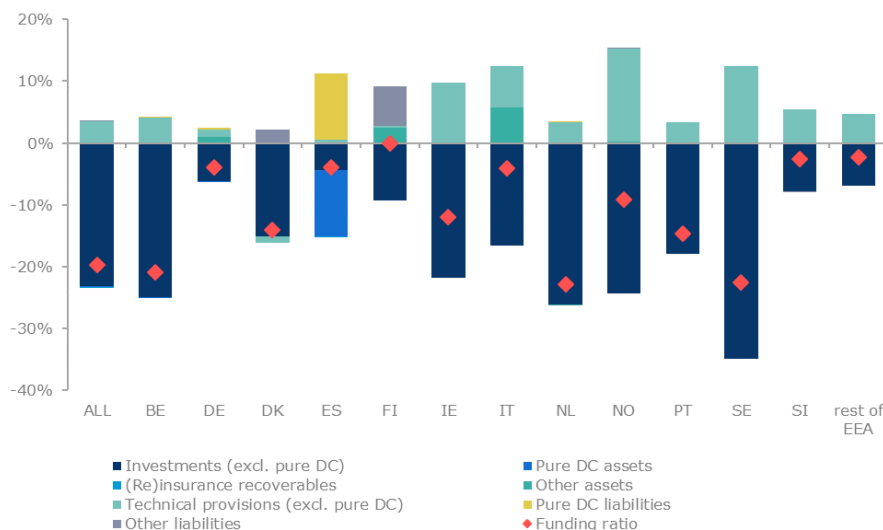


Only in SE - where IORPs have substantial buffers to absorb the negative impact of the stress, on an aggregated level – the IORPs can maintain a comfortable buffer following the adverse scenario. The positive excess of assets over liabilities turns into a shortfall mainly in NL and PT. As NL IORPs already experience aggregate funding ratios below 100% in the baseline scenario, these funding ratios further deteriorate in the adverse market scenario to the lowest coverage ratio. The other countries scratch the 100% funding ratio.

The fall in the aggregate funding ratio by 20%-point in aggregate is explained by a fall in the value of investments, partially offset by a decrease of the liabilities (figure 2.14). There is a clear relationship between the risk exposure to fixed income assets and the impact on investment assets. The impact is relatively low in countries with high aggregate exposures to bonds and loans (DE, DK, SI, Rest of EEA) and relatively high impact in countries with low fixed income exposures (BE, NO, SE). IORPs in NL have the lowest allocations to fixed income assets, but experience an average impact on investment assets. This is due to the substantial gains on derivative hedging positions, such as interest rate swaps. IORPs in FI have the second lowest exposure to fixed income assets while the effect on investments is relatively benign. IORPs in FI (partly) recognise book values on the national balance which reduces the impact of the adverse scenario compared to full market valuation. Similarly, the absence of full market valuation of assets on the national balance sheet in DE, IT and SI mitigates the effect on investments i.e. the valuation of the assets does not react to short-term impairment, so that the effect of the shock is not shown.

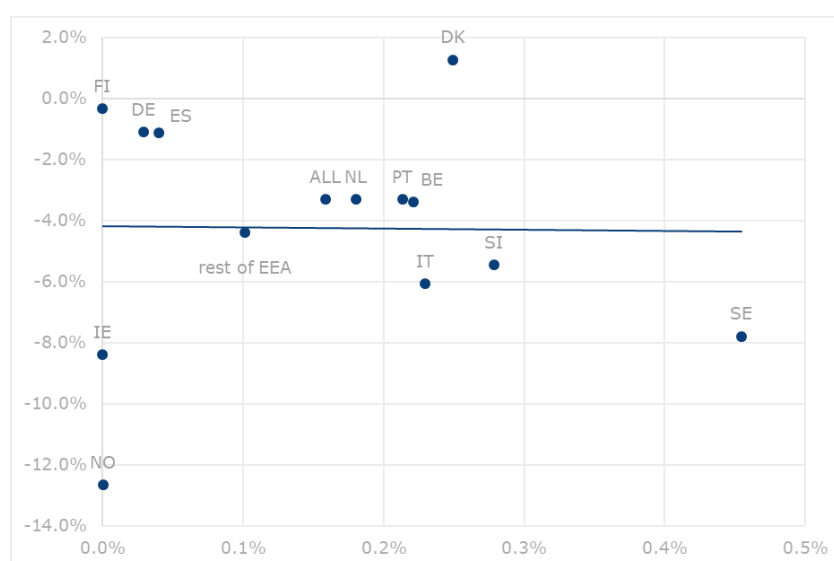
The negative impact of lower investment assets on the aggregate funding ratio in IT is - besides the decrease in liabilities – compensated to a substantial degree by the rise in other assets, containing the value of sponsor support on the national balance sheet.

Figure 2.15: Decomposition impact adverse market scenario on funding ratio, %-points



The impact of the adverse scenario on the national technical provisions depends to a large extent on how the scenario affects national discount rates: In DE, ES, FI, IE, NO and Rest of EEA, IORPs establish technical provisions using mainly fixed discount rates which do not change as a result of the adverse scenario. In these countries, national technical provisions remain more or less the same with IE and NO being notable exceptions (figure 2.16). In NO, technical provisions also contain conditional benefits which are adjusted downwards in response to the adverse scenario. In the other countries, the upwards risk-free rate stress results in a rise of the national discount rate. This is the case in DK, NL, PT and SE, where IORPs use risk-free rates or yields on high-quality bonds but also in BE and IT, where long-term expected returns/fixed discount rates have been adjusted upwards. The decrease in technical provisions ranges from -12% to an increase by +1.3%. For SI we observe a limited impact as about one third of the IORPs uses an expected return and two thirds a fixed discount rate.

Figure 2.16: Impact adverse market scenario on technical provisions (vertical axis, %) compared to change in national discount rate (horizontal axis, %-points)

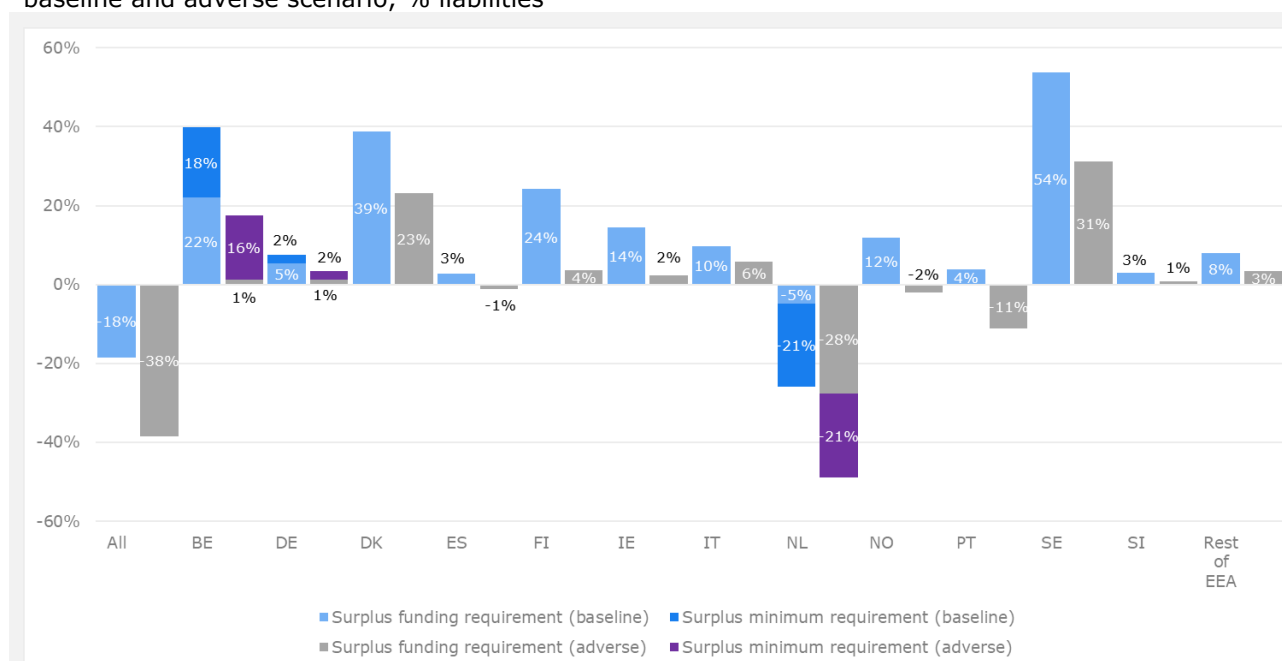


Surplus over funding requirement

The aggregate shortfall relative to the funding requirement at European level increases from 18% to 38% of liabilities following the adverse scenario (figure 2.17), driven by the NL results. In aggregate, IORPs in most countries continue to comply with the national funding requirement, whereas the surpluses would be marginal in the adverse scenario. Only in a few countries, the baseline surpluses reverse to a minor (NO) or more substantial (PT) aggregate deficit. The shortfalls in the NL in the baseline scenario further deteriorate in the adverse market scenario.

In BE, the aggregate surplus relative to the minimum funding requirement (16% of liabilities) is substantially higher than the surplus over the funding requirement (1% of liabilities) under the adverse scenario, while in NL the shortfall is considerably smaller (-21% versus -28% of liabilities) in the adverse scenario.

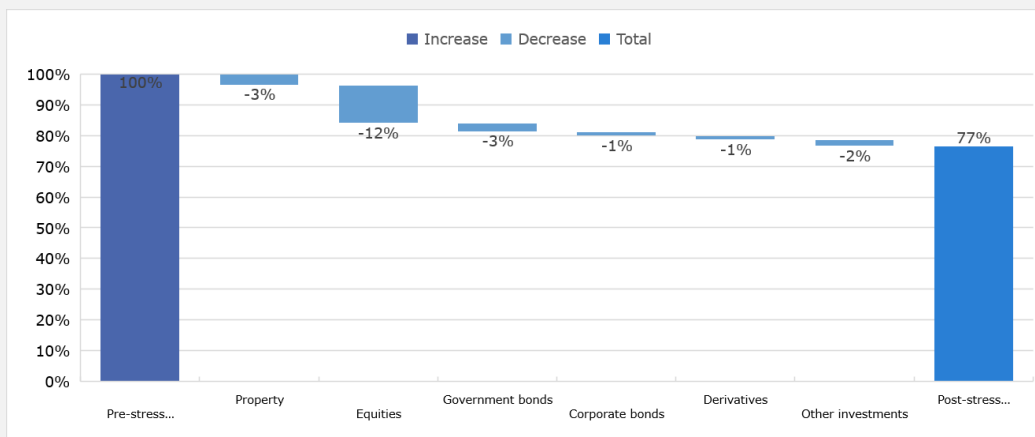
Figure 2.17: Surplus over funding requirement and, where available, minimum funding requirement in baseline and adverse scenario, % liabilities



Common methodology

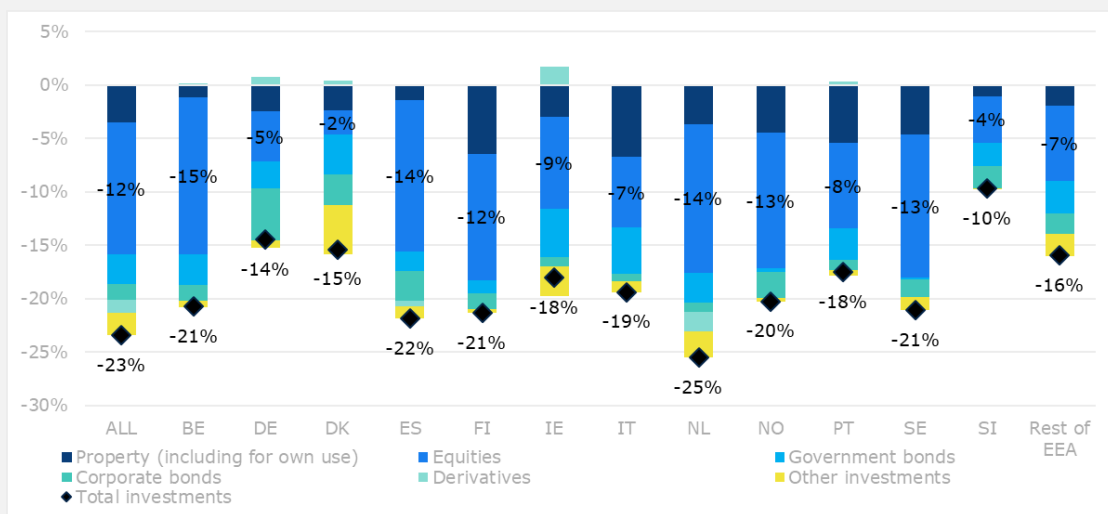
At the European level, the adverse market scenario leads to a fall of 23% in the value of investment assets (excl. pure DC), in absolute terms of approximately 249 bn. The main drivers of this negative impact are equities (12%-point) as well as property and government bonds (each 3%-point).

Figure 2.18: Impact of the adverse market scenario on investment assets (excl. pure DC), pre-stress value = 100%



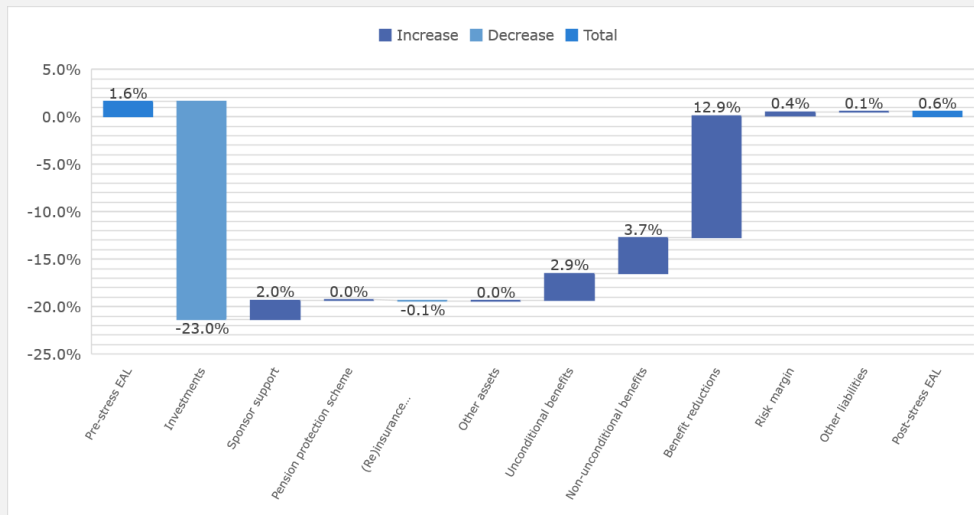
The decrease of investment assets (excluding pure DC) in the adverse market scenario ranges from 10% in SI to 26% in NL. As can be observed in figure 2.19, these are respectively the countries that have the highest and the lowest share of fixed income (85% in SI and 44% in NL).

Figure 2.19: Impact of the adverse market scenario on investment assets (excl. pure DC) by country, %



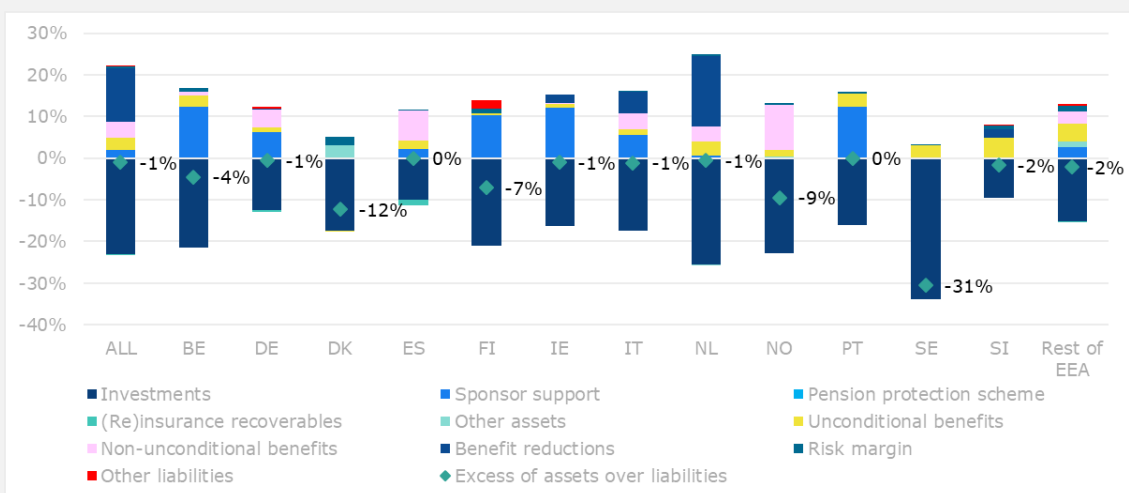
On the liability side, the application of the adverse market scenario, which tests an increase in the risk-free discount rates, reduces unconditional benefits by 3% on average. In aggregate terms, the pre-stress EAL and the post-stress EAL both are slightly positive. Indeed, taking into account that deficits should always be balanced within the common balance sheet, only aggregate surpluses are technically possible. Figure 2.20 shows the decomposition of the effect of the adverse market scenario on EAL.

Figure 2.20: Impact adverse market scenario on items common balance sheet, % liabilities baseline



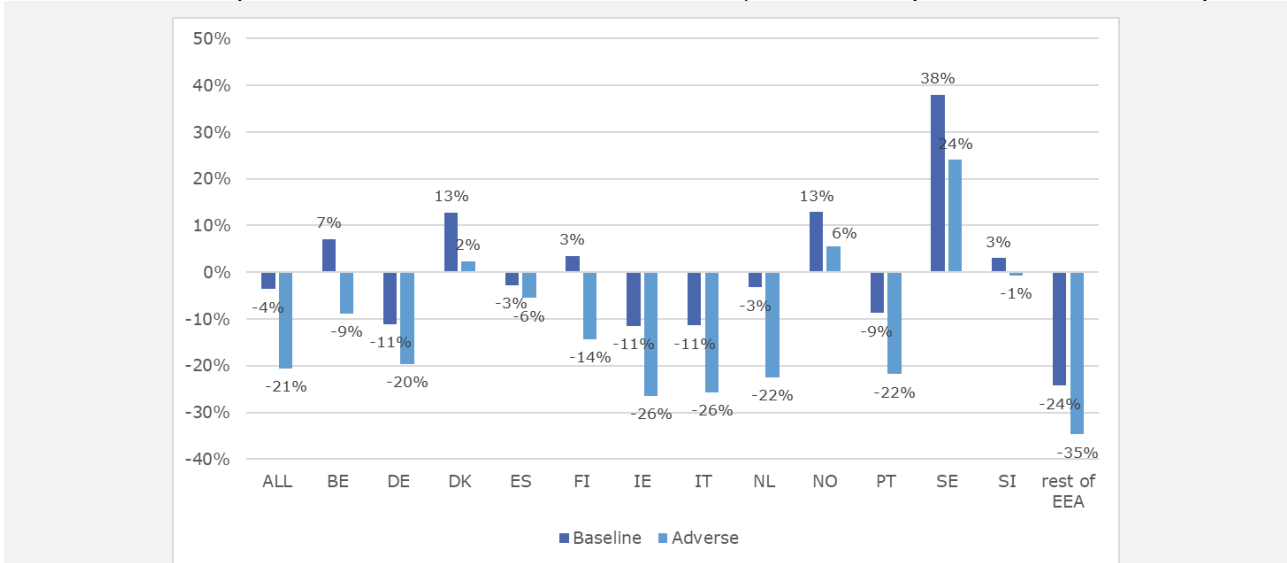
The way IORPs absorb the negative impact of the adverse market scenario differs considerably across countries (figure 2.21). With the exception of DK, SE and SI, there is an increase in the value of sponsor support; especially in BE, IE and PT, where the variation represents 12% of the liabilities (baseline), in comparison to an average of 2%. For those countries where IORPs have considered non-unconditional benefits, the decrease is, on average, equal to 4% of the liabilities (baseline), but in NO this variation achieved 11%. Benefit reductions play a more relevant role in NL, with additional reductions of 17% of the liabilities (baseline), but also have visible effects in IE, IT and SI.

Figure 2.21: Impact of the adverse market scenario on the common balance sheet items by country, % liabilities baseline



The aggregate results in the baseline scenario show a shortfall of 4% of the liabilities for the EAL excluding sponsor support, pension protection schemes and benefit reductions. In the adverse market scenario, this gap deteriorates to 21% of the liabilities. While DE, ES, IE, IT, NL, PT and the rest of EEA show a negative EAL excluding sponsor support, pension protection schemes and benefit reductions in both scenarios, in BE, FI and SI the sample of participating IORPs are able to cover the value of liabilities without security mechanisms and benefit reductions in the baseline scenario but not in the adverse market scenario. DK, NO and SE are the only countries that remain with a positive EAL in the adverse market scenario.

Figure 2.22: Excess of assets over liabilities (excl. sponsor support, pension protection schemes and benefit reductions) in baseline and adverse market scenario, % liabilities (excl. benefit reductions)



Note: Assets include all assets on the common balance sheet except sponsor support and pension protection schemes and liabilities include all liabilities, including conditional and discretionary benefits, except benefit reductions.

2.1.1.3. Impact on sponsors

The stress test exercise explicitly covered the overall impact of the adverse market scenario on both members or beneficiaries of IORPs and the IORPs' sponsors. When IORPs cannot cover for their pension obligation, they – based on the applicable framework – can either reduce the initial promises, by cutting the benefits, which impacts on the members' pension outcomes or they can – or have to – require additional funding from the sponsor, which – depending on the size of the shortfall – may significantly impact the financial situation of the sponsor.

In order to understand potential implications of a stress on DB IORPs on their sponsors, EIOPA surveyed the types and the individual financial situation of the sponsor. The business sectors of the IORPs' sponsors are quite diverse and would not necessarily indicate a specific concentration risk of the corresponding sectors. The business sectors of the IORPs' sponsors are quite diverse. A significant part of the DB IORPs have just one sponsor, while, in the majority of cases, the shortfalls would be covered by a number of sponsoring undertakings – up to more than 10,000 sponsors. A significant part of the DB IORPs in the sample have just one sponsor, so that the financing needs may directly impact that one sponsor, however, the direct implications for individual entities sponsoring an IORP is relatively difficult to assess.

Figure 2.23: Business sectors of the sponsors in the sample

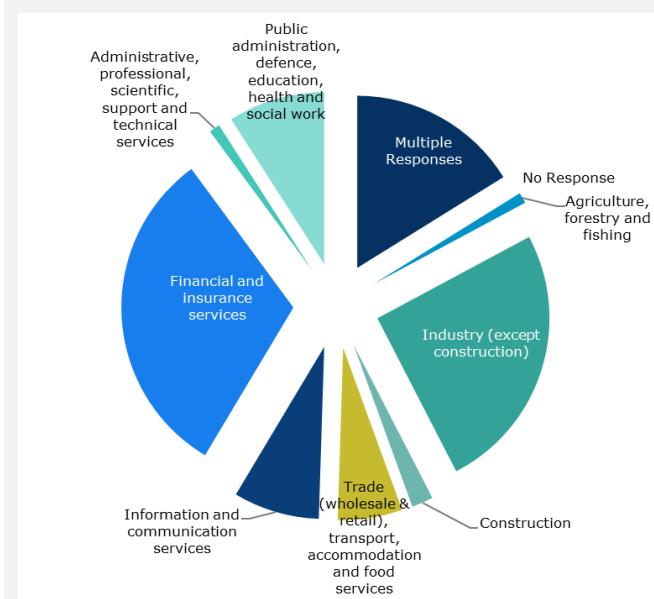
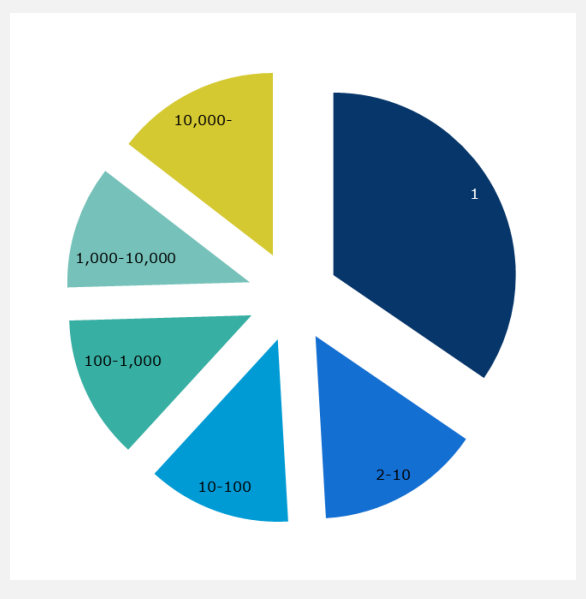


Figure 2.24: Number of sponsors of IORPs in the sample



This can be shown in the quantitative analysis based on the surveyed financial information of the sponsoring undertakings. Whereas in total of the sponsoring undertakings the observed impact of the adverse market scenario on the IORP is relatively low (median 2% of negative impact on the sponsor’s market value), the potential impact on sponsors outside the financial sector is widely dispersed (from 60% of the sponsor’s market value in the baseline and up to 100% in the adverse scenario).

Figure 2.25: Distribution of sponsor support in the baseline and adverse market scenario in % of the market value of the sponsor - all sponsors: 0th, 25th, median, 75th and 90th percentiles

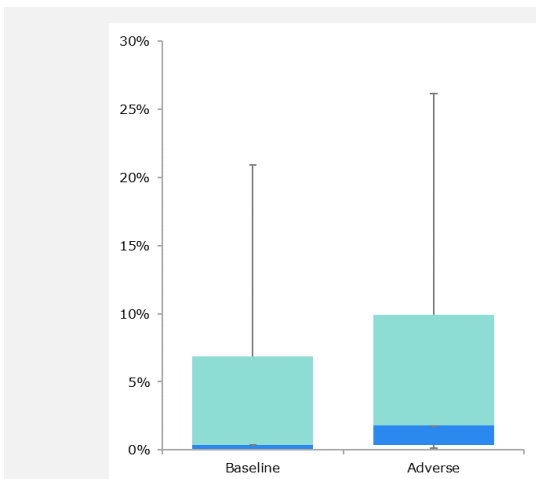
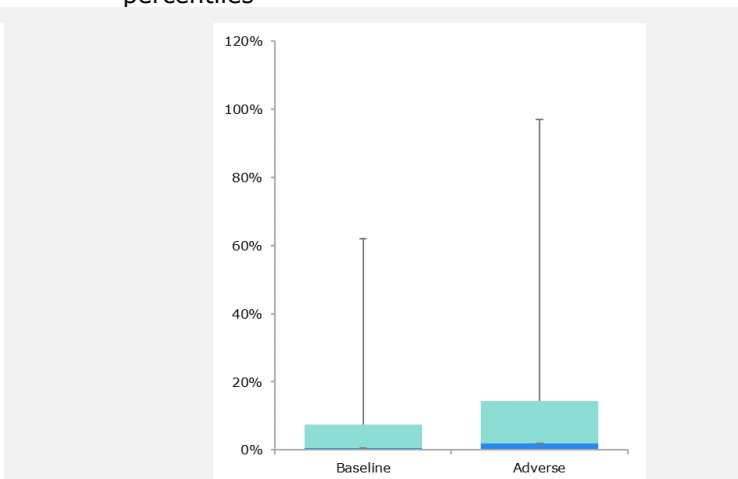


Figure 2.26: Distribution of sponsor support in the baseline and adverse market scenario in % of the market value of the sponsor - non-financial sponsors: 0th, 25th, median, 75th and 90th percentiles



2.1.2. Development over time – cash flow analysis

The reported shortfalls between assets and liabilities, which affect the values of sponsor support or benefit reductions, on the common balance sheet cannot provide information on the timing and allocation over time of these balance sheet items. To understand better the timing and extent of sponsor support and benefit reductions, the common balance sheet assessment is supplemented by a cash flow analysis. For the 2019 stress

test, that analysis was extended from the one used in the 2017 IORP stress test, which was limited to reflecting unconditional benefits.

For this exercise, IORPs were requested to project and report cash flows for sponsor support and benefit reductions in the baseline and adverse market scenario. To ensure comparability of the results, the cash flow projections were done consistently with the technical specifications for the common balance sheet and assumed risk-free investment returns in the baseline and adverse scenario. Cash flows for sponsor support and benefit reductions were determined by national funding requirements, valuation standards and recovery mechanisms.

In a second set of cash flow projections, the assumption of risk-free investment returns was replaced by a set of common, expected return and inflation assumptions in the baseline and adverse scenario.

For the baseline scenario the following return assumptions had to be used:

- The risk premiums on government and corporate bonds were based on EIOPA estimates for long-term average spreads minus the costs of default/downgrade (or fundamental spread).²² The risk premium on cash and deposits is assumed to be equal to zero.
- The expected return on non-fixed income assets is determined by the one-year forward rate in year t plus the risk premium. The risk premium on non-fixed income assets was assumed to be equal to 3%.

Standardised risk premiums	
<i>Fixed income risk premium over risk-free interest rate</i>	
Government bonds	28 bps
Corporate bonds (and other fixed-income excl. cash and deposits)	86 bps
- non-financial	56 bps
- financial	101 bps
<i>Non-fixed income risk premium over risk-free interest rate</i>	
Equities, property, alternatives and other non-fixed income	300 bps
<i>Cash and deposits risk premium over risk-free interest rate</i>	
Cash and deposits	0 bps

Those two sets of cash flow projections had to be done in a 'closed-modelling' setting, so that projections only consider pension accruals of current members and beneficiaries.

²² The spread data used for establishing the risk premium on government and corporate bonds can be found in the spreadsheet EIOPA-RFR_20181231_PD_COD in the zip-file Monthly Technical Information, December 2018 under the following link: <https://eiopa.europa.eu/regulation-supervision/insurance/solvency-ii-technical-information/risk-free-interest-rate-term-structures>

The long-term average spread for euro denominated government bonds (0.40%) is in cell L11 of the sheet [LTAS-Govts] assuming a 10-year maturity. The fundamental spread equals 30% of the long-term average spread, i.e. 0.12%, implying a risk premium of 0.28% (0.40% - 0.12%).

The long-term average spread for A-rated euro denominated financial corporate bonds (1.56%) is in cell G13 of the sheet [LTAS_Corps] and for A-rated euro denominated non-financial corporate bonds (0.86%) is in cell G20 assuming a 5-year maturity. The corresponding fundamental spreads for respectively financial and non-financial corporate bonds are in cells Y15 (0.55%) and Y55 (0.30%) of the [EUR] sheet, implying risk premiums for financial corporate bonds of 1.01% (1.56% - 0.55%) and non-financial corporate bonds of 0.56% (0.86% - 0.30%). Assuming that corporate bonds consists for 2/3 of financials and 1/3 of non-financials the overall risk premium amounts to 0.86% (= (2/3)x1.01% + (1/3)x0.56%).

Future contributions of current members were taken into account in line with the contract boundaries, i.e. unless the IORP or the sponsor have the unilateral right to stop the risks associated with those future contributions. In practice, this latter condition meant that most IORPs in most countries did not have to take into account future contributions or accruals.

On a voluntary basis, in a third set of cash flow projections, IORPs could replace the closed modelling approach by cash flow projections based on an open modelling approach, i.e. assuming additional, future members and accruals, both under risk-free and expected investment returns.

Whilst the assumptions and valuation inputs are quite different – ranging from prudently low assumptions on risk-free investment returns in the future over returning to relatively optimistic investment returns in the future and even adding expected additional contributions from assumed new members, the actual outcomes of the cash flow analyses – and corresponding take-aways – are remarkably similar: the impact of the shortfalls stemming from the adverse market scenario on sponsors will be significant in the first years after the shock, whilst the impact on members or beneficiaries in terms of benefit reductions will be more severe over a considerably longer timeframe.

The cash flow analysis shows the timing and size of adjustments over time: The cash flow analysis shows in how many years the shock of the adverse scenario is transmitted to the wider economy and the financial system via sponsor support or benefit reductions;

The cash flow analysis can reflect on another angle of the potential impact on financial stability, via the real economy:

- The comparison of cash flow shocks (related to benefit reductions and sponsor support separately) with relevant macro-economic aggregates (household disposable income, net operating profits in the business sector) provides a rough first indication of the risks posed to economic activity and, indirectly, financial stability
- Open modelling cash flow analysis can complement the comprehensive assessment of the impact on the real economy at European level, since smoothed adjustment may imply that (substantial parts of) new accruals will also be affected by the adverse scenario in some jurisdictions.
- As an illustration of a more comprehensive analysis of the impact of benefit reductions as a consequence of the adverse scenario on the wider economy, the impact has been implemented in the NL macro-econometric model Delfi (see Box 2).

The comparison of the cash flows based on expected returns with those based on risk free rates of returns, shows that in the baseline scenario benefit reductions are avoided and discretionary benefits are higher in the expected returns variant.

In the adverse scenario, the same comparison between expected returns cash flows and risk free cash flows shows that adjustments by means of benefit reductions and sponsor support are more limited in the expected returns variant, but in this variant the cash flows from discretionary benefits are being lowered. Overall, in terms of difference with respect to baseline, the expected returns cash flows display a larger impact of the adverse scenario. Hence, in terms of impact on the wider economy, the cash flow impact is larger in the expected returns variant.

There are evident differences in the impact of the adverse scenario on cash flow types, in particular regarding the time it takes for the shock of the adverse scenario to reach maximum impact. Sponsor support cash flows have their largest impact in the first year after the adverse scenario hits, and then taper off. The impact of the adverse scenario on benefit reduction cash flows, in contrast, takes some time to build up and reaches

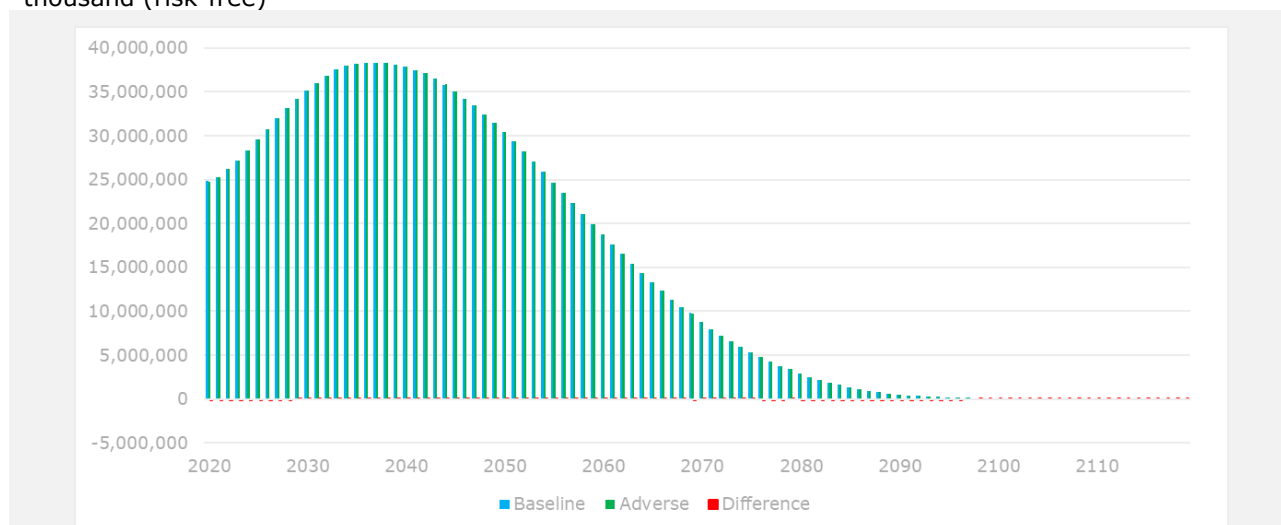
the highest percentages only after 10 to 15 years, when also the net cash flows reach their highest values, suggesting that it takes relatively long for adjustments to take place when benefit reductions are the key source.

2.1.2.1. Risk-free: baseline and adverse

Adverse shocks have a major impact on IORPs' balance sheets, but usually do not immediately or directly impact the wider economy and financial systems, as adjustments are usually allocated over time, as the 2017 EIOPA IORP Stress Test report concluded. The cash flow projections using a closed modelling approach and risk-free returns illustrate how the cash flows underlying the values on the common balance sheet are distributed over time in a scenario of risk-free investment returns.

Similarly to the 2017 exercise, IORPs had to report the net cash flows for unconditional benefits. The net cash outflows constitute the difference between on the one hand benefits and expenses and on the other hand contributions. IORPs were requested to provide projections consistent with specifications for the common balance sheet, but were allowed to use simplifications. The average deviation between the discounted value of projected cash flows and the value on the common balance sheet ranged from -3% for 'rest Europe' to +5% in Germany. The total net cash flows for unconditional benefits are more or less the same in the baseline and adverse scenario (see figure 2.27).

Figure 2.27: Net cash flows for unconditional benefits in baseline and adverse market scenario, EUR thousand (risk-free)



Supplementing the 2017 stress test exercise, IORPs were asked to estimate future cash flows for sponsor support and benefit reductions consistent with national funding standards and recovery mechanisms, based on the required set of risk-free returns on investment assets. Security mechanisms in the cash-flow analysis are derived from the national funding requirements, while the figures on the common balance sheet are derived from the risk free liabilities

In most countries, IORPs providing DB/hybrid schemes are covered by unlimited sponsor support, implying that future shortfalls relative to national funding requirements will have to be covered by additional sponsor contributions or payments. Sponsor support in the baseline scenario extends well into the current century, as the (risk-free) returns on assets are less favourable than the national discount rates applicable to liabilities. The adverse scenario has the biggest impact in the first three years following the instantaneous shock, but affects sponsor support for three decades.

In countries without or limited sponsor support, most notably NL and to a lesser extent IT, future deficits will result in benefit reductions over time. Benefit reductions in the baseline have consequences for many decades to come. The most important reason is that short term cuts of accrued pension rights will only gradually impact on pension benefits in payment with plan members reaching retirement. The effect of the adverse scenario on benefit reductions is relatively large compared to the effect on sponsor support, which needs to be seen in perspective that the highest shortfalls in total values in the sample would lead to benefit reductions according to the available protection mechanism.

Figure 2.28: Cash flow sponsor support (risk-free) – baseline and adverse scenario

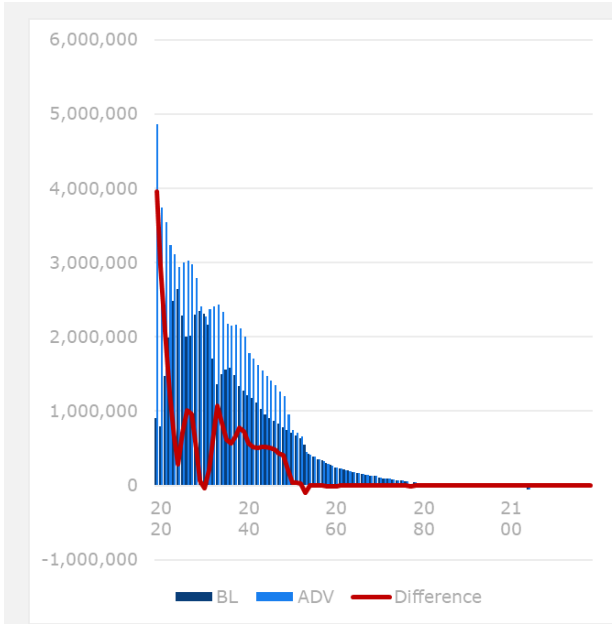
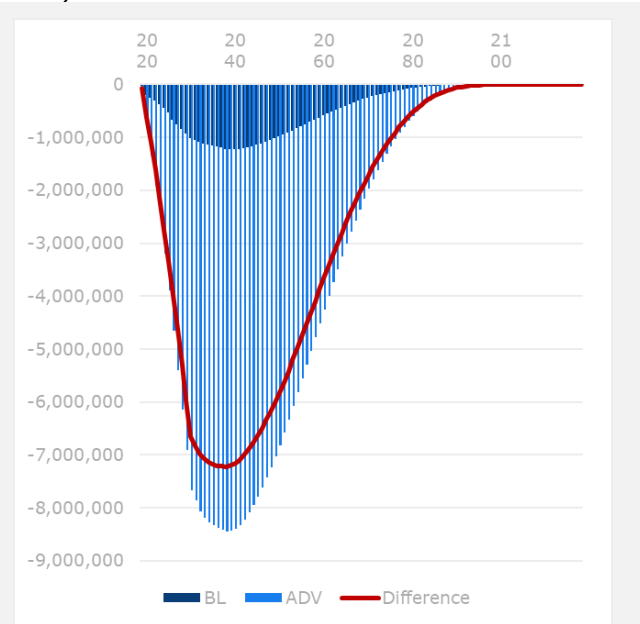


Figure 2.29: Cash flow benefit reductions (risk-free) – baseline and adverse scenario



2.1.2.2. Risk-adjusted/expected returns: baseline and adverse

IORPs were also requested to carry out cash flow projections assuming expected returns, instead of risk-free returns, on investment assets. IORPs with a higher proportion of non-fixed income assets (like equities and real estate) could assume higher risk premiums over the risk-free rates. Consequently, such IORPs would benefit from higher expected investment income, reducing the potential need for future sponsor support or benefit reductions. However, of course, higher exposures to market risk may lead to (further) financial losses in market downturn resulting in future sponsor support and/or benefit reductions.

Figure 2.30: Proportion of non-fixed income assets (vertical axis) and average implied risk premium during the first eighty years of the projection (horizontal axis)



Figure 2.31: Proportion of non-fixed income assets (vertical axis) and sensitivity to the adverse scenario in terms of EAL, excluding sponsor support and benefit reductions (horizontal axis)



Figure 2.32: Cash flow sponsor support (risk-adjusted) – baseline and adverse scenario

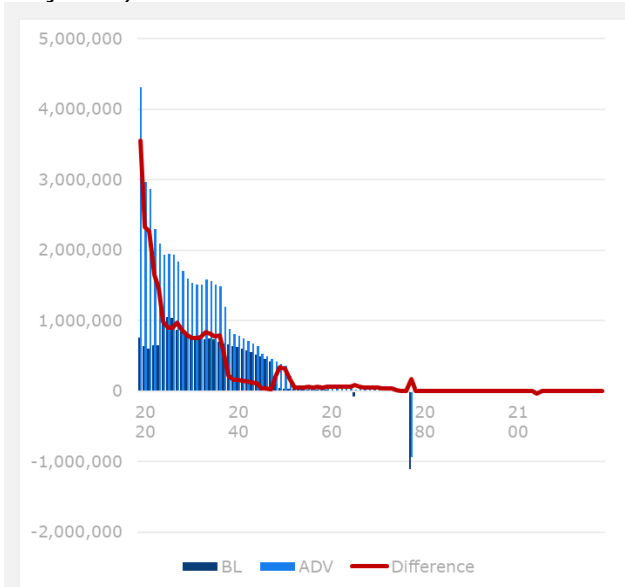
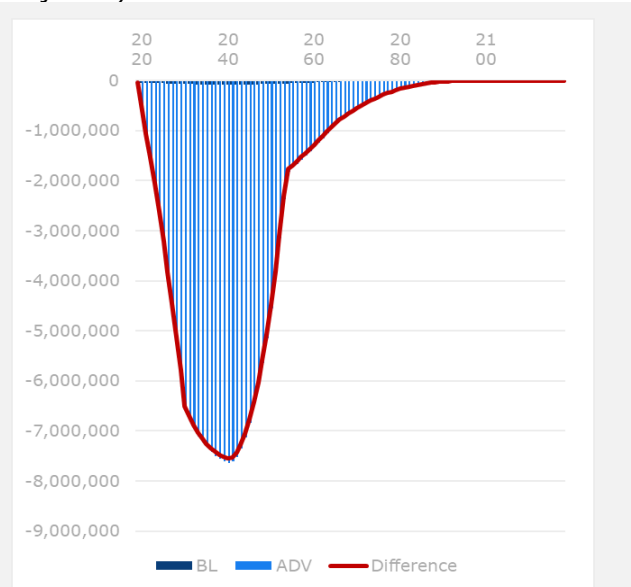


Figure 2.33: Cash flow benefit reductions (risk-adjusted) – baseline and adverse scenario



2.1.2.3. Open modelling

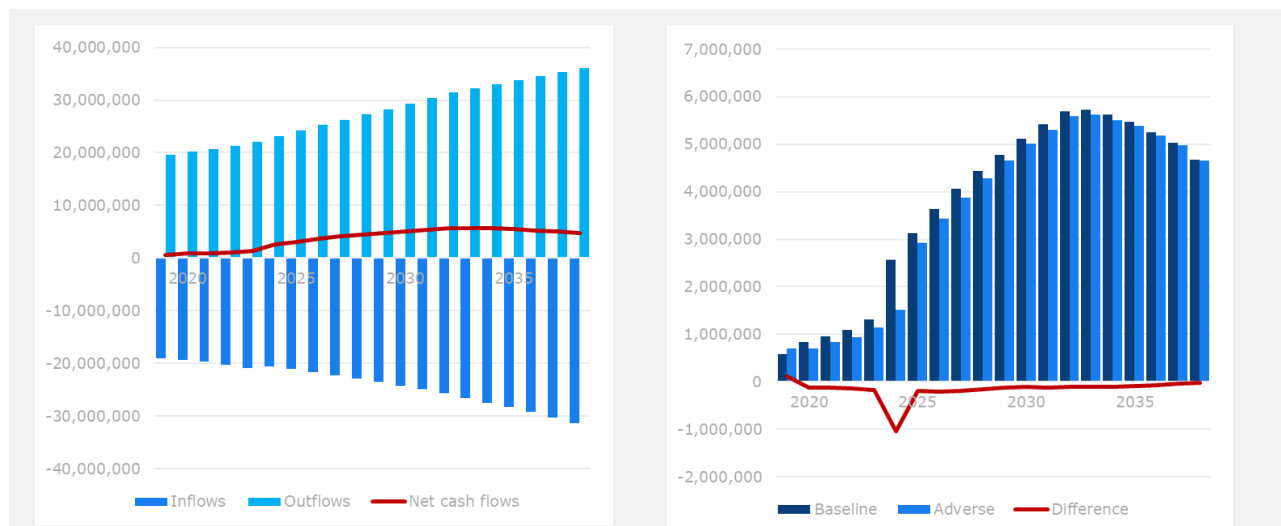
As a voluntary exercise, IORPs could provide cash flow projections using an 'open modelling approach' and so include future contributions and pension accruals of future members as well as, where this was not included in the 'closed modelling', the future contributions and pension accruals of current members. This additional analytical element was only used by a small fraction of the participating IORPs, mainly from the NL sector. As more than half of DB/hybrid schemes in the sample are closed to new members and/or new accruals means that the open modelling would not have had any effects on the projections. Due to the limited responses and to allow for an adequate representation of the observations, the results of the open-modelling projections are only presented for the NL IORP sector.

For the NL sample, open-modelled net cash flows for unconditional benefits are very close to the closed-modelled ones in the short-term, as IORPs receive contributions for

new accruals that lead to cash outflows in terms of pension benefits only gradually over time. The net cash flows for unconditional benefits are slightly lower in the adverse scenario than in the baseline scenario. The assumed higher inflation in the adverse scenario results in higher wages and higher contributions, entering the net cash flows with a negative sign.

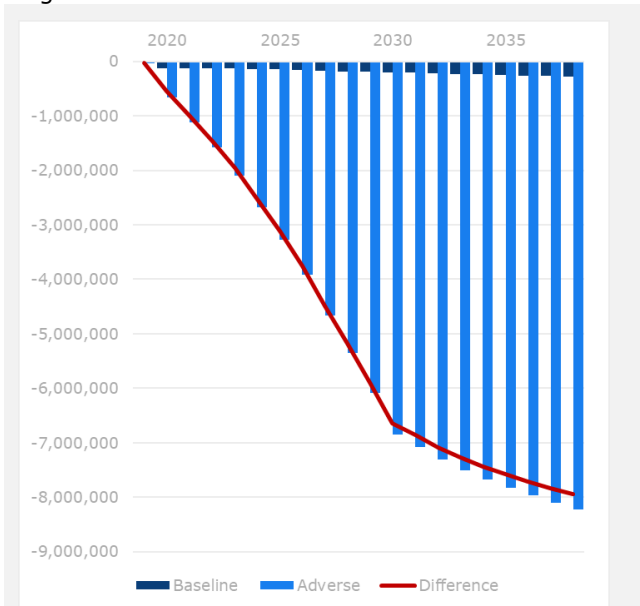
Figure 2.34: Cash flows for unconditional benefits in NL, baseline scenario, EUR thousand

Figure 2.35: Net cash flows for unconditional benefits in NL, baseline and adverse scenario, EUR thousand



For the NL sample, the cash flows for benefit reductions are slightly higher for the open-modelled cash flows when compared to the close-modelled cash flows. For the assessment of second round effects on the economy the open cash flows arguably are ex ante the most comprehensive impact measure, as it adds to the closed cash flows the non-negative element of shocks to future accrual that existing members are expected to bear, if that was not included in the closed modelled analysis, as well as the future accrual that new members are expected to bear. Ex-ante we can only expect the open-modelled cash flows to be larger than or equal to the closed cash flows, depending on national systems, the type of adverse scenario, and the timing of the stress test, and (see box 1).

Figure 2.36: Cash flows benefit reductions in NL



Box 1. On the difference in terms of cash flow impact between open and closed modelling: the case for the Netherlands

The observed difference in terms of the cash flow impact of the adverse scenario between the open and closed modelling depends on a number of factors: national systems, type of adverse scenario, and the timing of the stress test.

First, the national system determines whether in an open modelled setting adjustment can be shifted towards new accrual. In the NL systems this is possible and the difference is positive, in other systems this may not be the case and the difference may be zero. Another aspect of the national system is the adjustment period in recovery plans. The longer it is, the more positive will be the difference (conditional on shifting to new accrual to be at all possible, see the above).

Second, the type of adverse scenario matters. A one-off shock as in this stress test exercise necessitates immediate adjustments. The impact may be smoothed over time, but the main adjustment is in the accrual in place at the time the shock hits. A one-off shock has a more limited impact on new accrual than, for instance, a shock that is sustained for a couple of years and also triggers future adjustments, involving more new accrual.

Third, the timing of the stress test plays a role, in conjunction with specificities of national regimes. In the present sample two specific features of the position of Dutch IORPs stack against finding a meaningful difference: they have no buffers (coverage ratios in national definition around 100%) and they are quite close in time to the backstop measure where immediate and closed benefit reductions have to be made. There will probably be a larger difference between open and closed cash flows when the start of the adverse scenario lies further away in time from the point where the backstop kicks in, as will be the case in 2021/2, and when the initial position in terms of coverage ratio is better; in which case we will see more of the regular recovery plan measures in an effectively open setting.

2.1.2.4. Effects on sponsors or members and beneficiaries

The EEA DB IORP sector is relatively small compared to the aggregate size of the EEA national economies. Still, IORPs' needs for sponsor support may have a substantial impact on the balance sheet of individual sponsors, as well as their sponsors' future profitability. The figures below express the projected cash flows for sponsor support as a percentage of the future earnings of sponsoring companies. The future earnings are established using the average earnings in the past three years provided by IORPs through the stress test questionnaire. Those present average earnings have been extrapolated to the future using a real growth rate, comprising forward inflation rates and a constant real growth rate of 1%.

The overall conclusion is that future sponsor support as a percentage of earnings is relatively small for most IORPs. For the median sponsor, this measure is nearly 0% in the baseline scenario, both under the assumption of risk-free and expected returns. The maximum cash flow for sponsor support for the median company amounts to 2% of earnings in year 1 of the adverse scenario under the assumption of risk-free returns.

Still, for the top 10% of sponsoring companies, the need to make additional sponsor support payments will have a substantial impact compared to their earnings capacity, especially in the first couple of years following the adverse scenario. In those years, the cash flows for sponsor support are in the range of 250-300% of earnings.

Figure 2.37: Cash flows for sponsor support, in % sponsors' earnings (risk-free returns) - baseline

Figure 2.38: Cash flows for sponsor support, in % sponsors' earnings (risk-free returns) - adverse scenario

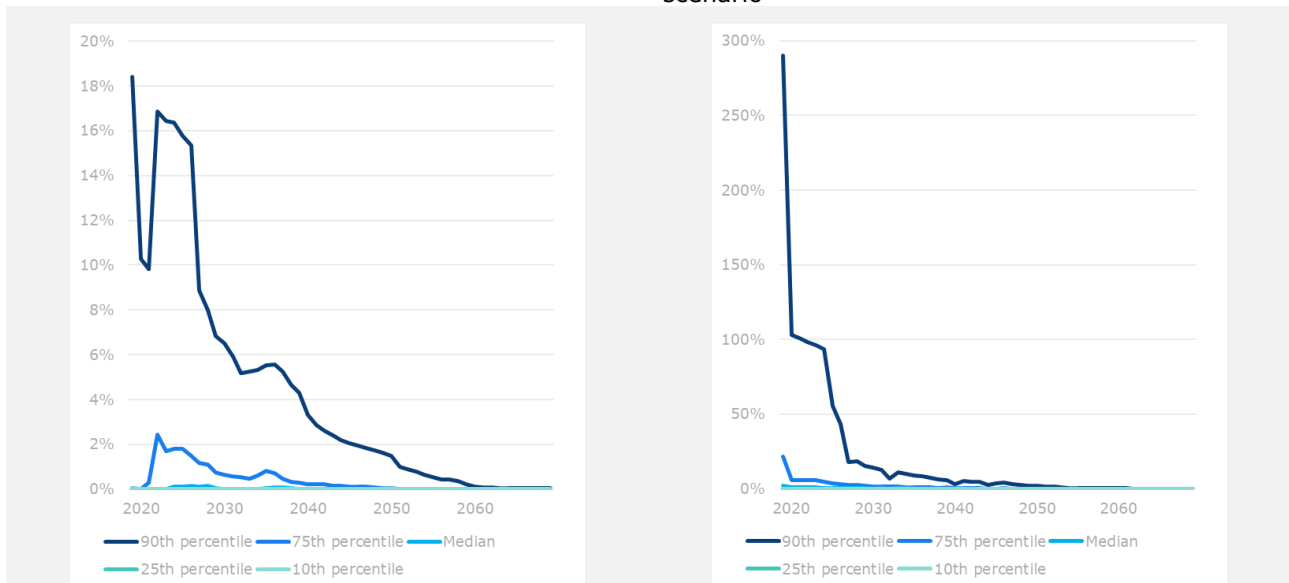


Figure 2.39: Cash flows for sponsor support, in % sponsors' earnings (risk-adjusted/expected returns) - baseline

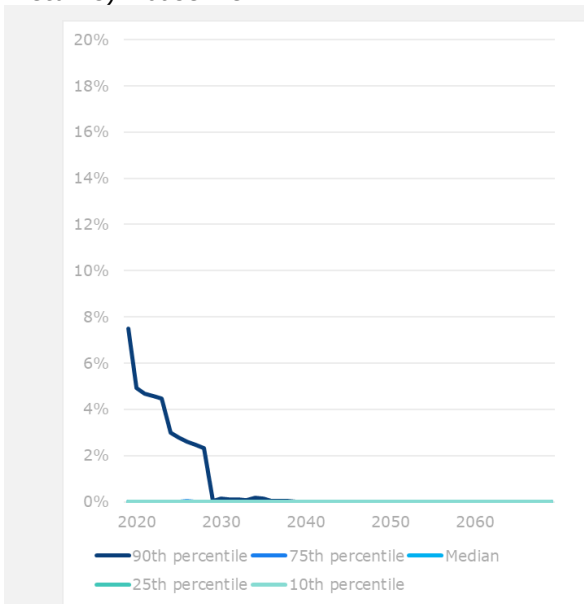
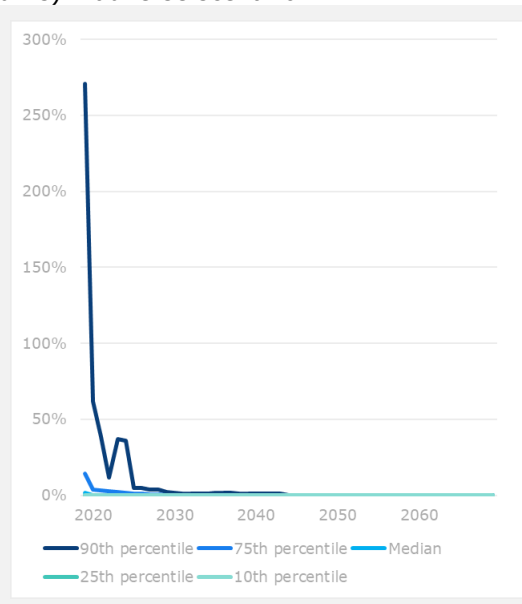


Figure 2.40: Cash flows for sponsor support, in % sponsors' earnings (risk-adjusted/expected returns) – adverse scenario



The aggregate impact of benefit reductions on members and beneficiaries in the sample is stronger: Cumulative benefit reductions gradually increase after ten years following the adverse scenario to 21% and 17% of unconditional benefits assuming respectively risk-free and expected returns.

Figure 2.41: Cash flows for benefit reductions, in % unconditional benefits (risk-free returns), baseline and adverse scenario

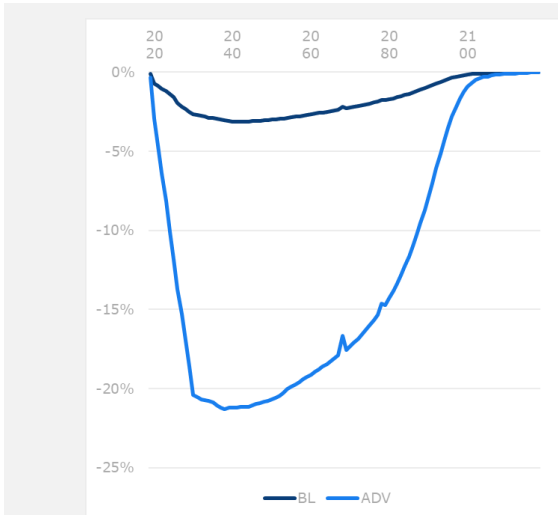
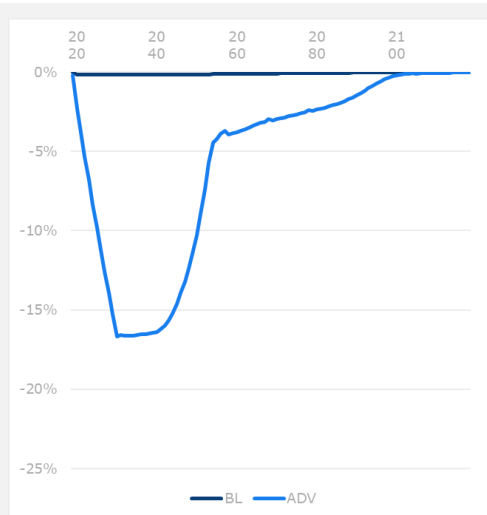


Figure 2.42: Cash flows for benefit reductions, in % unconditional benefits (risk-adjusted returns), baseline and adverse scenario

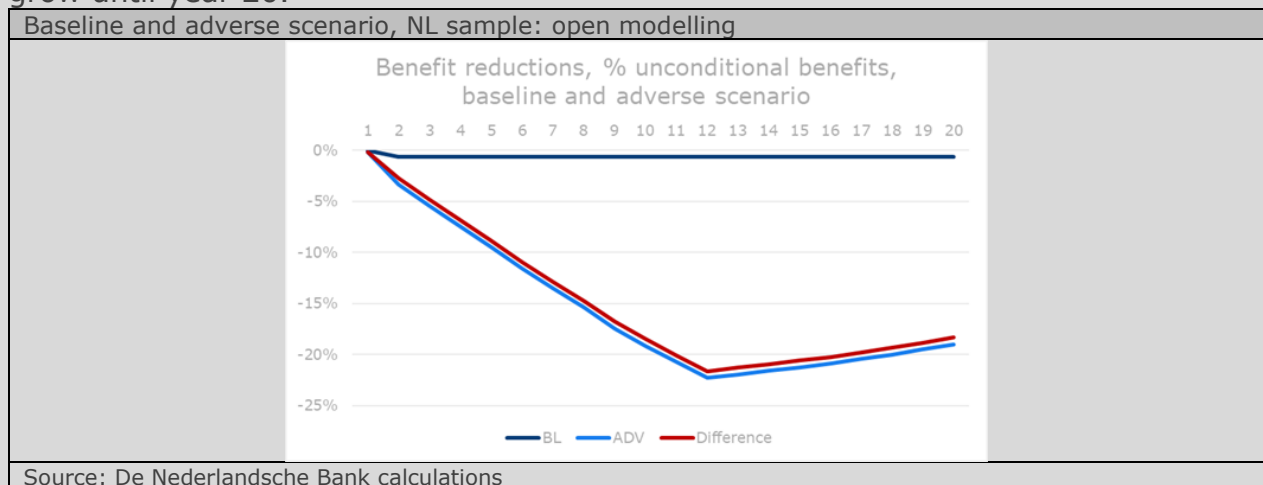


The relative size of the NL DB IORPs shows in the volume of benefit reduction cash flows, and the relatively long smoothing period embedded in NL recovery plans are reflected here.

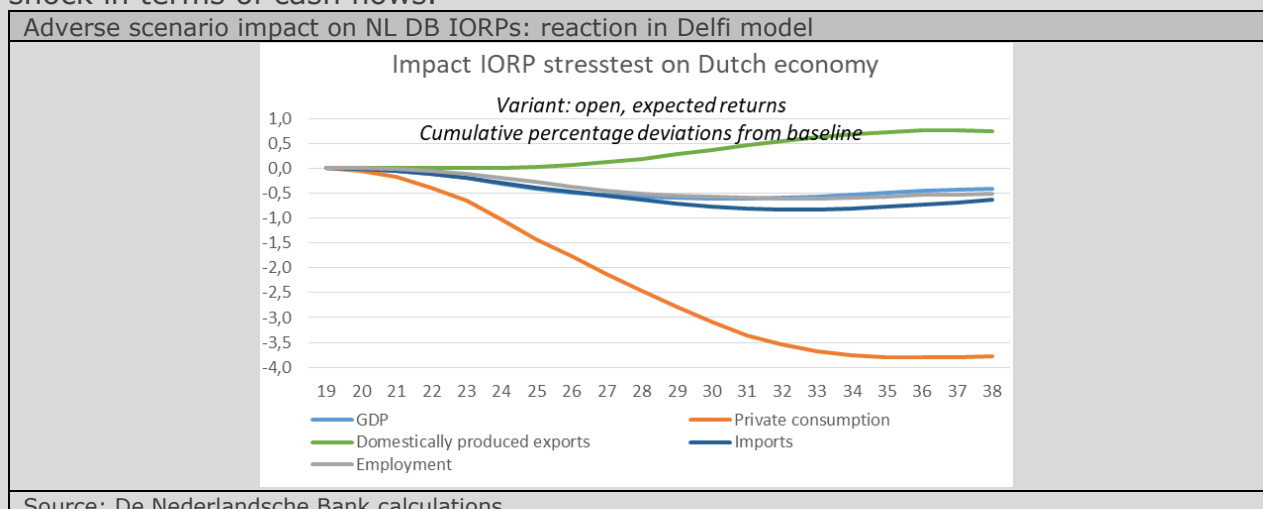
Box 2 below assesses the potential impact of a stress triggered by the IORP sector on the wider economy using the cash flow results for the Netherlands in a macroeconomic simulation exercise. The results illustrate that the cash flow impact of benefit reductions are marginal on an annual basis, but persistent over long period of time and cumulate into substantial losses in consumption expenditure.

Box 2. Macro-economic impact for the Netherlands of pension sector adjustment to the adverse scenario

This box assesses the impact of the adverse scenario on financial stability, indirectly via the real economy, in the Netherlands. The analysis uses the open modelled cash flows with expected returns. This makes the cash flows consistent with the way the macroeconomic scenario is constructed and generates the largest impact of the adverse scenario in terms of cash flows 'lost' (see chart below). It combines the loss on the accrual that was already there at the outset of the stress test with the future accrual that existing and new members would be expected to get. The maximum cumulative benefit reduction reaches 22% as a percentage of unconditional benefits within a little over ten years (see chart below), but benefit reductions continue to grow until year 20.



The cash flows (in terms of cumulative differences relative to baseline) are added as a shock to disposable household income in a simulation exercise using the macroeconomic model for the Dutch economy, Delfi. This is the model that the Dutch Central Bank uses to generate the Dutch input to Eurozone and EU economic analyses conducted by ECB and ESRB, respectively. The simulation results (see chart below) demonstrate a sizable cumulative loss in consumption expenditure, which however only gradually builds up over a 10-year horizon along with the gradually building shock in terms of cash flows.



The results of economic simulations always depend on the assumptions made. The key assumptions can be explained as follows: firstly, only the cash flow effects to the adverse scenario have been modelled; in reality, confidence effects may play a role,

so that the estimated economic impact is likely to be higher when confidence effects are considered. The impact on the NL economy is modelled based on the stress on the national IORPs only, disregarding the effects from outside the NL economy. Hence, the domestic adjustments include (small) downward adjustments in prices and wages, thereby improving competitiveness and exports and thus resulting in a limited effect on expected GDP.

The size and impact of the adverse scenario on NL IORPs can be summarised as that cash flows are gradually building up a negative effect on consumer expenditure and economic activity over time. As such, the risks for the Dutch economy, and indirectly its financial stability, following from a stress triggered by the pension sector seems limited. However, the smoothed impact over time also implies that the economic effects of an adverse scenario – all else equal– are still being felt more than 10 years after the shock.

2.2. Projected future retirement income and replacement rates of DC members

The analysis of the DC IORPs considers the direct effect on members and beneficiaries through a devaluation of the DC IORPs' investments and second round effects on the real economy by estimating the impact of the adverse market scenario on expected retirement income based on representative plan members. The devaluation of DC IORP's assets directly affects the accumulated savings of the members.

The stress test analysed how the adverse market scenario impacts on retirement income and replacement rates - i.e. expected pension income stemming from second pillar occupational pensions as a proportion of final earnings - of three representative plan members with respectively 35, 20 and 5 years away from retirement. The outcomes for the three representative members are then extrapolated to the overall membership of the DC IORPs, showing how these impacts on income are spread out over the cohorts of members and beneficiaries. To do so, DC IORPs provided information and data on the number of plan members and corresponding investments broken down by cohorts.

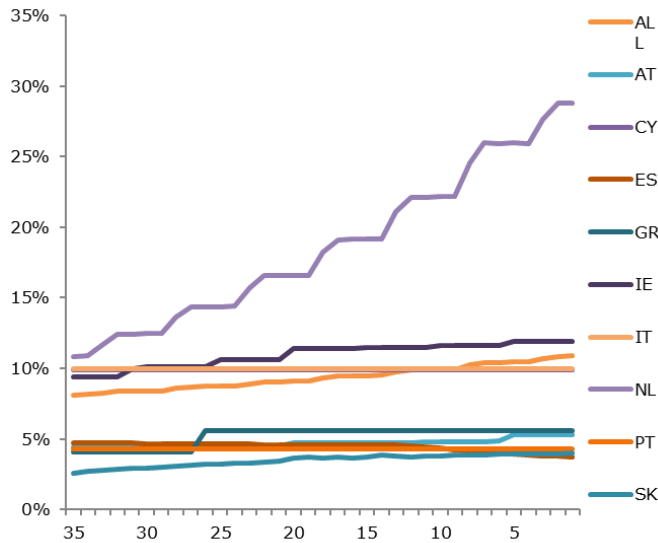
The results for IT have been prepared by the IT NCA using the data collected on a regular basis from all supervised pension funds and plans and not specifically for the stress test. They refer not only to the IT pension funds in the DC sample, but to the entire set of industry-wide DC IORPs.

EIOPA introduced a spreadsheet tool that calculates in a standardised manner accumulated assets at retirement and expected retirement income in a deterministic baseline scenario. The baseline delivers best estimate projections of pension outcomes and can be regarded as the 'median' or 'expectation' forecast. Subsequently, the impact of the adverse market scenario can be assessed by comparing the outcomes of this scenario with the baseline scenario.

The spreadsheet tool was built on the following assumptions:

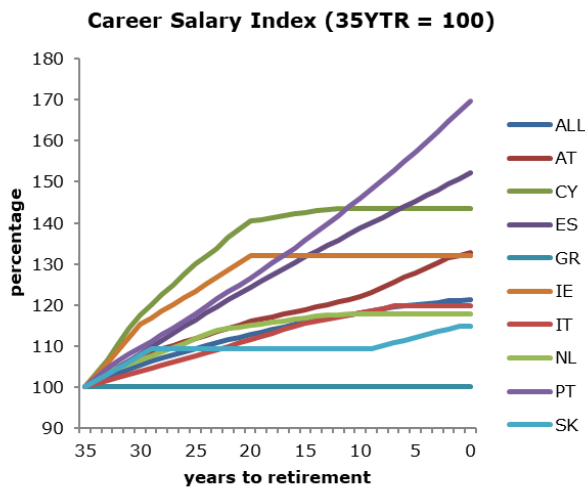
- Contributions are assumed to be paid into the DC funds until the retirement of the representative plan members. Contributions were based on the contribution rates provided by the IORP and on average came to the following results:

Figure 2.43: Expected contribution levels over 35 years of representative members' careers



- Annual earnings grow with the overall nominal wage growth, consisting of price inflation, a real wage growth of 1%, and the age-specific career growth. Inflation rates are variables in the market scenarios and hence set accordingly. Default career growth profiles were provided by the tool, yet were on average adjusted as follows:

Figure 2.44: Expected career growth-related salary increase over 35 years of representative members' careers



- The different asset classes generate gross investment returns during the simulation period. Interest rates and returns on different assets classes are specified in the baseline and adverse market scenario, consistently with the ones provided for the risk-adjusted cash flow analysis (see above).
- The administration and investment costs charged to the DC fund are taken into account in calculating the annual increase in assets. The accumulated assets at retirement are reduced by any transaction costs levied on pension pay-outs.

The standard, expected returns on the asset categories are based on the forward rates underlying the risk-free interest rate (spot) curves as at the end of December 2018 for the relevant currency. The expected returns for the different asset categories were calculated by adding the relevant (estimated) risk premium to the appropriate risk-free forward rate at year t. The expected returns on inflation-linked bonds move with the

forward rates implied by the inflation swap curve at the end of December 2018, since the principal of inflation-linked bonds is indexed with inflation.²³

The replacement rate is calculated as

$$\text{Replacement Rate} = \frac{\text{Pension wealth at retirement}}{\text{Final salary} \times \text{price of 1 unit of payout}}$$

2.2.1. Baseline

To understand the impact of the adverse market scenario on members and beneficiaries of DC funds, it is necessary to assess the starting point and the corresponding asset allocation of the DC funds, as the investment risk is solely borne by the members of these funds.

Whilst DC IORPs in most countries exhibit a relatively high exposure to bond investments (on average 57%), IE and NL stand out in terms of relatively high equity exposures (62% and 53% respectively), and here in particular in relation to US listed equities. CY shows a high exposure to 'other investments' (60%), which are mostly deposits other than cash.

Overall, DC IORPs invest the majority of their assets in fixed income instruments (on average 57%), in particular in EEA government bonds. While DC funds generally do not exhibit a high concentration of their fixed income investments in their home market (on average 24% of bonds' investments), Greek and Italian DC IORPs have domestic exposure for respectively 51% and 32% of their bond portfolio.

Comparing the asset allocation of the DC IORPs participating in the 2017 exercise - whereas the sample of participating IORPs may differ significantly from the 2019 sample - at country level, one can observe very similar investment allocations between 2017 and 2019. There has been a slight increase in the relative share of other investments (other investments meaning loans and mortgages, derivatives, deposits other than cash equivalent, residual investments), which may point to an increasing investment in non-traditional investments and derivatives.

Figure 2.45: Baseline investment allocation

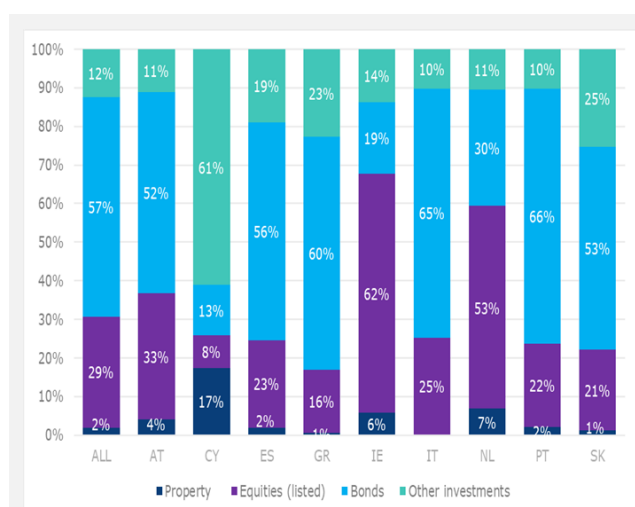
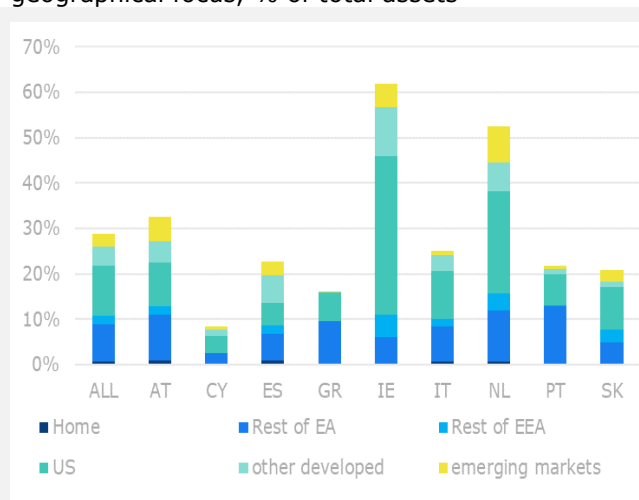


Figure 2.46: Breakdown listed equity by geographical focus, % of total assets



²³ The same approach was followed in the DC part of the 2017 IORP Stress Test, the DC satellite module of the 2015 IORP Stress Test as well as in the 2015 quantitative assessment for the determination of the so-called Level B expected return on assets. See for the latter HBS.10.35-41 in EIOPA, Technical Specifications - Quantitative Assessment of Further Work on Solvency of IORPs, EIOPA-BoS-15/070v2, 11 May 2015.

Figure 2.47: Breakdown of listed equities by region

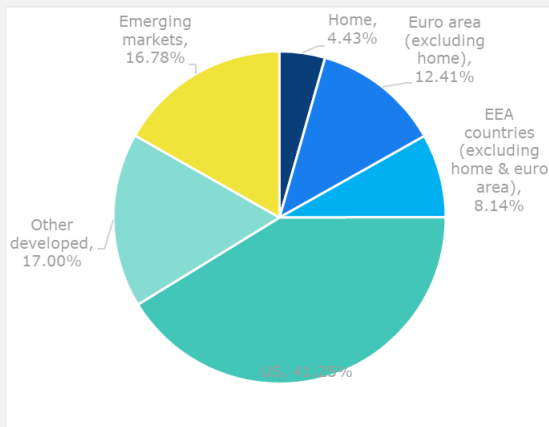


Figure 2.48: Breakdown of fixed income investments

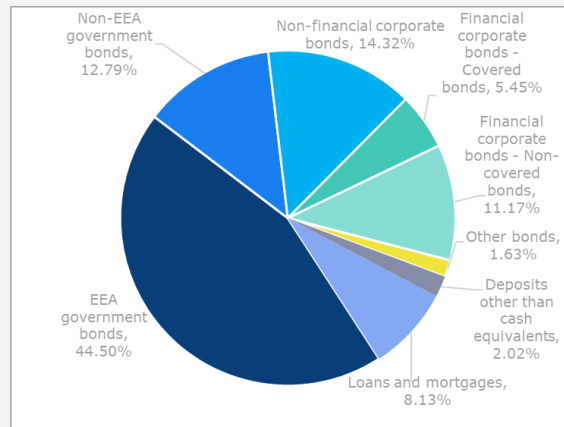


Figure 2.49: Breakdown of property investments

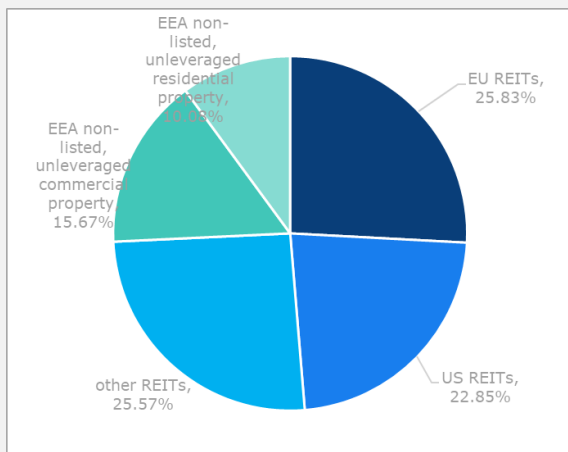
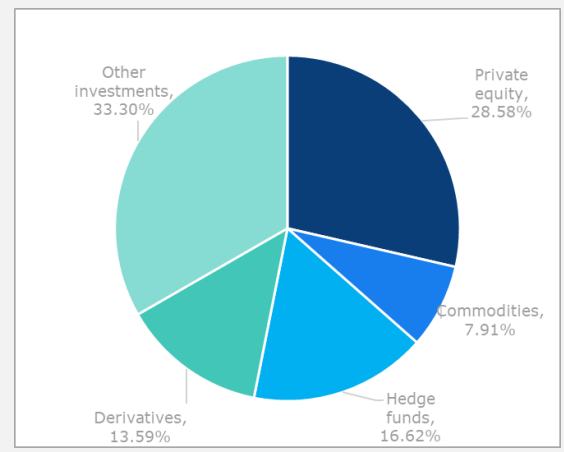


Figure 2.50: Breakdown of other investments

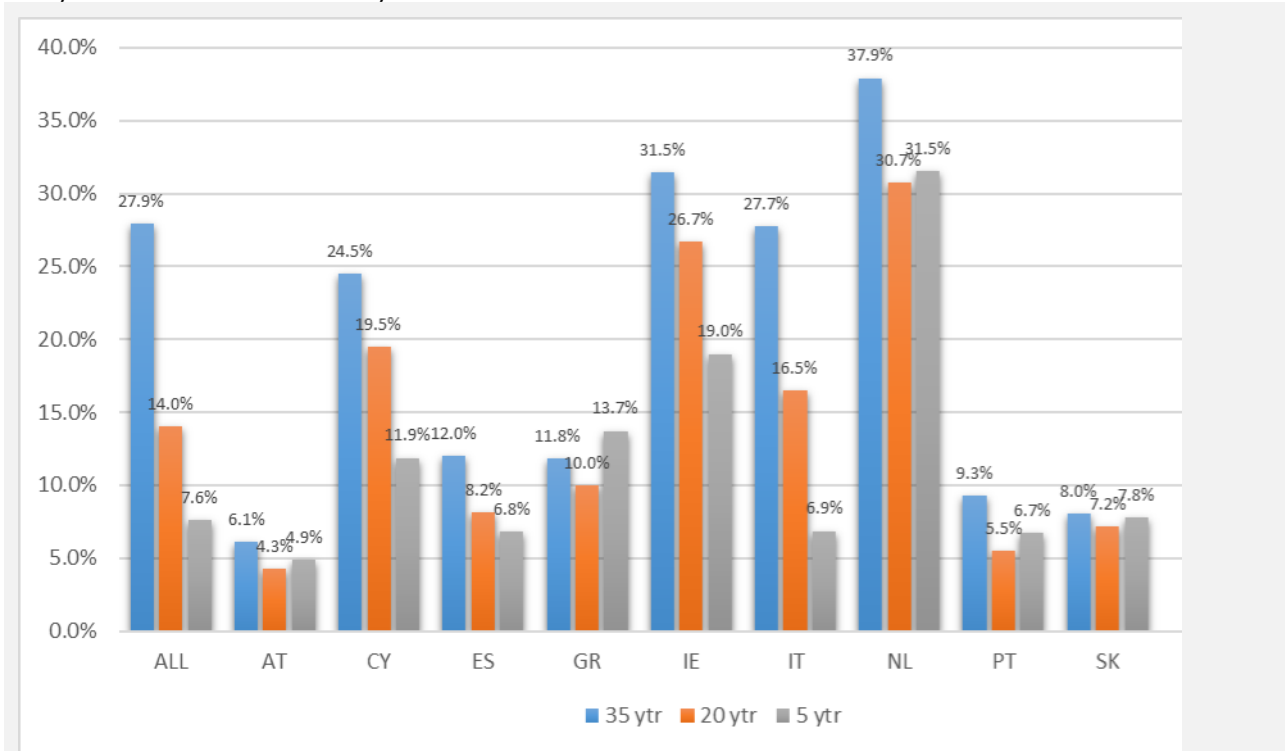


The breakdown of the EEA aggregate asset allocation in listed equities per region, fixed income investments, property investments and other investments is very similar to the corresponding breakdowns of the EEA DB IORPs. The exposure to US equities and the investments in EEA sovereign bonds comes – in aggregate – to the exactly same percentages. Interestingly, DC IORPs in aggregate are less invested in private equity and derivatives (28%/ 14% of other investments) than DB IORPs.

For the assessment of the impact on replacement rates, the baseline scenario is important, as for this exercise IORPs were asked to assume that the identified three representative members have been members of this IORP for their entire career. This required additional estimates, assumptions and inputs in particular for fairly 'young' IORPs that have not been in existence for that long. Further, as wage growth, inflation assumptions and purchasing powers are diverse in the EEA, the chosen inputs on career salary growth and expected contribution levels have a significant level.

On average the following replacement rates stemming from the future income from the benefits paid by the participating DC IORPs are as follows, in the baseline scenario:

Figure 2.51: Baseline replacement rate, real annuity, % final salary of members 35 years to retirement, 20 years to retirement and 5 years to retirement



Linked to the higher contribution levels in countries like the Netherlands and Ireland, the projected replacement rates are relatively higher than for the other countries. Replacement rates are difficult to compare, as they need to be considered together with the relative importance of DC IORPs to the national pension systems and frameworks.

Further, on average, the IORPs seem to expect that younger members will contribute relatively more over their careers - which is an expectation consistent with the relatively high assumptions of the IORPs in the sample on career growth and the resulting final salary before retirement in the different countries - than those members that are currently closer to retirement, so that the projected replacement rates are mostly significantly higher for the younger members compared to those closest to retirement.

2.2.2. Adverse market scenario

The impact of the adverse market scenario on the aggregate investment assets in the DC sector is a drop in values by 16bn, which represents 17% of the total investments assets in the sample.

The devaluation of equities has the highest effect in the sample, with on average 40% decrease compared to the baseline figures. Consequently, the two countries with the highest exposures to equities are most affected by the sudden impairment.

Figure 2.52: Effect of adverse market scenario on DC assets

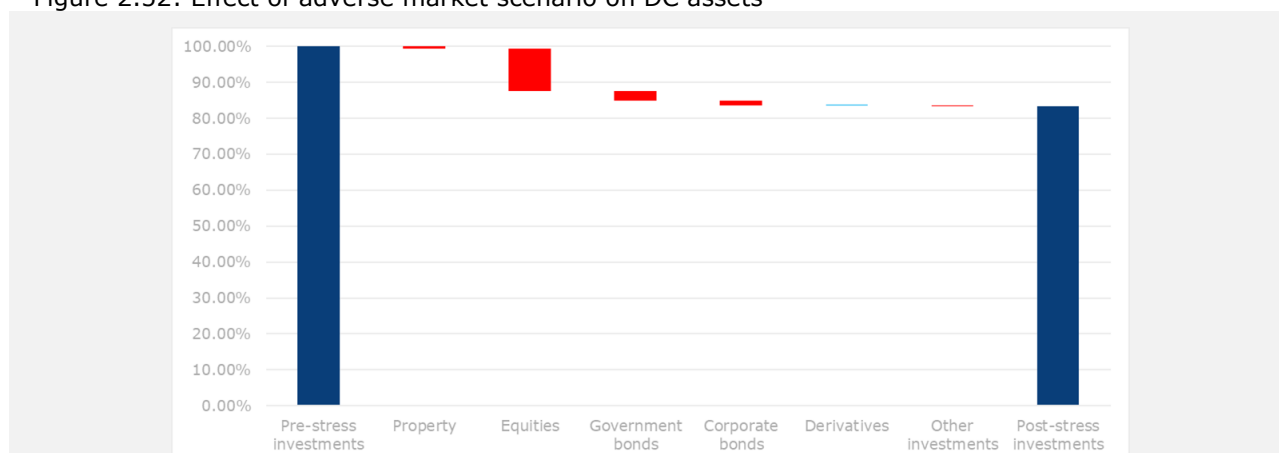
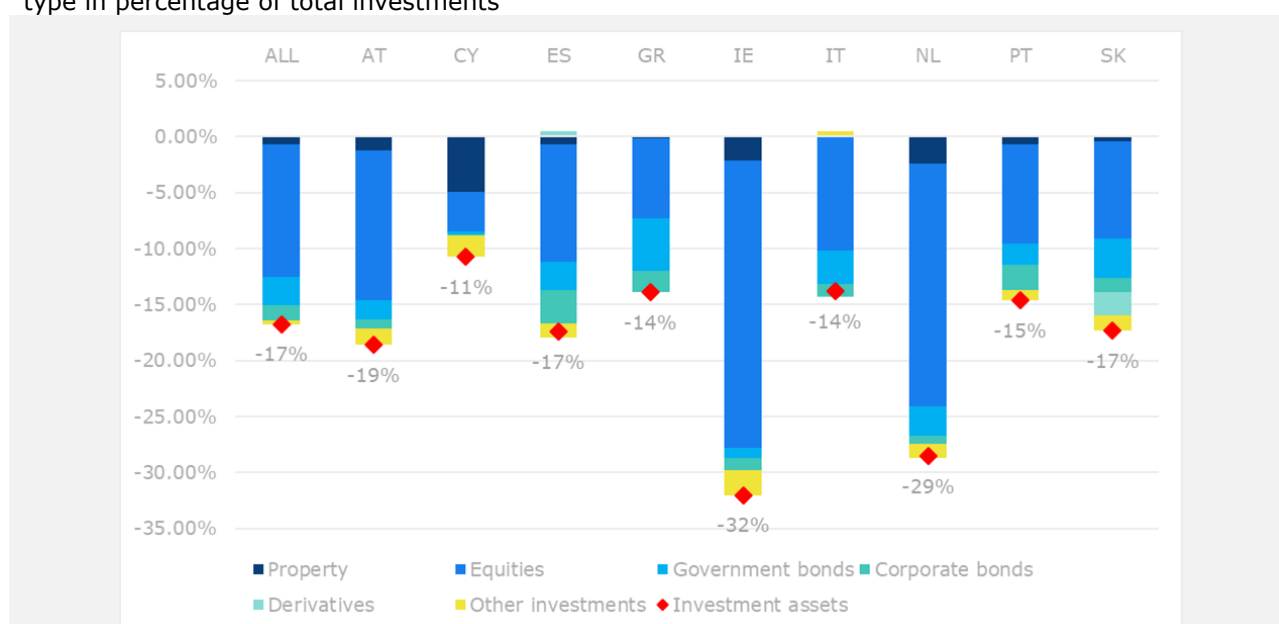


Figure 2.53: Effect of adverse market scenario on DC assets per country - changes in value by asset type in percentage of total investments



On aggregate, derivatives slightly mitigate the strong negative effect on the investment assets. This hedging effect is mostly driven by the use of derivatives in ES. However, in IT and SK the derivatives move in the same direction as the investment portfolio and therefore amplify the effects of the shock (with an expected immediate impact on the liquidity of those IORPs). Although IORPs' investments in derivatives is relatively small at market value (on average 1% and 3% of investment assets respectively for DC funds and DB funds), it is an area worthwhile monitoring. Even when used as a hedge, in stressed periods, margin calls on derivative positions may create significant liquidity demands within extremely short timeframes that can only be met by selling or lending other assets or by closing out the position. Whilst IORPs are temporarily exempted from the central clearing requirement of EMIR²⁴ relating to OTC derivatives, they may engage in centrally cleared derivatives. In a low for long environment with potentially increasing risk-taking and exposure to alternative and illiquid investments, a decline in liquidity buffers need to be considered together with liquidity requirements related to derivatives.

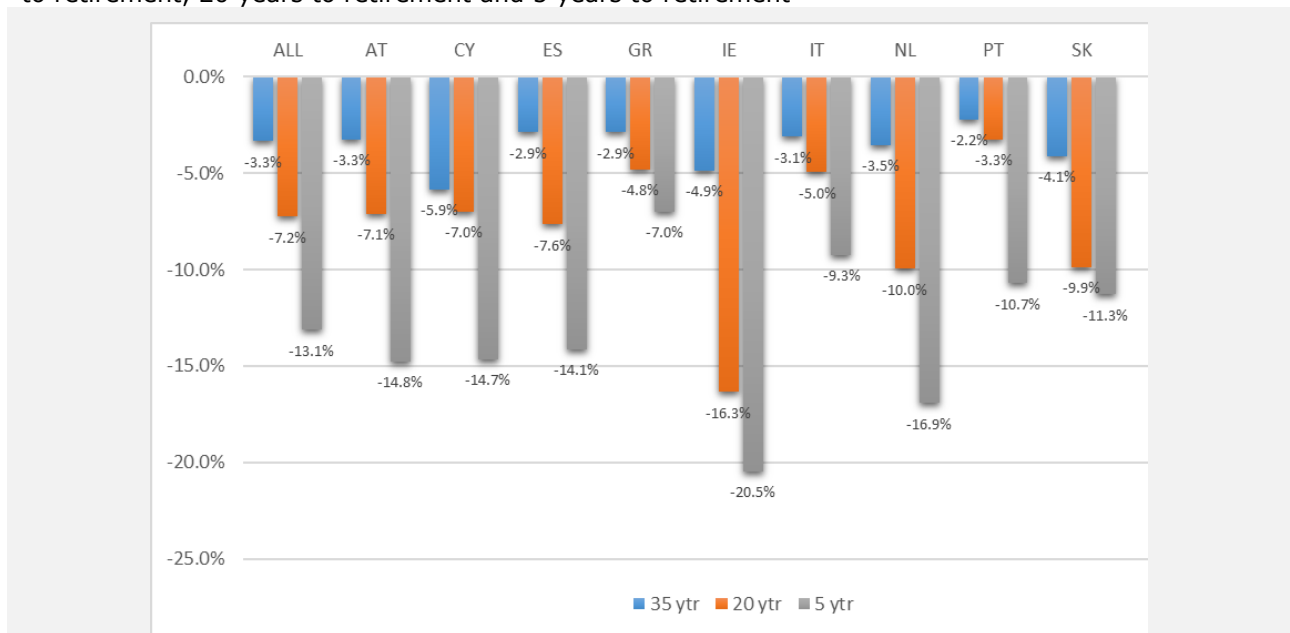
²⁴ Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories (Text with EEA relevance); OJ L 201 27.7.2012, p. 1.

For the analysis of the impact on replacement rates, the adverse market scenario is the same as the adverse scenario that was used by participants to assess the impact on the DC IORP's overall (investment) assets. However, the spreadsheet tool used aggregate shocks for sovereign bonds, corporate bonds and commercial/residential property.²⁵ The stresses were applied as permanent shocks to the baseline scenario, assuming that there is no change in long-term risk premiums on fixed-income and non-fixed income assets compared to the baseline scenario.

The asset price shocks have most impact for members close to retirement, who have accumulated most pension wealth. The instantaneous shocks applied to the current value of assets held by the representative members will have limited impact on young members, who have accumulated little pension wealth to date. However, younger members are more exposed to the decline in long-term future investment returns as a result of the long-term low risk-free interest (forward) rates.

The impact on the members' replacement rates relating to future retirement income from these DC IORPs can be reconciled with the details of the adverse market scenario and the stresses relating to the individual asset classes. The impact is higher for those countries (IE and NL) that exhibit particularly high exposures to equities and showed relatively high replacement rates in the baseline scenario. Very clearly, the members closest to retirement are more heavily affected in all countries, as they cannot benefit from valuation gains stemming from longer periods in 'normal' economic environment after the stress. However, the effects of the shock on the assets seems to have higher impacts also on the representative members in the middle range (20 years to retirement) for IE and SK.

Figure 2.54: Adverse scenario: Impact on replacement rate, %-change real annuity of members 35 years to retirement, 20 years to retirement and 5 years to retirement



²⁵ Another simplifying assumption is that the government and corporate bond stresses as calculated as constant shocks to the credit spread over the risk-free interest rate curve. The shock to the spread on government bonds is determined as the shock to the 10-year yield minus the shock to the 10-year swap rate. The shock to the spread on corporate bonds is determined as the shock to the 5-year yield minus the shock to the 5-year swap rate.

3. Potential investment reactions to the adverse market scenario

IORPs can be large institutional investors and as such, IORPs may have a significant influence on financial markets through their investment behaviour. The horizontal assessment addresses the expected investment behaviour of both DB/hybrid and DC IORPs following the adverse market scenario. The assessment aims to analyse whether the low interest rate environment in the past led to search for yield and whether a sudden rise in interest rates will induce a flight to quality, in terms of asset classes as well as geographical location of investments.

One of the key areas of the stress test is to assess the potential impact of the adverse scenario on IORPs' investment behaviour and, consequently, financial markets. To analyse the short-term and the longer-term effects of the adverse scenario appropriately, the evaluation took into account the investment allocation on 31 December 2018 prior to the shock. Further, in a qualitative manner, IORPs were asked to identify trends pertaining in the five years before the shock - the purpose was to identify common behaviours - like search for yield - given the persistent low interest rate environment throughout the recent years. In addition, the potential room for manoeuvre of IORPs were investigated, in particular regarding any legal, contractual or voluntary constraints of the actual (and future) investment allocation of IORPs - and the impact thereof.

IORPs were requested to provide estimates of expected changes in the asset allocation within a year following the stress event. The requested asset allocation data includes the type of asset as well as the geographical breakdown of the investments for both the fixed-income and the equity portfolio. This should indicate to what extent, if at all, IORPs will rebalance their investment portfolios after the shock. Further, it should show potential stabilising effects on financial markets or to what extent IORPs may try to reduce asset risk, triggering a potentially destabilising effect.

In addition, IORPs were asked to indicate the longer-term effects on their strategic asset allocation, which may indicate potential trends, such as 'flight to quality', or phenomena like 'herding behaviour' following a sudden rise in interest rates.

3.1. Legal and contractual constraints on investment allocation

In order to understand potential investment behaviours of IORPs, their regulatory and contractual framework need to be assessed. Whilst the IORP Directive sets out high-level principles in line with the 'prudent person rule' to promote diversified investment allocations, national regulation and individual, contractual provisions can further specify the target – or required – investment allocation. To further assess the 'room for manoeuvre' and the freedom to allocate assets, EIOPA has surveyed the actual – and perceived – investment regulation of the IORPs in the sample.

All IORPs in AT, BE, DE, FI, GR, IT, PT, SE, SI and SK indicated that they are subject to legal constraints. In IE more than 50% of the sample mentioned not to be bound by such constraints.²⁶ All IORPs in ES, IT, PT and SK raised other constraints to which they obey. In AT, IT, SI, SK more than 60% of the sample considers these constraints as significant.

²⁶ In NO new legislation came into effect in 2019 to lift most of the legal investment limitations related to asset classes or types of instruments, so that some IORPs anticipated that change in the legal framework for their responses.

Figure 3.1: Qualitative question on legal constraints – in % of total responses

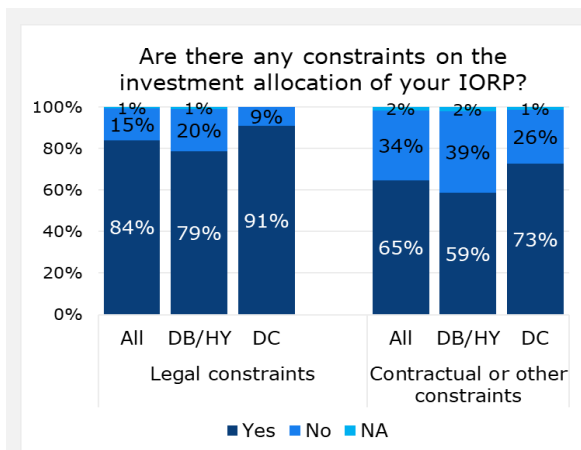
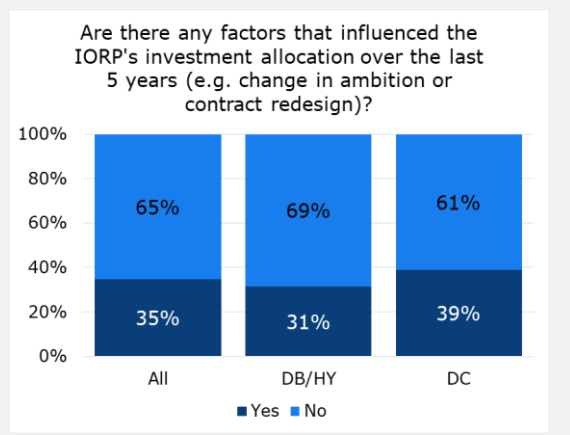
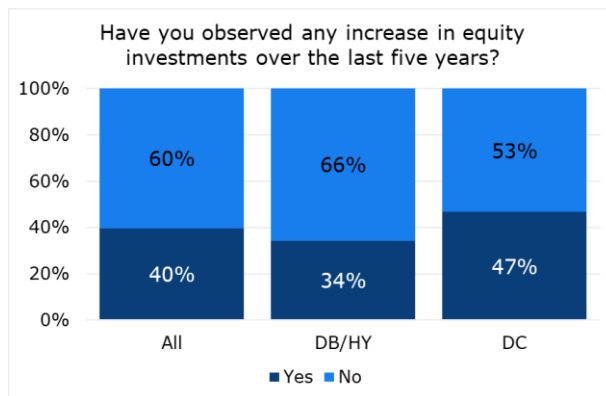
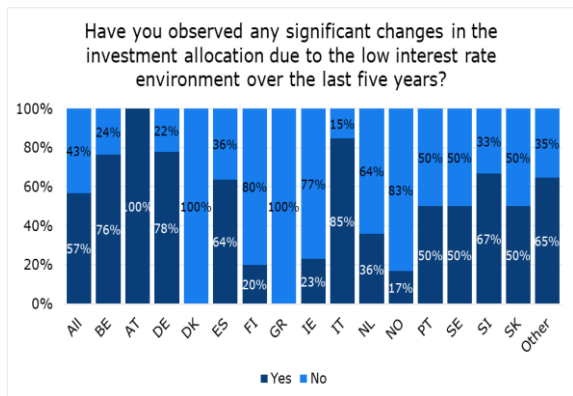


Figure 3.2: Qualitative question on factors affecting the investment allocation – in % of total responses



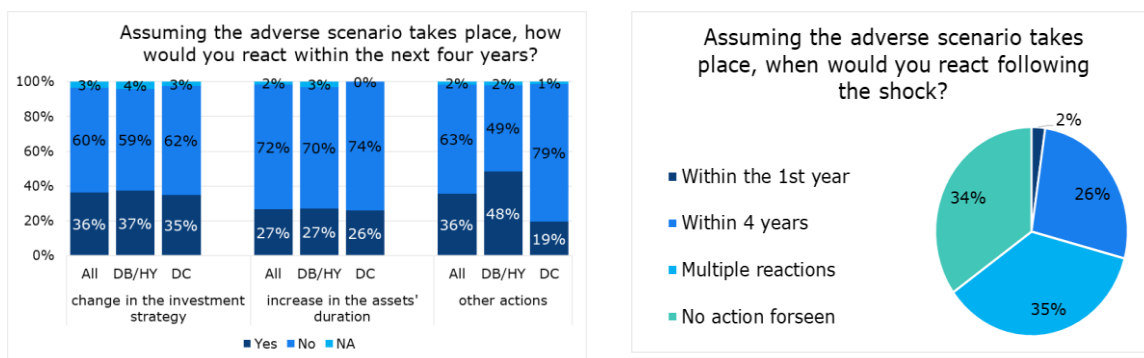
Legal or contractual constraints are expected to influence IORPs' investment allocations. Almost half of the IORPs in the sample indicate that the investment asset allocation has not been changed in the last five years. Similarly, the exposure to higher risk/ reward investments, like equity investments, have not been increased by the majority of the IORPs. The strong pervasiveness of most IORPs' chosen or required strategic investment allocation needs to be seen in light of the challenging economic environment and the low yield and low interest rate environment in the recent years.

Figure 3.3: Qualitative questions on the impact of the low interest rate environment over the last five years – in % of total responses



When asked whether the investment allocation is expected to be changed as a consequence of the adverse scenario, the majority of the IORPs would not change the pre-stress investment allocation or increase the duration of the investment or take other actions – at least not in a short timeframe after the shock:

Figure 3.4: Forward-looking questions – in % of total responses



From the qualitative questionnaire, one cannot observe any prevailing investment strategy in terms of active or passive investment strategies, since most of the IORPs indicated to use a mix of passive and active strategies for different investment portfolios at the same time.

3.2. Re-allocation behaviour after the shock

To investigate further the 'stickiness' of the once chosen – or required – investment allocation, EIOPA surveyed the IORPs' expectations on re-balancing the relative proportions of the individual asset classes, whereas some asset classes would be more affected by the applied adverse market scenario. In particular, investments in equity exposures have taken a significant hit in the applied adverse market scenario. Yet, the overall exposure to equities is expected to be rebalanced within the first year after the shock.

Whilst the re-balancing to pre-stress investment allocation could indicate a potential counter-cyclical effect, stabilising the pricing mechanisms on financial markets in the EEA, the magnitude of the effect may be marginal. However, the relatively quick re-balancing, may expose IORPs to the risk of investing in still volatile conditions where market prices may still be falling, potentially amplifying the risk of increased financial loss.

Re-allocation in the three main investment categories

In aggregate, IORPs clearly expect to increase the investments in those asset categories that were most affected by the shock and accordingly decrease the relative investment allocation of those assets that were less affected, which on aggregate are investments in bonds. The relative investment in 'other assets' remain relatively stable pre-stress, post-stress and one year after the stress.

Figure 3.5: Overall investment allocation (in % to total investments)

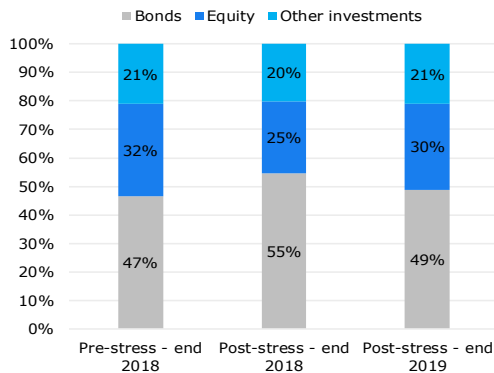


Figure 3.6: Difference of post shock 2019 asset allocation with pre shock 2018 asset allocation for the three main investment categories

	Bonds	Equity	Other investments
All	2%	-2%	0%
AT	4%	-6%	1%
BE	3%	-2%	-1%
DE	0%	-1%	1%
DK	-3%	-2%	5%
ES	3%	-3%	0%
FI	7%	-6%	-2%
GR	-2%	-2%	3%
IE	2%	-1%	-1%
IT	3%	-4%	1%
NL	1%	-1%	0%
NO	9%	-6%	-4%
PT	7%	-6%	-1%
SE	10%	-8%	-2%
SI	-1%	1%	0%
SK	-2%	-6%	9%
Other	5%	-4%	-1%

However, when assessing the individual country breakdown, it becomes clear that IORPs in some countries would keep the post-stress investment allocation or would not re-balance to a significant extent in the three major asset classes. The IORPs in the countries indicated (AT, FI, NO, PT, SE and SK) do not (fully) re-balance one year after the shock, so it seems those IORPs would expect the effects of the shock to be more persistent, so that a quick re-balancing is not desirable. The effects of these countries' IORPs' differing investment strategy cannot be identified in the aggregate figures, as they only represent 6% of total assets in the sample.

Within the bond portfolio, which is the largest investment class out of the three, a minor shift towards corporate bonds can be observed in the first year after the shock. Furthermore, when assessing the geographical location of the bond issuers, the stable allocation to different markets is remarkable before and after the shock.

For a few countries, such as DE, FI, NO and SE, the percentages of the government bond portfolio remains stable at up to around 40% before and after the shock. Other IORPs in countries such as IE, IT and PT exhibit a high concentration in government bonds, where a proportion of more than two thirds of the bond portfolio to government bonds is maintained.

Figure 3.7: Shifts in the Bond portfolio (in % to total bonds)

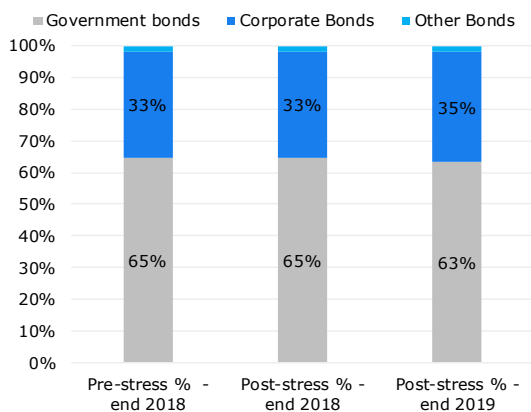


Figure 3.8: Actual pre-stress, stressed and expected exposures in bond portfolio by issuer location (in % to total bonds)

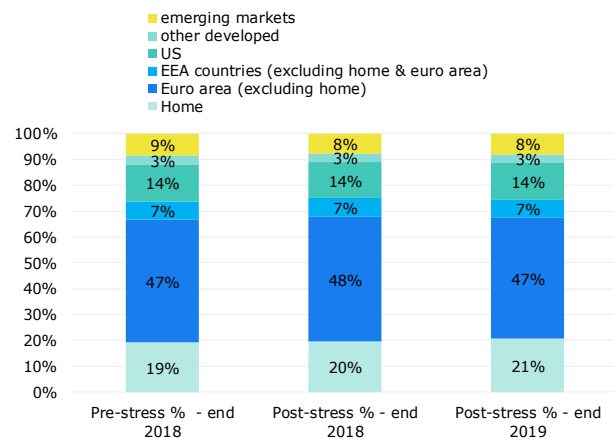
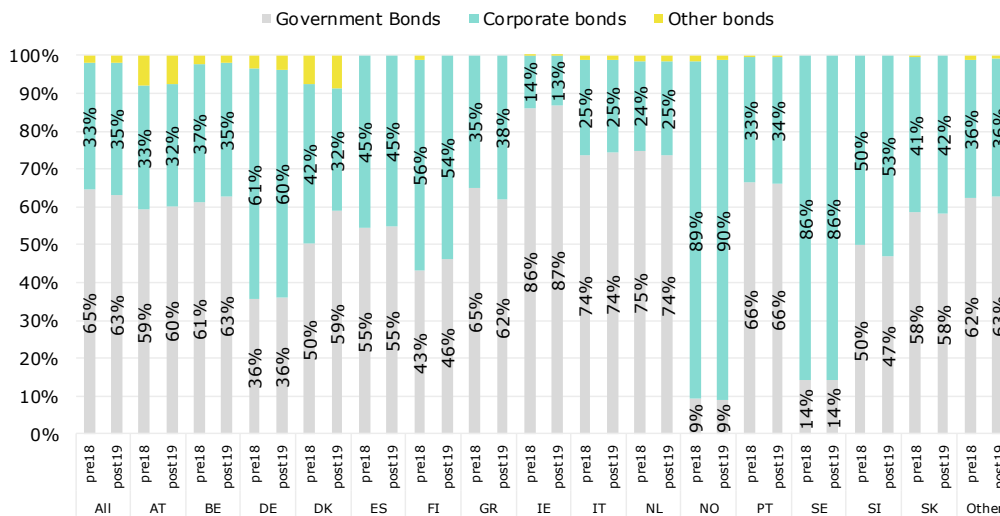


Figure 3.9: Shifts in the bond portfolio pre-stress and one year after the stress per country (in % of total bonds)



Investments in equity have taken a significant hit in the applied adverse market scenario. In line with the observations on the bond investments, the overall exposure to equities is expected to be mostly re-balanced within the first year after the shock. Furthermore, a minor shift towards non-listed equity can be observed to the whole sample, within one year after the shock, so that the expected year-end 2019 values equal the ones before the shock at the end of 2018. Interestingly, within the listed equity portfolio there is a move away from US equity, shifting towards listed equity of other developed countries. Overall, listed equity investments in the home economy, the euro area, the EEA and the emerging markets remains stable.

Figure 3.10: Actual pre-stress, stressed and expected exposures to listed and non-listed (in % to total equity)

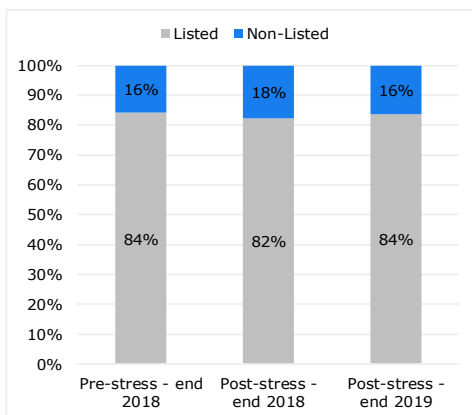
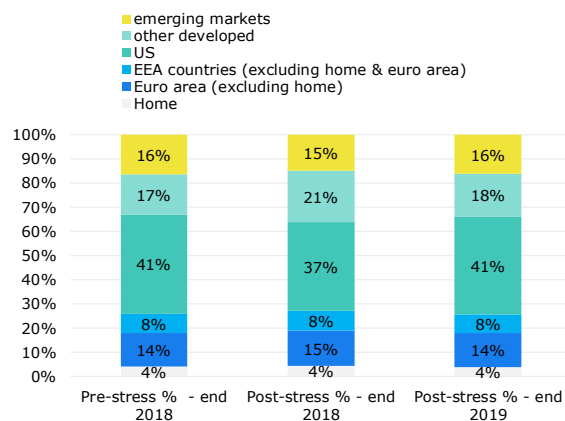
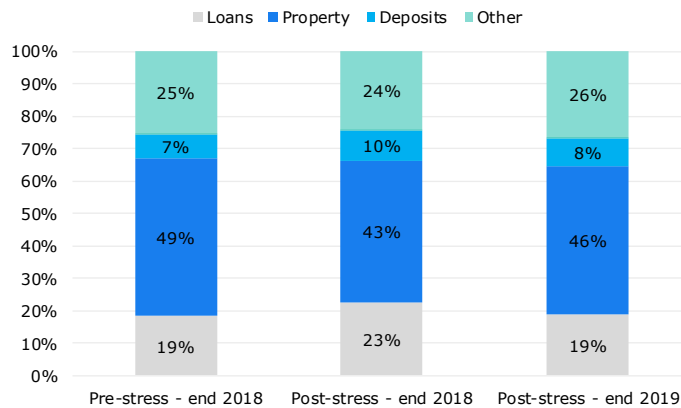


Figure 3.11: Actual pre-stress, stressed and expected exposures to equity portfolio (in % to total equity)



Finally, also in the third main category of 'other investments', the IORPs indicate a quick re-balancing for all other investment sub-categories - in aggregate terms - one year after the shock. The amount of deposits in cash naturally remains stable, as deposits were not subject to a stress in the applied adverse market scenario.

Figure 3.12: Actual pre-stress, stressed and expected exposures of 'Other investments' (in % to total other investments)



Note: Other investments includes: Loans, Property, Deposits, Residual investment fund (RIFs) investments and 'Other'. RIFs are not chart in the figure because the overall size is smaller than 0.5% to total assets.

Quantile analysis on the rebalancing of 'Equity' and 'Other investments'

For the further analysis, the effects are separately shown for 'larger IORPs' in the sample representing 20% of all participating IORPs holding 90% of the assets in the sample. This category includes IORPs from AT, DE, DK, FR, IE, IT, NL and NO. The 'smaller IORPs' are the remainder of the sample, which is quite heterogeneous in size, representing 80% of the participating IORPs.

Figure 3.13: Re-balancing of equity exposures: Larger IORPs

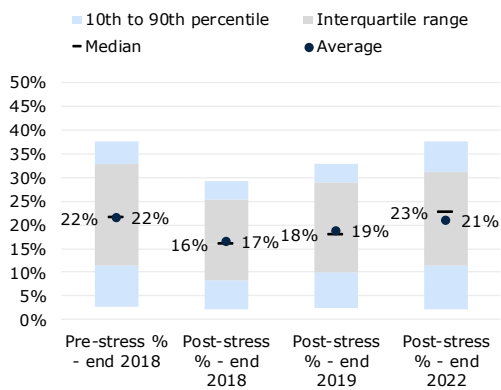
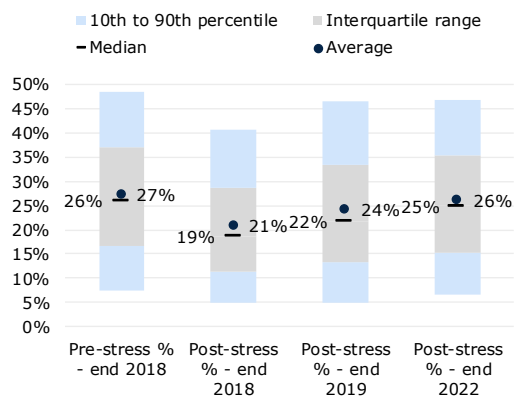


Figure 3.14: Re-balancing of equity exposures: Smaller-sized IORPs



Whilst the median and average of the large and smaller sized IORPs will rebalance within the next one and three years after the stress, the dispersion of expected new allocations is higher in the smaller sized IORPs. The same effect can be seen in the allocation to debt instruments, yet is even more pronounced when assessing the exposures to 'other investments', which cover property, loans and mortgages, deposits, derivatives and residual investments, like hedge funds.

Figure 3.15: Re-balancing of 'other investments' exposures: Larger IORPs

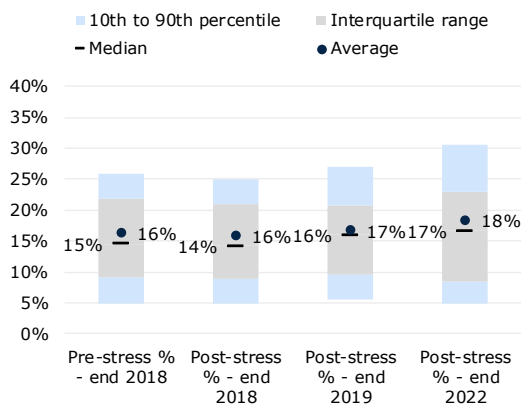
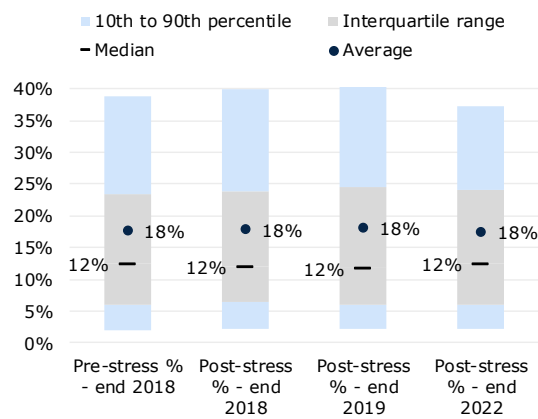


Figure 3.16: Re-balancing of 'other investments' exposures: Smaller-sized IORPs



Net Selling and Buying

The findings on overall relatively quick re-balancing to pre-stress investment allocations are confirmed by the responses on the qualitative questionnaire regarding net selling and buying for bonds and equity. Here, one can observe two distinctive trends: in the first year after the shock, a large part of the IORPs of the sample (44%) report a negative outflow from bonds and a positive inflow to equity investments (60%). This indicates a clear and immediate reaction to the shock, as the equity portfolio is substantially affected by the stress stemming from the adverse market scenario - and the economic environment prevailing at end-2018. That expected behaviour can be identified and confirmed when assessing the breakdown of positive inflows towards listed equity, where one can see a high concentration (close to or more than 50% of the sample) towards the euro area, the US and the emerging market segments.

It is worth mentioning that 29% and 27% - for bonds and equity respectively - of IORPs responded that they would not perform any net selling or buying in the first year after the shock.

Figure 3.17: Net buying and selling of bonds after the shock until 2019

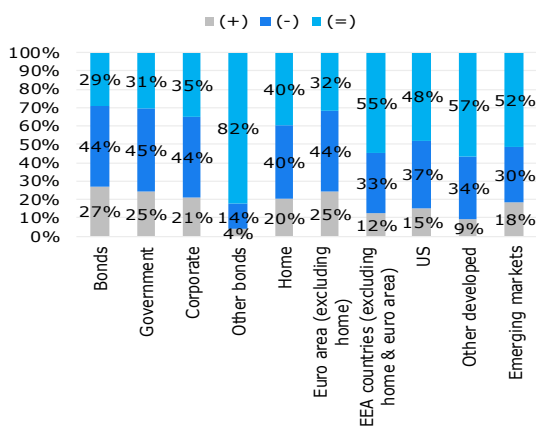
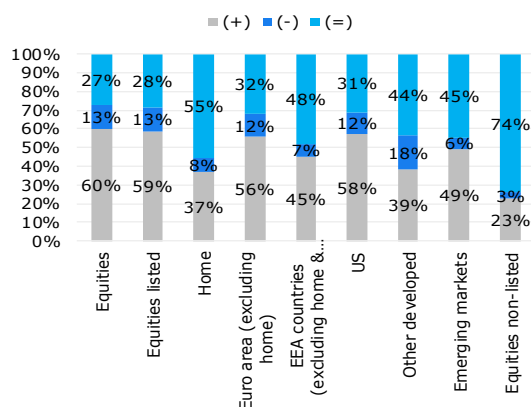


Figure 3.18: Net buying and selling of equity after the shock until 2019



Note: N/A or - have been excluded from the count

When comparing these findings to the replies regarding expected trading activities by the end of 2022, the indicated trading activities slow down and one can observe an

easing of the shock effect for both bonds and equity portfolios. Overall, for the bond portfolio the net selling would decrease from 44% to 25% of the IORPs in the sample, and for the equity portfolio the net buying also would decrease from 60% to 39%.

Figure 3.19: Net selling and buying of bonds until end 2022

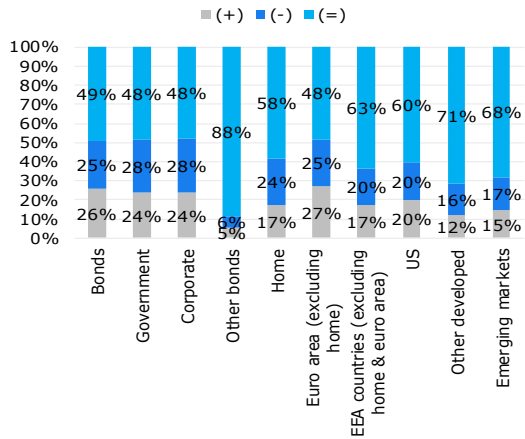
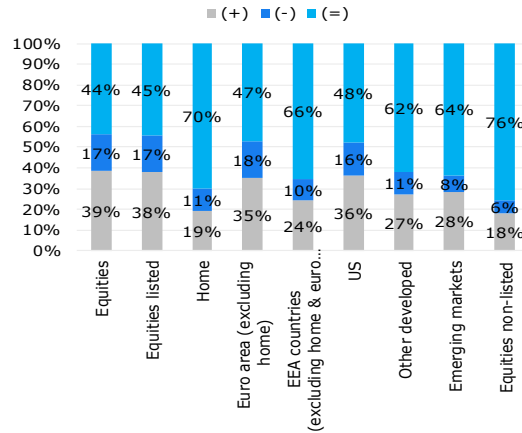


Figure 3.20: Net selling and buying of equity until end 2022

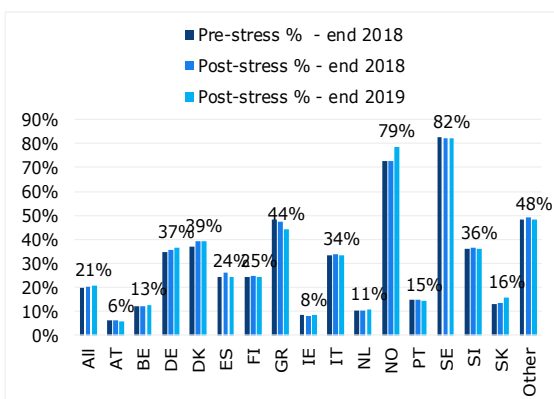


Finally, assessing the reported, expected volumes of trading, overall, large IORPs (representing the 20% of the sample) perform approximately 90% of the trading activities, which confirms the findings, as larger IORPs have relatively higher amounts to re-balance.

3.3. Home concentration

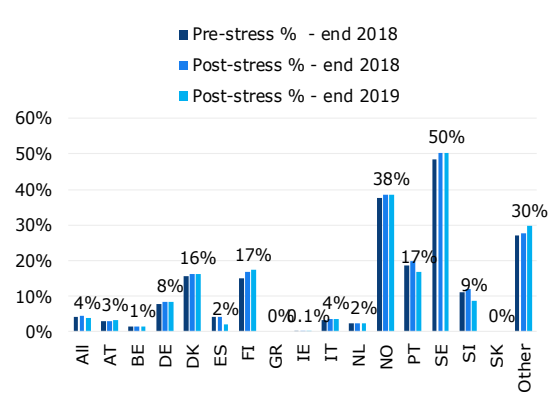
Another area for the strategic IORPs' investment allocation, and of potential investment restrictions or limitations, are the geographical location of the exposure or the issuer of the financial instrument or investment.

Figure 3.21: Home concentration in bonds in % of total bonds



Indicated percentage number refers to end 2019.

Figure 3.22: Home concentration in equity in % of total listed equity



Indicated percentage number refers to end 2019.

Whilst for larger economies in the EEA, like DE or IT, where the opportunities to invest in local capital markets are manifold, the relatively high investments in DK, GR, SI and other relatively smaller economies regarding local bonds are remarkable.

IORPs exhibit a relatively high home concentration and a concentration of investments in the Eurozone, in particular as IORPs' obligations are mostly denominated in home currency, often pegged to the Euro, or in Euro. However, in particular in times of heightened uncertainties of countries' debt sustainability, the risk inherent in the bonds' home concentration should be assessed together with the rating of the country. Hence, IORPs in countries with relatively low rating and high home concentration to debt exhibit by definition more risk in their balance sheets than IORPs in countries with higher ratings. This is based on the assumption that issuers' ratings cannot be significantly higher than their countries' ratings. Countries like GR (44%), IT (34%) and SI (36%) may be considered to fall under the category of countries with lower ratings.

On the other hand, IORPs with relatively high home concentration and high country rating currently experience (very) low yielding debt, which cannot support the financing needs, especially for DB/HY IORPs, and may lead to funding problems in the long run. Countries such as DE, DK, NO and SE can be considered to fall in this category of highly rated countries.

Table 3.1: Ratings per country				
#	Country	S&P	Moody's	Fitch
1	AT	AA+	Aa1	AA+
2	BE	AA	Aa3	AA-
3	DE	AAA	Aaa	AAA
4	DK	AAA	Aaa	AAA
5	ES	A	Baa1	A-
6	FI	AA+	Aa1	AA+
7	GR	BB-	B1	BB-
8	IE	A+	A2	A+
9	IT	BBB	Baa3	BBB
10	NL	AAA	Aaa	AAA
11	NO	AAA	Aaa	AAA
12	PT	BBB	Baa3	BBB
13	SE	AAA	Aaa	AAA
14	SI	AA-	Baa1	A
15	SK	A+	A2	A+

Source: Refinitiv

4. ESG exposures

The horizontal assessment analyses in a qualitative manner in how far IORPs contribute to mitigating ESG risks in society and in how far IORPs reduce their own exposure to ESG risks. Further, a quantitative analysis based on IORPs' allocation of investment assets by economic activity provides for a rough indication of the exposure of IORPs to 'brown' assets and the overall carbon footprint, measured by reference to greenhouse gas emissions, of their investment portfolios. This quantitative part can be viewed as a first step towards a stress test analyses, assessing the impact of transition scenarios towards a low-carbon economy.

4.1. Qualitative analysis of management and incorporation of ESG

The aim of the exercise was to carry out a relevant evaluation of IORPs' ESG exposures. Obviously, in absence of a defined ESG taxonomy and the still relatively thin data situation in terms of ESG factors, the analysis need to be regarded as preliminary with regards to the actual ESG risks, as managed by IORPs. To gain further insights in to the risk management and incorporation of ESG factors in the governance processes, IORPs were requested to provide qualitative information on:

- The extent to which IORPs take into account ESG factors, the objectives of ESG integration and the way this is done: exclusion policies, implementing international principles for sustainable investing (like UNPRI), voting, engagement, best-in-class investing and impact investing²⁷;
- The extent to which the integration of ESG factors enhances or impairs the risk-return characteristics of the investment portfolio;
- The extent to which IORPs assess their exposure to ESG risks and, if yes, how;
- Whether the introduction of the IORP II Directive and the new Shareholder Rights Directive²⁸ is expected to impact the ESG policies of IORPs.

The IORP II Directive and the amendment of the Shareholders Rights Directive were expected to be transposed in national law by January 2019 and June 2019 respectively and could not necessarily be expected to be implemented by end-2018 for this survey.

The IORP II Directive does not require, but allows, IORPs to take into account the potential long-term impact of investment decisions on ESG factors. IORPs are required to cover ESG risks in their risk-management system. To incorporate ESG factors in the risk management of an IORP can be expected to result in an appreciation of ESG factors to ensure the security, quality, liquidity and profitability of their investment portfolio.²⁹

Even ahead of the IORP II transposition deadline, the majority of IORPs indicate to have integrated ESG factors (figure 4.1) – and if they did, they implemented all three E - Environmental, S – Social and G- Governance factors (figure 4.2). It seems that IORPs in AT, ES, NL, NO and SE have mostly integrated ESG factors – which may be related

²⁷ See for a description of these instruments for example DNB, Sustainable investment in the Dutch pension sector, 2016: https://www.dnb.nl/en/binaries/Sustainable%20investment%20in%20the%20Dutch%20pension%20sector_tcm47-346418.pdf

²⁸ The Shareholder Rights Directive 2007/36/EC was amended by Directive (EU) 2017/828 as regards the encouragement of long-term shareholder engagement.

²⁹ See EIOPA, Opinion on the supervision of the management of environmental, social and governance risks faced by IORPs, EIOPA-BoS-19-248, 10 July 2019.

to the demands from their stakeholders in those countries, rather than the legal obligation, which came into effect only in 2019.

Figure 4.1: Integration of ESG factors by country, % IORPs

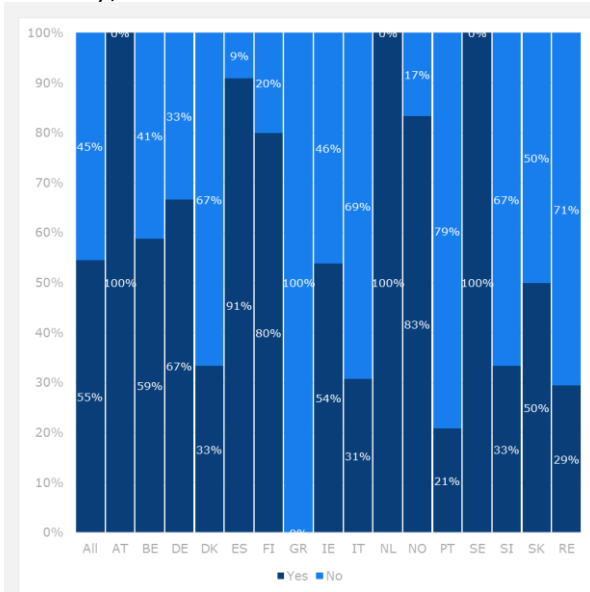
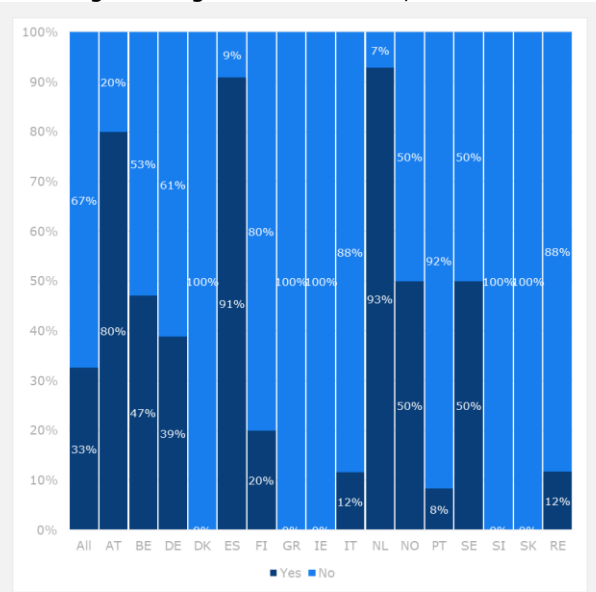


Figure 4.2: IORPs with members and sponsor seeking to integrate ESG factors, % IORPs



Of the IORPs incorporating ESG factors, 42% indicated that ESG factors are taken into account as a long as this does not lead to lower financial returns. Other IORPs indicated that they might accept a worsening of risk-return characteristics by taking into account ESG factors or by excluding certain investments for ethical reasons. On average, only 19% of IORPs have assessed or analysed the actual effect of ESG factors on the risks and rewards of the investments (figure 4.3). IORPs located in those Member States where most IORPs are taking into account ESG factors, namely AT, ES, NL and SE, seem to carry out such analyses more often.

IORPs incorporating ESG factors adopt various approaches to achieve their ESG objective (figure 4.4). Most frequently mentioned are 'subscribing to international principles for responsible investments' (74%) and 'exclusion policies' (69%), least frequently indicated are 'impact investing' (21%) and 'best-in-class investing' (31%). 44% of IORPs incorporating ESG factors have a voting policy in place and 49% an engagement strategy.

Figure 4.3: Assessment of ESG impacts on risks and returns of the investments, % IORPs

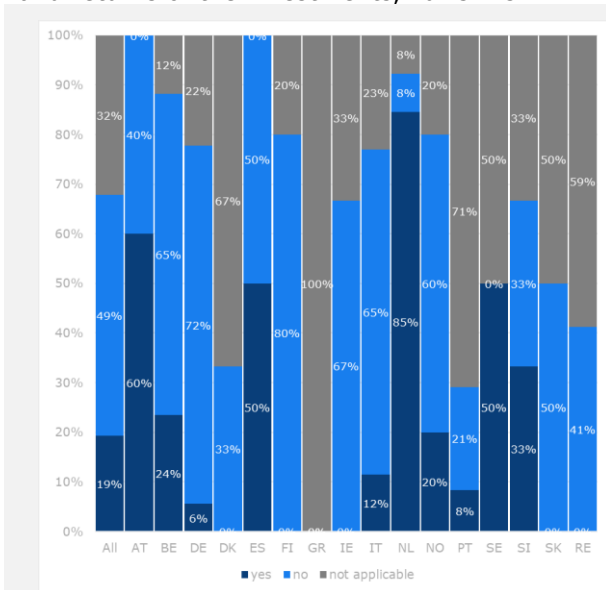
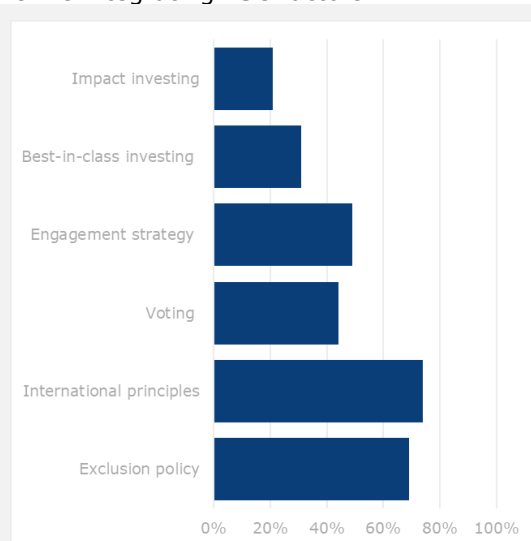


Figure 4.4: Approach to achieving ESG objectives, % IORPs integrating ESG factors



The integration of ESG factors does not necessarily mean that IORPs can easily identify or find suitable, sustainable investments. Of all IORPs, 22% indicated that they experienced difficulties in defining and identifying sustainable investments (figure 4.5) and 16% in finding suitable sustainable investments (figure 4.6).

Figure 4.5: Identification of sustainable investments, % IORPs

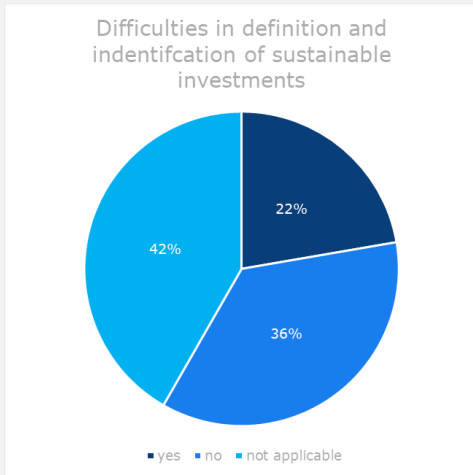
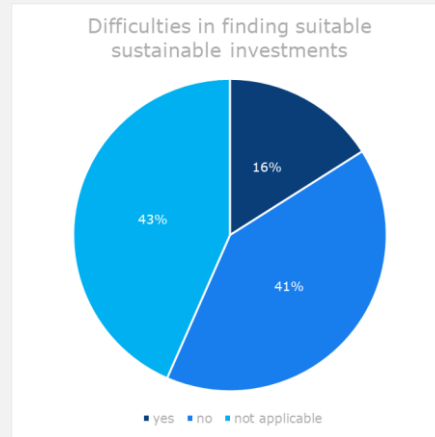
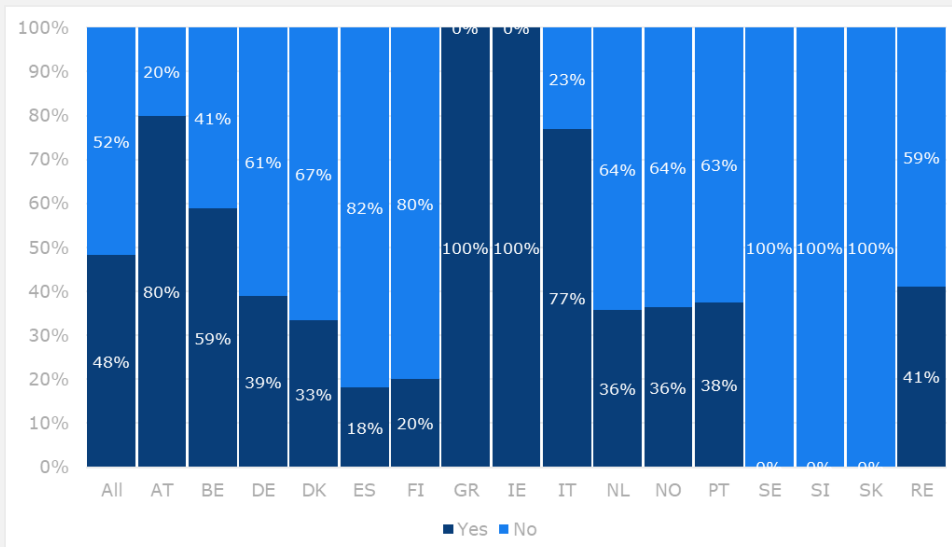


Figure 4.6: Finding suitable sustainable investments, % IORPs



Almost half of participating IORPs expect that the new ESG provisions in IORP II and the Shareholders Rights Directive will have an impact (figure 4.7). This is especially the case for IORPs in IE and GR and to a lesser extent in AT (80%) and IT (77%). Naturally, the expected impact is lower in countries where IORPs have integrated ESG factors already, such as in SE and SI and to a lesser extent in ES (18%) and FI (20%).

Figure 4.7: Expected impact of IORP II and SRD Directives, % IORPs



From 2019, the transposed IORP II Directive requires IORPs to take into account ESG risks in their risk management system. Where ESG factors are considered in investment decisions, IORPs have to assess as part of their own-risk assessment (ORA) new or emerging risks related to climate change, use of resources and the environment, social risks and risks related to the depreciation of assets due regulatory change. Only 30% of IORPs indicated having in place a process to manage ESG risks in advance of the transposition of the IORP II Directive (figure 4.8). All IORPs in SE dispose of such a

process and the majority of IORPs in AT (60%), DE (56%), FI (60%), NL (71%) and NO (55%). The percentage of IORPs having conducted an ORA-type ESG risk assessment ranges from 19-26% (figure 4.9).

Figure 4.8: IORPs having in place a process to manage ESG risk, % IORPs

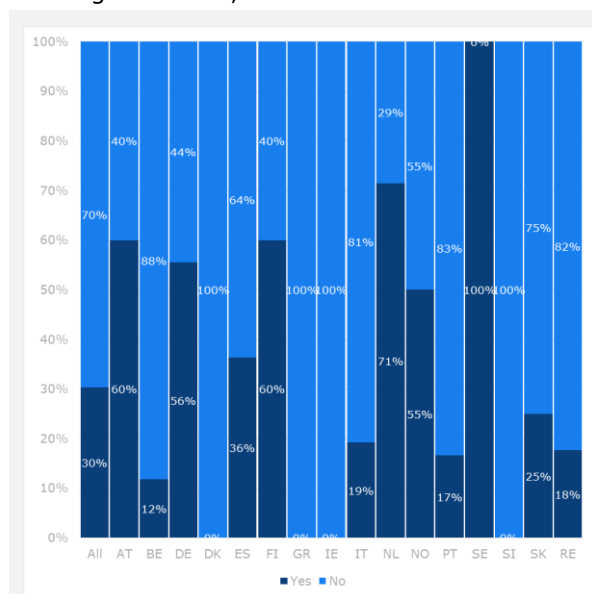
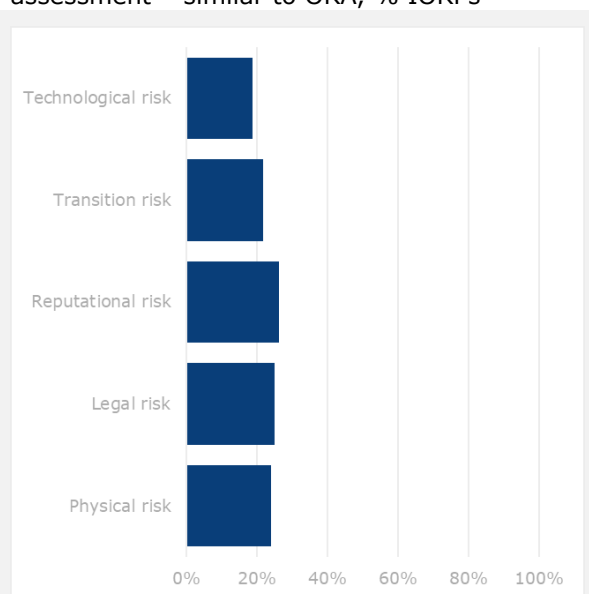


Figure 4.9: IORPs having performed an ESG risk assessment³⁰ similar to ORA, % IORPs



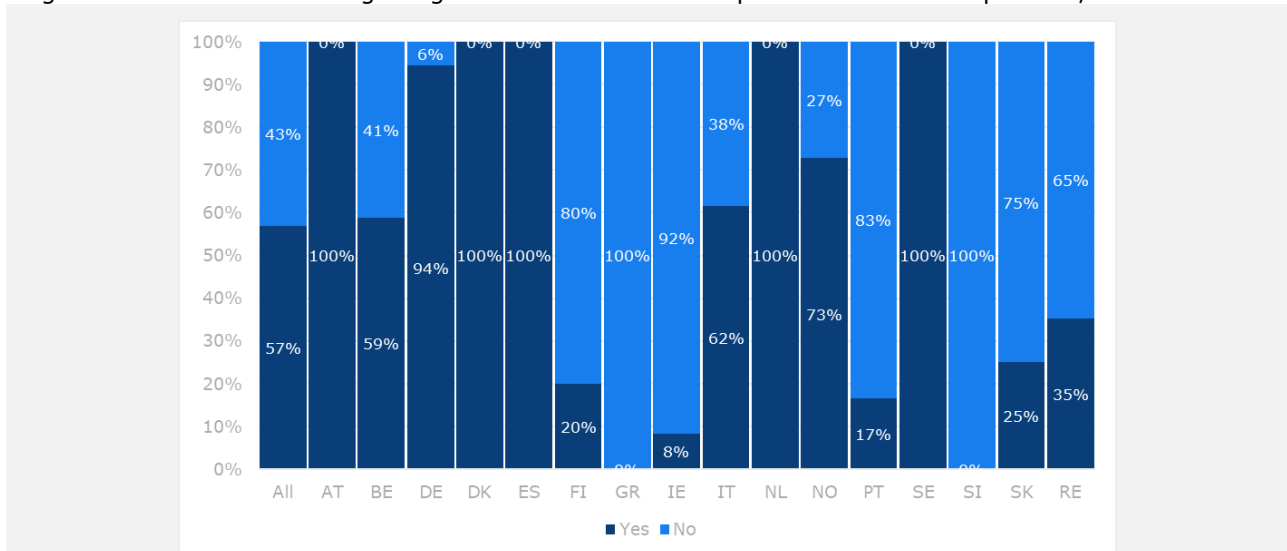
Further, the IORP II Directive requires IORPs to publicly disclose the statement of investment policy principles (SIPP), including a description on how the investment policy takes into account ESG factors. Moreover, IORPs have to inform prospective members on whether and how ESG factors are considered in the investment approach. The Shareholders Rights Directive prescribes that institutional investors, including IORPs, develop and publicly disclose an engagement policy, containing a description of how they engage with investee companies, including on ESG matters.³¹

At the time of the stress test exercise, 57% of the participating IORPs disclosed to plan members and sponsors how they integrate ESG factors in investment decisions (figure 4.10). None or very few IORPs make such disclosures in FI (20%), GR (0%), IE (8%), PT (17%), SI (0%), SK (25%) or rest of the EEA (35%).

³⁰ The survey mentioned the following specific ESG risk assessments: (1) technological risk relating to the significant impact that technological improvements supporting an energy-efficient economic system can have on organisations, (2) transition risk relating to depreciation of assets due to regulatory changes (for example leading to 'stranded assets'), (3) reputational risk relating to mismanagement of the company, fraud, corruption, tax evasion, et cetera; (4) legal risk (including liability risk, reputational damage, etc.) arising from environmental, social or governance factors (working conditions, safety and health of local residents, etc.), (5) physical risk with an impact on profitability due to the direct impact of environmental degradation and climate change (economic losses due to natural disasters, deforestation, pollution, resource depletion, etc.).

³¹ Institutional investors that choose not to develop an engagement policy are required to publicly disclose a clear and reasoned explanation why they have chosen not to do so.

Figure 4.10: IORPs disclosing integration of ESG factors to plan members and sponsors, % IORPs



4.2. Quantitative analysis of investments prone to significant greenhouse gas emission intensity

The qualitative information was complemented by a quantitative survey focussing on greenhouse gas emissions, in particular carbon dioxide, linked to climate change. For that, asset information from IORPs was matched with Eurostat data on greenhouse gas emission intensities by economic activities.

IORPs were requested to provide a breakdown of their investments in three major asset classes by ten economic activities based on the NACE section classification³². For investments in investment funds, the identification of the economic activity followed the underlying assets (i.e. 'look through approach'), not the economic activity of the asset/fund manager or issuer. To simplify the application, IORPs could allocate their assets using the Global Industry Classification Standard (GICS)³³ developed by MSCI and S&P Dow Jones Indices.³⁴

Acknowledging the limitations of such a high-level analysis of IORPs' investments by NACE section codes, the breakdown allows for a rough identification of investments in economic activities that are prone to being exposed to risks related to a transition to a low-carbon environment and may provide insights in the overall greenhouse gas emission intensity or carbon footprint of IORPs' investment assets.

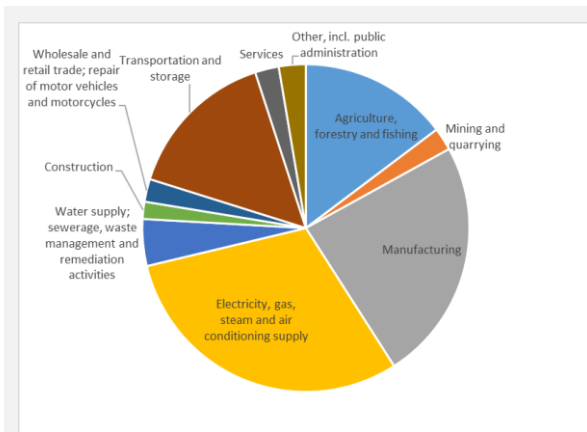
Four economic activities account for 84% of all greenhouse gas emissions in the EU with electricity production amounting to 30%, manufacturing 24% and agriculture and transportation both to 15% of the total greenhouse gas emission (figure 4.11). The absolute amounts of emissions reflect the size of activities relative to the overall economy. The greenhouse gas intensity, measured in kilograms per valued added, is the highest for electricity generation followed by agriculture, water supply and waste management, mining and quarrying, transportation and manufacturing (figure 4.12).

³² See Eurostat: NACE Rev. 2 - Statistical classification of economic activities in the European Community, Methodologies and Working papers, 2008: <https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF/dd5443f5-b886-40e4-920d-9df03590ff91?version=1.0>

³³ See <https://www.msci.com/gics>

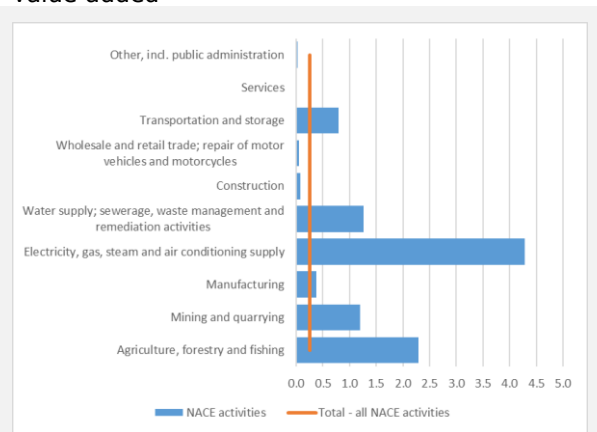
³⁴ 40% of IORPs allocated investment assets directly to the NACE activities, 38% used the GICS classification as an intermediate step, 10% used a combination of both and 12% used an "other" approach.

Figure 4.11: Greenhouse gas emissions by economic activity in EU in 2017, tonnes



Source: Eurostat

Figure 4.12: Greenhouse gas intensity by economic activity in EU in 2017, kg per EUR value added



Source: Eurostat

Due to the limited granularity of the underlying data and the missing ESG taxonomy, the analysis cannot distinguish high-emission and low-emission activities within the ten high-level categories. For example, within the electricity production activity, there may be obvious differences in the greenhouse gas emission between renewable and non-renewable energy. Further, the greenhouse gas emissions by economic activity do not take into account to what extent the various activities already consume energy produced by the electricity production activity and to what extent this implicitly adds to the measured greenhouse gas emissions. Similarly, they do not consider the emissions that occur further on in the value chain of producing final goods and services. Most notably, coal mining and oil and gas exploration constitute a small portion of overall emissions, whereas eventually, these activities could be identified as the main source of carbon dioxide emissions.

Bearing these limitations to the quantitative analysis in mind, figures 4.13 and 4.14 show the equity and debt allocations of IORPs to the most greenhouse gas-intensive economic activities.³⁵ These refer to the four activities that are responsible for most greenhouse gas emissions (in absolute terms) in addition to the mining and quarrying activity. A striking result is that the overall exposure of equity investments to greenhouse gas-intensive industries is relatively high (37%) and of debt investments relatively low (10%). This can be explained by the high proportion of manufacturing companies in publicly traded equities and by the high share of government bonds within the debt asset class.

IORPs in GR, IE, IT and SI have the highest equity exposures to greenhouse gas-intensive activities, ranging from 45% (IE, SI) to 53% (IT), while IORPs in GR, SI and SK have the highest debt exposures, ranging from 15% (SK) to 31% (SI). However, it should be noted that not all IORPs managed to allocate their equity and debt investments to the ten economic activities, especially in ES, RE (both equities) and NL (debt).

³⁵ The results for the 'other investments' category are not presented because of the relatively high proportion of these other assets (36%) not having being allocated to one of the ten economic activities.

Figure 4.13: Greenhouse gas-intensive equity investments, % total equity investments

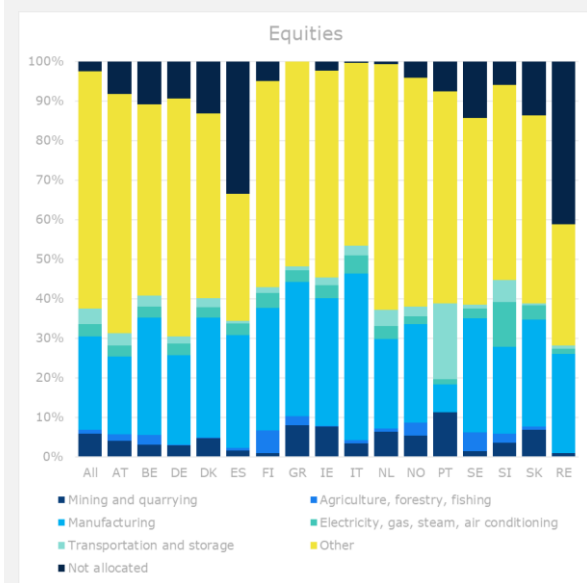
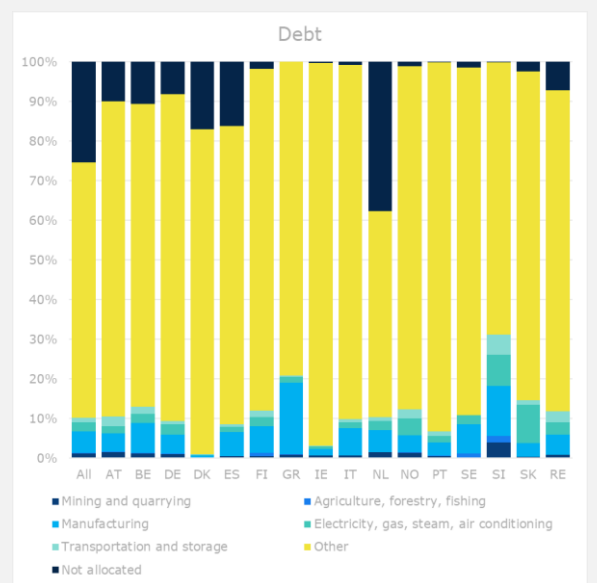


Figure 4.14: Greenhouse gas-intensive debt investments, % total debt investments



The greenhouse gas intensities, which can be translated into a carbon footprint, in figures 4.15 and 4.16 constitute a weighted-average of the greenhouse gas intensities published by Eurostat and IORPs' equity and debt allocations to the ten economic activities. As such, the assumption is made that debt and equity investments in activities outside the EU have the same carbon footprint as the corresponding activities within the EU.

The average carbon footprint of IORPs' equity investments (0.37 kg per EUR value added) exceeds the average greenhouse gas intensity of all economic activities in the EU (0.26 kg per EUR value added), while the average carbon footprint of debt investments (0.22 kg per EUR value added) is lower. This mirrors the relatively high equity allocations and the relatively low debt allocations to greenhouse gas-intensive activities. Equity and debt portfolio have a relatively high carbon footprint in SI (equity and debt) and SK (debt) due to significant investments in the energy sector.

Figure 4.15: Greenhouse gas intensity of IORPs' equity investments by country, kg per EUR value added

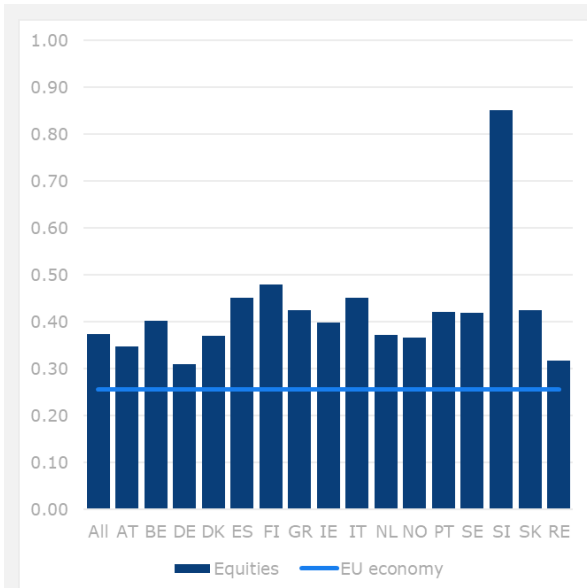
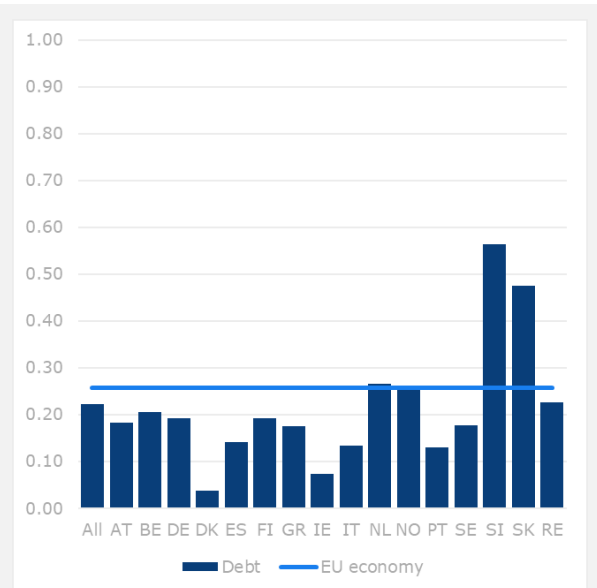


Figure 4.16: Greenhouse gas intensity of IORPs' debt investments by country, kg per EUR value added



Annex: Participating IORPs

Aberto BPI Acções, PT
Aberto BPI Garantia, PT
Aberto BPI Segurança, PT
Aberto BPI Valorização, PT
Aberto Caixa Reforma Prudente, PT
Aberto Horizonte Segurança, PT
Aberto Horizonte Valorização, PT
ABN AMRO Pensioeninstelling N.V., NL
Aegon Cappital B.V., NL
AIB Group Irish Pension Scheme, IE
Allianz Pensionskasse AG, AT
Allianz Pensionskasse AG, DE
ALLIANZ PREVIDENZA FONDO PENSIONE APERTO A CONTRIBUZIONE DEFINITA, IT
Allianz Versorgungskasse VVaG, DE
AMONIS OFP, BE
Amundi Ireland Limited Retirement and Death Benefit Plan, IE
APK Pensionskasse Aktiengesellschaft, AT
ARCA PREVIDENZA - FONDO PENSIONE APERTO, IT
ASSOCIAZIONE FONDO PENSIONE COMPLEMENTARE A CAPITALIZZAZIONE PER I LAVORATORI DELL'INDUSTRIA CHIMICA E FARMACEUTICA E DEI SETTORI AFFINI in forma abbreviata FONCHIM, IT
Aviva Retraite Professionnelle, FR
AXA d.d.s., a.s, SK
BÆRUM KOMMUNALE PENSJONSKASSE, NO
Banco BPI, PT
Banco de Portugal - Benefício Definido, PT
Banco Santander Totta, PT
BANIF, PT
Bar Of Ireland Retirement Trust Scheme, IE
BASF Pensionskasse VVaG, DE
Bayer-Pensionskasse VVaG, DE
BeFrank PPI N.V., NL
BELFIUS OFP, BE
BERGEN KOMMUNALE PENSJONSKASSE, NO
BIL PensionFund- Compartiment Luxembourg, LU
BONUS Pensionskassen Aktiengesellschaft, AT

Bosch Pensionsfonds AG, DE
Brand New Day Premiepensioeninstelling N.V., NL
BVV Versicherungsverein des Bankgewerbes a.G., DE
Compagnie Luxembourgeoise de Pension - Compartiment BCEE, LU
CONOCOPHILLIPS NORGE PENSJONSKASSE, NO
CYPRUS TELECOMMUNICATIONS AUTHORITY - PENSION SCHEME, CY
da Volkswagen Autoeuropa, PT
Daimler Pensionsfonds AG, DE
DNV GL PENSJONSKASSE, NO
do Banco de Portugal - Contribuição Definida, PT
Doplnková dôchodková spoločnosť Tatra banky, a.s., SK
Eircom Superannuation Fund, IE
ELECTRICITY AUTHORITY OF CYPRUS PENSION FUND, CY
EQUINOR PENSJON, NO
ERGO Pensionskasse AG, DE
ExxonMobil OFP, BE
Finnairin Eläkesäätiö, FI
FON.TE - FONDO PENSIONE COMPLEMENTARE PER I DIPENDENTI DA AZIENDE DEL TERZIARIO (COMMERCIO, TURISMO E SERVIZI), IT
FONDO DI PREVIDENZA PER IL PERSONALE DELLA CASSA DI RISPARMIO DI FIRENZE, IT
FONDO NAZIONALE PENSIONE COMPLEMENTARE A CAPITALIZZAZIONE PER I LAVORATORI DELL'INDUSTRIA ALIMENTARE E DEI SETTORI AFFINI in forma abbreviata ALIFOND, IT
FONDO NAZIONALE PENSIONE COMPLEMENTARE PER I LAVORATORI DELLE AZIENDE DI TELECOMUNICAZIONE TELEMACO, IT
FONDO NAZIONALE PENSIONE COMPLEMENTARE PER I LAVORATORI DELL'INDUSTRIA METALMECCANICA, DELLA INSTALLAZIONE DI IMPIANTI E DEI SETTORI AFFINI in forma abbreviata COMETA, IT
FONDO NAZIONALE PENSIONE COMPLEMENTARE PER IL PERSONALE NON DIRIGENTE DI POSTE ITALIANE S.P.A., in forma abbreviata FONDOPOSTE, IT
FONDO PENSIONE A PRESTAZIONE DEFINITA DEL GRUPPO INTESA SANPAOLO, IT
FONDO PENSIONE APERTO IL MIO DOMANI, IT
FONDO PENSIONE COMPLEMENTARE A CAPITALIZZAZIONE DEL SETTORE ENERGIA in forma abbreviata FONDO PENSIONE FONDENERGIA, IT
FONDO PENSIONE COMPLEMENTARE A CAPITALIZZAZIONE PER I LAVORATORI DELL'INDUSTRIA DELLA GOMMA, CAVI ELETTRICI ED AFFINI E DELLE MATERIE PLASTICHE in forma abbreviata FONDO GOMMA PLASTICA, IT
FONDO PENSIONE COMPLEMENTARE A CAPITALIZZAZIONE PER I LAVORATORI DELL'INDUSTRIA TESSILE - ABBIGLIAMENTO, DELLE CALZATURE E DEGLI ALTRI SETTORI INDUSTRIALI DEL SISTEMA MODA - PREVIMODA, in forma abbreviata FONDO PENSIONE PREVIMODA, IT

FONDO PENSIONE COMPLEMENTARE PER I LAVORATORI DIPENDENTI DAI DATORI DI LAVORO OPERANTI NEL TERRITORIO DEL TRENINO ALTO ADIGE in forma abbreviata LABORFONDS, IT

FONDO PENSIONE DIPENDENTI GRUPPO ENEL in forma abbreviata FONDO PENSIONE FOPEN, IT

FONDO PENSIONE FIDEURAM FONDO PENSIONE APERTO, IT

FONDO PENSIONE NAZIONALE A CAPITALIZZAZIONE DEI LAVORATORI, SOCI E DIPENDENTI DELLE IMPRESE COOPERATIVE E PER I LAVORATORI DIPENDENTI ADDETTI AI LAVORI DI SISTEMAZIONE IDRAULICO-FORESTALE ED IDRAULICO-AGRARIA - PREVIDENZA COOPERATIVA, IT

FONDO PENSIONE NAZIONALE DI PREVIDENZA COMPLEMENTARE PER I LAVORATORI ADDETTI AI SERVIZI DI TRASPORTO PUBBLICO E PER I LAVORATORI DEI SETTORI AFFINI, IT

FONDO PENSIONE PER GLI AGENTI PROFESSIONISTI DI ASSICURAZIONE, IT

FONDO PENSIONE PER IL PERSONALE DELL'EX BANCA DI ROMA, IT

FONDO PENSIONI PER IL PERSONALE CARIPLO, IT

FONDO PENSIONI PER IL PERSONALE DELLA EX CASSA DI RISPARMIO DI TORINO - BANCA CRT S.P.A., IT

Galp Energia, PT

GENERALI GLOBAL - FONDO PENSIONE APERTO A CONTRIBUZIONE DEFINITA, IT

Grupo Banco Comercial Português (DB), PT

Grupo EDP, PT

Hamburger Pensionskasse von 1905 VVaG, DE

HOTEL EMPLOYEES PROVIDENT FUND, CY

IBM Deutschland Pensionsfonds AG, DE

IBM Portuguesa, PT

IORP Danmarks Nat. Banks under afv., DK

IORP IBM Pensionsfond, DK

IORP PLAN DE PENSIONES BANCO DE SABADELL, ES

IORP PLAN DE PENSIONES DE EMPLEADOS DE IBERCAJA, ES

IORP PLAN DE PENSIONES DE EMPLEADOS DEL GRUPO BANKIA, ES

IORP PLAN DE PENSIONES DE EMPLEO DE CAIXABANK SA, ES

IORP PLAN DE PENSIONES EMPLEADOS DE TELEFONICA, ES

IORP PLAN DE PENSIONES EMPLEADOS GRUPO ENDESA, ES

IORP PLAN DE PENSIONES IBERDROLA, ES

IORP PLAN DE PENSIONES SANTANDER EMPLEADOS, ES

IORP PLAN DE PENSIONES SISTEMA EMPLEO BBVA, ES

IORP PLAN DE PROMOCIÓN CONJUNTA BANCO POPULAR, ES

IORP PLAN DE PROMOCIÓN CONJUNTA EMPRESAS GRUPO NESTLE, ES

IORP TDC Pensionskasse, DK

IORP_OCCUPATIONAL PENSION FUND FOR EMPLOYEES OF FOOD COMMERCE,
GR/EL

IORP_OCCUPATIONAL PENSION FUND OF INSURERS AND PERSONEL OF INSURANCE
COMPANIES, GR/EL

J&J Pension Fund OFP, BE

Kåpan Pensioner, SE

Keskon Eläkekassa, FI

KRISTIANSAND KOMMUNALE PENSJONSKASSE, NO

LV1871 Pensionsfonds AG, LI

MM Retraite Supplémentaire, FR

MP PENSJON, NO

Multireforma Capital Garantido, PT

NAV - EP Complementos, PT

NN Tatry - Sympatia, d.d.s., a.s., SK

Nokia Bell Pensioenfonds OFP, BE

NORDEA NORGE PENSJONSKASSE, NO

Nordean Eläkesätiö, FI

NORSK HYDROS PENSJONSKASSE, NO

Novo Banco (DB), PT

OFP Aanvullende pensioenen van ING België, BE

OFP BP Pensioenfonds, BE

OFP ELGABEL, BE

OFP PENSIOBEL, BE

OP-Eläkesätiö , FI

Oracle EMEA Limited Retirement Benefits Scheme, IE

PANCYPRIAN PROVIDENT FUND OF PEO MEMBERS, CY

PENSIO B OFP, BE

Pensioenfonds KBC OFP, BE

Pensioenfonds Metaal OFP, BE

Pensionskasse Degussa VVaG, DE

Pensionskasse der Mitarbeiter der Hoechst-Gruppe VVaG, DE

PENSJONSKASSEN FOR HELSEFORETAKENE I HOVEDSTADSOMRÅDET, NO

Pessoal da Caixa Geral de Depósitos, PT

PIR FIDELIDADE - COMPANHIA DE SEGUROS e Associadas, PT

Pokojninska družba A, SI

Pro bAV Pensionskasse AG, DE

PROVIDENT FUND FOR THE DIRECTORS OF PRICEWATERHOUSECOOPERS LTD, CY

PROVIDENT FUND FOR THE EMPLOYEES OF THE BANKS OF CYPRUS, CY

PROVIDENT FUND OF BUILDING INDUSTRY, CY
PROVIDENT FUND OF THE GOVERNMENT HOURLY PAID EMPLOYEES, CY
PROXIMUS Pension Fund OFP, BE
R+V Pensionsversicherung a.G., DE
RWE Pensionsfonds AG, DE
Sava pokojninska družba, SI
SECONDAPENSIONE FONDO PENSIONE APERTO, IT
Siemens Pensionsfonds AG, DE
Skupna pokojninska družba, SI
Société Anonyme de Consolidation des Retraites de l'Assurance, FR
SOLIDARIETÀ VENETO - FONDO PENSIONE, IT
Sparinstitutens pensionskassa, SE
Sparkassen Pensionskasse AG, DE
STABILITA, d.d.s., a.s., SK
Stichting Bedrijfstakpensioenfonds voor de Bouwnijverheid, NL
Stichting Bedrijfstakpensioenfonds voor de Detailhandel, NL
Stichting LifeSight, NL
Stichting Pensioenfonds ABP, NL
Stichting Pensioenfonds Metaal en Techniek, NL
Stichting Pensioenfonds van de ABN AMRO Bank N.V., NL
Stichting Pensioenfonds van de Metalektro (PME), NL
Stichting Pensioenfonds Zorg en Welzijn, NL
Stichting Rabo PGGM Premiepensioeninstelling, NL
Swiss Life International Pension Fund, LU
TAMEIO PRONOIAS ERGATOYPALLHLON MELON SEK, CY
TELENOR PENSJONSKASSE, NO
The Aughinish Defined Contribution Pension Plan, IE
The Central Bank and Financial Services Authority of Ireland Superannuation Scheme 2008, IE
The Citibank Employee Benefit Plan-Ireland, IE
The IBM Ireland Defined Contribution Plan, IE
The Irish Aviation Authority Pension Plan, IE
The Irish Life Staff Benefits Scheme for Irish Employees, IE
The National Federation of Voluntary Bodies Pension and Life Assurance Scheme, IE
The Navigator Company, PT
The PwC Defined Contribution Plan, IE
The Unilever Pension Plan Ireland, LU
TOTAL PENSION FUND BELGIUM OFP, BE

TRONDHEIM KOMMUNALE PENSJONSKASSE, NO

Valida Pension AG, AT

VBV Pensionskasse AG, AT

VR Eläkesäätö, FI

Weshare, PT

Zusatzversorgungskasse des Baugewerbes AG, DE

Zwitserleven PPI N.V., NL