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Technical Report

Modelling of pension policy options, analysis based upon the Wealth and Assets Survey dataset and PPI individual modelling – updated for 2022 PLSA RLS Update

Analysis sponsored by the PLSA

PENSIONS AND LIFETIME SAVINGS ASSOCIATION

About this paper

This Technical Report details an update to the previously published write-up (October 2022) based on revisions to the Retirement Living Standards. It includes:

- Background to the analysis
- Modelling approach taken
- Observations and commentary upon the results
- Conclusions

Full results of the modelling are available in a separate Appendix.

Tim Pike, Head of Modelling; and John Upton, Policy Analyst, at the Pensions Policy Institute (PPI), carried out the modelling and produced this Technical Report between December 2022 – September 2023.

The PPI is grateful for the input from Nicky Day and Simon Sarkar, of the PLSA, in the production of this paper. Editing decisions remain with the authors, who takes responsibility for any remaining errors or omissions.

Sponsorship has been given to help fund the research, and does not necessarily imply agreement with, or support for, the analysis or findings from the project.

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Section 1: Background to the analysis

Introduction

This report builds on the work of two previous Technical Reports:

- The first Technical Report titled Projection of future pensioner household income, analysis based upon the Wealth and Assets Survey dataset,[1] explored what different generations of people who are currently working might earn in retirement. It examined their income through the lens of retirement income standards, allowing the findings to be framed in terms of adequacy, and reveal the implications for the quality of life of many people approaching retirement.
- The second Technical Report titled Modelling of pension policy options, analysis based upon the Wealth and Assets Survey dataset and PPI individual modelling,[2] expanded on this work by imagining these same people under different policy scenarios proposed by the Pensions and Lifetime Savings Association (PLSA), comparing their Retirement Living Standards in each scenario to estimate the improvement these proposals would bring. The report also made use of the PPI's Individual Model, to explain the impacts of the policy changes on representative individuals which complemented the population wide statistics.

These previous Technical Reports found that large sections of the working population – especially older generations – are currently not on track to hit minimum retirement living standards. Further, that the second Technical Report found that the PLSA's proposed policy changes, when combined, would bring a significant proportion of those missing the PLSA minimum retirement income standard up to this level.

This Technical Report updates:

- The work of the first Technical Report to project the future retirement adequacy of the current working population using the Wealth and Assets Survey, and
- The section of the second Technical Report that used the PPI's Individual Model.

These are updated in order to reflect developments in the last year:

- The high inflation and subsequent uprating of the 2023/24 State Pension in line with the triple lock, and
- The updated PLSA Retirement Living Standards.[3]

These have implications for the results of the PPI's models, and the interpretation of the data. This report / paper covers the updated output.

Research Question:

The intention of the analysis is to provide quantitative evidence to support research into the question:

To what extent do the recent changes in pensions policy, economic indicators and retirement living standards affect the findings of PPI research into retirement adequacy?

[1] Pike, et al.[PPI] (2022)
[2] Pike, et al. [PPI] (2022)
[3] PLSA (2023)

Income targets

As in the previous Technical Reports,[1, 2] the PLSA Retirement Living Standards and the Pensions Commission Replacement Rates were the benchmarks used to assess pension adequacy under various simulated policy conditions.

There are two traditional approaches to benchmarking retirement incomes which stem from these different perspectives:

1. Fixed income targets

Fixed income targets have their origins in the State underpin and avoidance of deprivation but have developed into 'basket of goods' approaches (the cost of a basket of goods and services required to meet a certain level of need or lifestyle standard). This method is used by the Joseph Rowntree Foundation (JRF) in their Minimum Income Standard (MIS) and by the PLSA to produce their 'Minimum', 'Moderate' and 'Comfortable' Retirement Living Standards. These 'basket of goods' approaches produce living standard targets in terms of the fixed incomes required to achieve these levels, regardless of working-life income levels.

These targets vary at each level to allow for different household circumstances, including housing costs and household composition, which significantly impact per person expenditure within a household.

2. Proportional income targets

Proportional income targets focus on assessing subjective individual comfort. This approach has its origins in the view of the engaged employer and is embedded in the design of final salary pension arrangements. The Pensions Commission used this approach to make its adequacy assessments, which produced targets in the form of 'replacement rates'[4] - the proportion by which retirement income replaces other income immediately before retirement. A target replacement rate is one which allows people to replicate working-life living standards in retirement.

These replacement rates depend upon income prior to retirement: it is generally assumed that those with the lowest incomes prior to retirement will need to maintain this income level into retirement, while those with higher incomes may not need to maintain these levels, as their expenditure will undergo a relative decrease due to circumstances associated with retirement. These include:

- paying off a mortgage, resulting in a significant reduction in living costs;
- reduction in potentially substantial travel costs associated with stopping work; and
- reduced discretionary spending as expenditure reduces with older ages.

[4] Pensions Commission (2005)

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Section 2: Modelling approach

Introduction

Two separate pieces of modelling work were updated from two previous PPI Technical Reports: one using projections based on the Wealth and Assets Survey (WAS), and another using the PPI's Individual Model.

Common Assumptions

Both previous analyses used identical assumptions about retirement behaviour and saving behaviour. The common assumptions between the WAS section and the Individual Model section are listed here. The modelling is then discussed in two separate sections, and in those any assumptions specific to that analysis are given.

Retirement behaviour

People are modelled to claim the new State Pension (nSP) and other applicable benefits. After retirement, there is assumed to be no earned income.

Income derived from capital sources, such as Defined Contribution (DC) pension savings, formal financial assets or housing equity, is taken at an initial amount of 3.5% of the starting capital. This allows for the amount to be increased with inflation throughout retirement to protect against the impact of price inflation. The chance of the capital having been exhausted prior to death using this approach is approximately 5%[5] and, as such, can be regarded a sustainable rate of income drawdown of capital.

Saving behaviour and pension accrual

Individuals were assumed to contribute a fixed percentage of their salary towards a DC pension fund, according to the contribution rate being modelled in the given scenario, throughout their working life.

DC assets are projected to achieve investment returns of 1½% above increases in Average Weekly Earnings.

WAS Modelling

Data

The model projects to retirement the microdata pertaining to working-age individuals collected in the Wealth and Assets Survey (WAS).[6] The number of households sampled in round 7 was approximately 17,500 (reduced due to the move to financial year reporting). This includes data for nearly 39,000 individuals aged 25 to 64 years old, weighted to be representative of the population of Great Britain.

The PPI projects the retirement income accrual of each relevant individual to State Pension age (SPa), considering the following individual circumstances.

- Savings to date;

[5] Wilkinson, L. et al. Pensions Policy Institute (2018)
[6] ONS (2022)

- Current saving situation;
- Housing tenure;
- Projected employment trajectory, including earnings levels; and
- Future savings accrual.

The working-age trajectory includes:

- Earnings at a consistent level within age-dependent earnings distribution. Individuals are assumed to earn income at a consistent level relative to the distribution of income by ages as a proportion of median earnings. This allows for promotional increases in salary and any propensity to reduce working hours.
- Future working allows for periods out of work based upon a future number of expected years in the labour force by age, derived from analysis of the Labour Force Survey.[7]

Assumptions specific to WAS modelling

Saving behaviour and pension accrual of WAS population

Pension saving

Defined Contribution (DC) pension schemes

Employees who are currently making contributions to a DC workplace pension scheme are assumed to continue making contributions while in employment, with a contribution rate of at least the legislated minimum under automatic enrolment. This follows the working-age trajectory of income and future working as described above. Workers who are not members of workplace pension schemes, primarily the self-employed and those who have opted out, are not assumed to make contributions to a workplace pension.

Defined Benefit (DB) pension schemes

Employees who are members of DB pension schemes are assumed to continue to accrue benefits to retirement in a scheme equivalent to their current membership, subject to their working-age trajectory. This especially is worth noting as the policies only affect DC savings, and so including DB income in the modelling can appear to reduce the effects of the policies compared to individual modelling that assumes no DB savings.

Housing assets and housing benefit

Homeowners currently paying mortgages: Mortgages are assumed to be paid off by retirement, future generations are assumed to have attained the same extent of home ownership as current generations by retirement (allowing for later transitions for transitioning from renting to ownership).

Where households rent in retirement: Households may be eligible for Housing Benefit. This means-tested benefit effectively reduces the need to support housing costs from other income sources.

Formal financial assets

Formal financial assets are expected to achieve investment returns consistent with DC pension savings.

Retirement Behaviour of WAS population

Prior to SPa, pension savings are untouched as households are assumed to be able to finance until SPa without needing to access pension savings.

[7] Mitchell and Guled (no date). NISRA and ONS (2022)

Assessment of income level of WAS population

Retirement income is calculated at three levels for each household:

- **'Standard income'** is defined as the income from the State Pension, DB entitlement and DC savings, but after taking a tax-free lump sum taken from pension savings at retirement, which is not included in this level.
- **'Additional capital'** includes all items in standard income, as well as income generated from pension lump sums and financial assets.
- **'Housing capital'** includes all items in additional capital, as well as income generated through releasing equity from housing wealth.

Assessment of retirement outcomes

Each projected individual will be measured against income levels. This will include both fixed income approaches and proportional income targets.

Pensions & Lifetime Savings Association (PLSA) Retirement Living Standards

The Retirement Living Standards produced by the PLSA are based on the Minimum Income Standards (MIS) research supported by the Joseph Rowntree Foundation (JRF) and carried out by the Centre for Research in Social Policy (CRSP) at Loughborough University. It determines an annual target income under three different retirement living standards (Minimum, Moderate and Comfortable) for those living in London and outside London, and for single person and couple households [Table 2.1]. These were independently reviewed and revised by Loughborough University and published by the PLSA early in 2023, and this is one of the reasons that the analysis has been updated.

Table 2.1: PLSA Retirement Living Standards net household income levels[3]:

PLSA Retirement Living Standards	Single households		Couple households	
	Outside London	London	Outside London	London
Minimum	£12,800	£14,400	£19,900	£22,900
Moderate	£23,300	£28,300	£34,000	£41,400
Comfortable	£37,300	£40,900	£54,500	£56,500

Pensions Commission Target Replacement Rates (TRRs)

This measure considers whether an individual can achieve a standard of living comparable to the standard of living the individual had before retirement. This approach was used by the Pensions Commission in 2005. It defines a proportion of working age income that is necessary in retirement to maintain living standards after retirement [Table 2.2].

Table 2.2: Pension Commissions TRRs[4]:

Pre-retirement gross earnings (2004)	Pre-retirement gross earnings (2021) *	Replacement rate threshold
Up to £9,500	Up to £15,000	80%
£9,500 to £17,500	£15,000 to £27,500	70%
£17,500 to £25,000	£27,500 to £39,300	67%
£25,000 to £40,000	£39,300 to £62,800	60%
£40,000 or more	£62,800 or more	50%

*Figures for 2021 are taken directly from official government statistics, however for the purposes of analysis these bands can be uprated suitably for any given year.

These income levels are applicable to individual incomes. To apply these to multiple occupancy households, the household income is first equivalised and then comparison to the threshold is made.

Pre-retirement gross earning thresholds have been uprated using earnings inflation.

Each of the adequacy measures were applied to individuals in the WAS round 7 dataset, giving a proportion of the population meeting each target level.

Policy options

Four policies, identified by the Pensions and Lifetime Savings Association (PLSA), were modelled as potential options for improving retirement income adequacy in the individual modelling carried out in the second paper.

1. Contribution Rates

Currently, automatically enrolled pension savers who do not make any changes to the default arrangement contribute 5% of their salary to their pension, with their employer contributing 3%, to make a total of 8% salary contributions. One way to increase an individual's pension savings would be to increase the total salary contribution, through some combination of employee and employer contributions.

2. Qualifying Earnings

This calculation on qualifying earnings is currently only made on salary lying within certain bands – above a minimum level and below a maximum level. In the 2022/23 tax year, the lower limit is £6,240 and the upper limit is £50,270. A second way to increase the amount that earners contribute to their pension would be to remove these limits.

3. State Pension Level

The State Pension provides a guaranteed income in retirement to anyone who has paid enough in National Insurance contributions to qualify for it. Increasing the level of State Pension to be in line with retirement standards would have a high chance of ensuring those standards are met for most people.

4. Minimum age of contribution

Currently, employees are automatically enrolled into pension schemes when they reach 22 years of age. Lowering this age threshold to 18, as recommended by the Automatic Enrolment Review conducted in 2017,[8] would allow people to contribute earlier and therefore increase their pension pot.

Modelling Policy Options

For the WAS modelling section of this report, the policy situation was modelled as it currently exists, in order to best estimate the future retirement outcomes of the current working population. For the section of the report that aims to examine the effectiveness of the proposed PLSA policy changes, the following options were modelled.

Contribution rates

The contribution rates modelled were 8%, 12% and 16% modelled in depth being made up of 5% + 3%, 6% + 6%, and 12% + 6% from the employee and employer respectively.

Earnings limits

The limits were modelled as either being kept and uprated in line with earnings or removed altogether. If being modelled as being kept, they started with their 2022 values of £6,240 and £50,270.

State Pension

The State Pension was modelled as being set at either the current level, or the PLSA Minimum RLS level (see Table 2.1) and uprated in line with the triple lock. The triple lock uprates the State Pension by the higher of earnings, the rise in the consumer price index, or 2.5%. There are currently no stated plans to end the triple lock policy. The government has committed to retaining it until at least the end of the current parliament in 2024.

Individual Modelling

Data

The PPI's Individual Model is based on the Office for Budget Responsibility (OBR) figures for the Economic and Fiscal Outlook (EFO). It is these figures, and the updates to them following the gilts crisis, that prompted this update to the original paper that this paper builds on. These figures provide a projection of economic determinants such as inflation. With these assumptions about the future of the economy, it is possible to project and model other policies and conditions that would affect a DC saver in the future, and therefore estimate their retirement income.

[8] DWP 2017

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Assumptions specific to individual modelling

Characteristics of individuals under individual modelling assumptions

All individuals modelled for this report were assumed to be 18 in 2022. The individuals may start work and finish working at various ages. The median salary for each gender and age was derived from the Labour Force Survey,[9] and all individuals modelled were assumed to be earning, throughout their life, one of:

- Median earnings;
- Half of these median earnings; or
- Double these median earnings.

Individuals could have complex working patterns throughout their life, for example by taking breaks or working part-time, but while they were working, their salary was adjusted so that they would either be earning the median, half the median, or twice the median salary for their age, gender and employment status.

Saving behaviour and pension accrual under individual modelling assumptions

Defined Benefit (DB) pension schemes

Individuals were modelled as having no DB pension entitlements. This is out of scope of the individual modelling.

Housing assets and housing benefit

Individuals were modelled as not receiving housing benefit, and retirement income was given without any housing costs deducted.

Formal financial assets

Individuals were modelled as having no formal financial assets such as other investments.

Retirement behaviour under individual modelling assumptions

People are projected to retire at various ages, access pension savings and claim the new State Pension (nSP) and other applicable benefits. Individuals may retire before SPa, in which case they will start accessing their DC pension savings at that point. After retirement, there is assumed to be no earned income.

The individuals are modelled as not choosing to take a tax-free lump sum at retirement, but to keep this money in their pension fund to draw down from.

[9] Labour Force Survey, 2021

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Section 3: Observations and commentary upon the results

WAS Modelling

Updated results for those produced in the first Technical Report are available in the Appendix, and the same figures that were highlighted in that are highlighted again here.

The updated results continue to show that significant proportions of the population are set to miss the retirement income targets set by the PLSA Minimum Retirement Living Standard and the Pensions Commission TRRs calculated on a personal/household basis. Furthermore, we see that the PLSA Moderate and Comfortable standards are unattainable for the majority of the population.

The updated results show some movement in some of these areas, though not enough to alter the overall implications of the results. We see that:

- Even using equity release on their home, a quarter (25%) of working households are projected to miss the PLSA's Minimum Retirement Living Standard.
- Restricting this to only the households that contribute to a DC pension, we find that 19% will still miss this target.
- We also see that the risk of missing the Pensions Commission's Target Replacement Rates (TRRs) increases for households that contribute to a DC pension depending which generation they are from – older segments of the working population are more likely to miss these targets.
- We also see that the risk of a household that contains a couple missing the PLSA's Minimum RLS is much lower, at 10%.

Table 3.1: The proportion of working-age households projected to miss retirement income thresholds

Retirement income threshold	Proportion of households below the income threshold		
	Standard Income	Additional Capital	With Housing Equity
PLSA RLS Minimum	33%	29%	25%
PLSA RLS Moderate	80%	70%	62%
PLSA RLS Comfortable	96%	91%	89%
Pensions Commission Target Replacement Rates	57%	48%	39%

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Table 3.2: The proportion of working-age households contributing to DC pensions projected to miss retirement income thresholds

Retirement income threshold	Proportion of households below the income threshold		
	Standard Income	Additional Capital	With Housing Equity
PLSA RLS Minimum	25%	21%	19%
PLSA RLS Moderate	79%	65%	57%
PLSA RLS Comfortable	97%	92%	88%
Pensions Commission Target Replacement Rates	75%	60%	49%

Table 3.3: The proportion of working-age households contributing to DC pensions projected to miss target replacement rates, by generation.

Generation	Proportion of DC saving households attaining Pensions Commission TRRs using income from additional capital.
Millennials	34%
Generation X	38%
Baby Boomers	53%

Table 3.4: The proportion of working-age households projected to miss retirement income thresholds by household status.

Retirement income threshold	Proportion of households below the income threshold using income from additional capital.	
	Couples	Singles
PLSA RLS Minimum	10%	55%
PLSA RLS Moderate	56%	87%
PLSA RLS Comfortable	88%	96%

Table 3.5: The proportion of working-age households contributing to DC pensions projected to miss target replacement rates, for those with the highest and lowest incomes.

Retirement income threshold	Proportion of households making DC savings below the income thresholds using income from additional capital.	
	Lowest Income Quintile	Highest Income Quintile
PLSA RLS Minimum	44%	3%
PLSA RLS Moderate	88%	33%
PLSA RLS Comfortable	98%	80%
Pensions Commission Target Replacement Rates	31%	80%

Individual Modelling

A wide range of individuals were modelled using the Individual Model. The full set of results is available in the Appendix. This section shows some of the key findings from implementing the following policy recommendations:

- Increasing contribution rates to 16%
- Increasing the State Pension to the level of the PLSA Minimum RLS;
- Lowering the age threshold of automatic enrolment to 18; and
- Removing qualifying earnings bands.

We see that implementing all of these policies for a person who earns at the median level for their gender at every age, and who works consistently full-time from 18 to the projected State Pension age (SPa) of 68, would see an improvement of 45%/43% to their retirement income. This is not only a significant increase, but represents a large proportion of the population. The Appendix contains many more representative individuals, who earn at different levels, retire early, or take breaks from full-time employment to work part-time or stop working altogether.

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Table 3.1: Weekly retirement earnings of median earners, before and after implementation of proposed policy changes by the PLSA

Age	Man, current situation	Man, all policies implemented	Woman, current situation	Woman, all policies implemented
68	£359	£567	£343	£534
70	£355	£554	£341	£524
75	£347	£525	£334	£499
80	£340	£498	£330	£476
85	£335	£475	£327	£457
90	£331	£454	£324	£441
95	£328	£438	£323	£428
Retirement average	£339	£492	£330	£473

Table 3.2: Weekly retirement earnings of woman with unemployment spell in working life, before and after implementation of proposed policy changes by the PLSA

Age	Current situation	All policies implemented
68	£280	£383
70	£282	£382
75	£285	£380
80	£289	£378
85	£294	£377
90	£298	£379
95	£303	£380
Retirement average	£291	£379

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Section 4: Conclusions

The first part of this Technical Report, updating earlier projections of the retirement outcomes of the current working population based on the Wealth and Assets Survey, demonstrates that large portions of the population are not on track to hit minimum standards for quality of life in retirement. This is especially prevalent for older segments of the working population and single people. This update to the report provides more up to date figures with some small movements in the proportions of certain cohorts hitting these targets, but ultimately, the key takeaways remain the same.

The second part of this Technical Report, updating modelling of representative individuals under different policy scenarios, namely the existing situation and all proposed PLSA policy changes in combination, demonstrates that the PLSA's suite of policy changes would bring an improvement to many individuals' retirement outcomes.

The full suite of representative individuals commissioned by the PLSA is extensive. Improvement is brought to the retirement outcome of every individual, and in the cases of many individuals that are representative of large sections of the population, that improvement is significant.

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Appendix

Additional results

Full results of all the modelling are available in the separate Appendix here.

Projection Assumptions

Key assumptions

Except where explicitly stated in the report, the key assumptions used in the report are detailed below.

The pensions system

The pension system is modelled as currently legislated. The triple lock is assumed to be maintained. In the Wealth and Assets Survey (WAS) modelling, it was assumed that policies would be implemented in 2027, as a best guess for when they might realistically be implemented. However, in the individual modelling, it is assumed that policy changes are implemented from 2022. While this would be too soon to implement in practice, this aims to provide figures for an illustrative argument, and reduce liability of incorrectly predicting the date of implementation.

Other economic assumptions

Other economic assumptions are taken from the Office for Budget Responsibility's (OBR) Economic and Fiscal Outlook (EFO)[10] (for short-term assumptions) and Fiscal Sustainability Report[11] (for long-term assumptions). Investment returns are assumed to be 1.5% above the rate of increase in average earnings.

Limitations of analysis

Care should be taken when interpreting the modelling results used in this report. In particular, individuals are not considered to change their behaviour in response to their pension provision or personal circumstances. For example, an individual will not increase their contributions to pension saving as they approach retirement, or have higher incomes.

Key results

The key output from the model is the built-up pension wealth and entitlement over the course of the individual's work history and the post-retirement income that results from this.

The post-retirement income is presented as projected cashflows from retirement over the future lifespan of the individual. These are annual cashflows which include the following key items:

- State Pension
  - Reflects entitlement and the projected benefit level of State Pension components.
- Private pension
  - Derived from the decumulation of the pension pot, allowing for tax-free cash lump sum and the chosen decumulation style (e.g., annuity or drawdown).
- Other State benefits
  - Other benefits contributing to post-retirement income, such as Pension Credit.

[10] OBR (2021)
[11] OBR (2020)

- Tax
  - Tax payable on the post-retirement income, to understand the net income available to the individual.

These cashflows are calculated as nominal amounts and restated in current earnings terms.

Outcomes are expressed in current earnings terms for two reasons; it improves the comprehension of the results and reduces the liability of either overly optimistic or cautious economic assumptions.

Application of output

The models are best used to compare outcomes between different individuals, policy options, or other scenarios. The results are best used in conjunction with an appropriate counterfactual to illustrate the variables under test.

Key data sources

The specification of a model run is based upon three areas:

1. The individual

The individual to be modelled is specified based upon an earnings and career profile. Saving behaviour for private pension accumulation is considered, as well as the behaviour at retirement.

These are generally parameterised according to the project in question, designed to create vignettes to highlight representative individuals of the groups under investigation.

2. The policy options

The policy option maps the pension framework in which the individual exists. It can accommodate the current system and alternatives derived through parameterisation. This allows flexing of the current system to consider potential policy options, in order to assess their impact upon individuals under investigation.

This area has the scope to consider the buildup of pensions in their framework, such as the automatic enrolment regulations for private pensions and the qualification for entitlement to State benefits.

The framework in retirement allows for the tax treatment and decumulation options taken by the individual, as well as other sources of State benefits which influence the post-retirement outcomes for individuals.

3. Economic assumptions

The deterministic assumptions used in this analysis are taken from the OBR's EFO to ensure consistency. They cover both historical data and future projected values.

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References

1. Pike, T. et al. Pensions Policy Institute. (2022). Projection of future pensioner household income, analysis based upon the Wealth and Assets Survey dataset
2. Pike, T. et al. Pensions Policy Institute. (2022). Modelling of pension policy options, analysis based upon the Wealth and Assets Survey dataset and PPI individual modelling
3. Pensions and Lifetime Savings Association (2023), Retirement Living Standards
4. Should this be Pensions Commission (2005), A New Pension Settlement for the Twenty-First Century: The Second Report of the Pensions Commission
5. Wilkinson, L. et al. Pensions Policy Institute. (2018). The evolving retirement Landscape.
6. Office for National Statistics, Social Survey Division, 2022, Wealth and Assets Survey, Waves 1-5 and Rounds 5-7, 2006-2020, [data collection], UK Data Service, 16th Edition, Accessed 17 May 2022. SN: 7215, DOI: 10.5255/UKDA-SN-7215-16
7. Mitchell and Guled (no date). Average age of withdrawal from the labour market: a methodology update Northern Ireland Statistics and Research Agency (NISRA), Office for National Statistics, Social Survey Division, 2022, Quarterly Labour Force Survey, October - December, 2021, [data collection], UK Data Service, Accessed 18 May 2022. SN: 8915, DOI: 10.5255/UKDA-SN-8915-1
8. Department for Work and Pensions (2017), Automatic Enrolment Review 2017: Maintaining the Momentum
9. Office for National Statistics. (2022). *Quarterly Labour Force Survey, January - March, 2021*. [data collection]. *4th Edition.* UK Data Service. SN: 8806, DOI: 10.5255/UKDA-SN-8806-4
10. Office for Budget Responsibility (2022), Economic and fiscal outlook – November 2022
11. Office for Budget Responsibility (2022), Fiscal Sustainability Report – July 2022