Care and State Pension Reform

State Pension and Long-term Care Funding Reforms: the costs and distributional effects of alternative uprating policies: Technical Report

State Pension and Long-term Care Funding Reforms: the Costs and Distributional Effects of Alternative Uprating Policies

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1. Introduction

In April 2016, major reforms to state pensions were implemented in Great Britain. Reforms to the English long-term care financing system were also to be introduced in 2016 but have been postponed until 2020. The CASPeR[1] project analyses the combined effects of these two sets of reforms and the interactions between them.

The work involves researchers from the Pensions Policy Institute (PPI)[2], the Personal Social Services Research Unit (PSSRU) at the London School of Economics and Political Science (LSE)[3] and the Health Economics Group at the University of East Anglia (UEA).[4]

As part of the CASPeR project, three existing simulation models have been linked and further developed:

- the PPI's dynamic microsimulation model;
- the PSSRU's (aggregate) long-term care projections model ; and
- UEA's microsimulation model, CARESIM, which simulates long-term care charges.

In this report we use these models to analyse the costs and distributional effects of alternative uprating policies for state pensions and state funding for long-term care. Appendix A contains a detailed description of the models, as well as the linkages between them. Appendix B provides further details on the linkage between CARESIM and PPI's dynamic model, a major development carried out as part of the project. Appendix C provides the specific economic assumptions that were used to simulate a base case scenario and variations from it in this application of the models.

This report complements a report of the findings from the CASPeR project as a whole (Adams et al. 2016). It provides additional detail on the analysis of alternative uprating policies and of the methods underpinning that analysis.

[1] http://www.pensionspolicyinstitute.org.uk/casper
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2. The state pension and long-term care reforms

a. The state pension reforms

For people reaching State Pension age from April 2016, a new State Pension (nSP) has replaced the basic State Pension (bSP) and the State Second Pension (S2P) and its predecessor, the State Earnings Related Pension Scheme (SERPS). At £155.65 a week, the full level of the nSP has been set five pence above the minimum guaranteed income for pensioners – known as the Guarantee Credit within the means-tested benefit Pension Credit. Some people retiring from April 2016 will get more than the full level of the nSP – if their accumulated state pension entitlements at the time the nSP was introduced are higher than if the nSP had been in place. People will get less than the full level if they have not made – or been credited with – sufficient National Insurance Contributions.

Savings Credit – a component of Pension Credit – has been removed for people reaching State Pension age from April 2016, on the grounds that the full level of the nSP is above the minimum income level guaranteed through Pension Credit.

The changes do not apply to people who reached State Pension age before the new arrangements were introduced. All pensioners will continue to be able to apply for Pension Credit and means-tested help with their rent and/or council tax. Entitlements to these benefits may be lower than they would have been under the previous system if state pension entitlements exceed what they would have received under the basic State Pension.

Box 1 provides more details of the reformed state pension system.

Box 1: Details of the state pension reforms implemented in April 2016

The new single tier state pension

- The **new State Pension (nSP)** replaced the previous two-tier system of a flat rate **basic State Pension (bSP)** and an earnings-related component – the **State Second Pension (S2P)**, or its predecessor the State Earnings Related Pension (SERPS) – for those reaching State Pension age from April 2016.
- Like its predecessor, entitlement to the new State Pension depends on a person's **National Insurance Contribution (NIC)** record. **Thirty-five years of NICs are necessary to qualify for a full nSP** compared with 30 years under the previous system, and a minimum of 10 years' contributions is needed to qualify for any amount. Since there is no longer an earnings-related component of the state pension, 'contracting-out' is no longer possible.
- **Protection of accumulated state pension entitlements** for those under State Pension age: when the new State Pension was introduced, a **foundation amount** was calculated for each individual, based on their entitlement built up under the previous state pension system. This is then compared to the amount that the individual would have built up if the new State Pension system had been in place. Individuals will then take forward the higher of the two amounts (adjusted for time spent contracted out of the S2P and SERPS) into the new system. If the foundation amount is higher than the new single-tier level, the amount above the single-tier level will be protected and paid on top of the new State Pension.
- The three main means-tested benefits for pensioners – **Pension Credit, Housing Benefit and Council Tax Support** continue to be available. People whose state pension income is higher under the new State Pension than it would have been under the previous system will be entitled to reduced amounts of Pension Credit, Housing Benefit and Council Tax Support.
- Pension Credit aims to ensure that pensioners' incomes do not fall below a minimum (the **Guarantee Credit**) and also provides a 'reward' through the **Savings Credit** component. The Savings Credit is being removed for people reaching State Pension age from April 2016.
- The nSP has been set just above the Guarantee Credit with the intention of reducing the number of pensioners receiving means-tested benefits.
- **Uprating requirements**: legislation requires government to uprate the nSP annually by at least the increase in average earnings. The present Government has given a commitment to uprate it by the '**triple lock**' – the highest of the annual increase in earnings, prices or 2.5%. The standard Guarantee Credit – before any additions e.g. for disability – must be uprated by at least earnings.

b. The long-term care reforms for older people

The 2014 Care Act introduced changes to long-term care funding in England. Currently when people need long-term care, their Local Authority (LA) applies a means test to establish how much they must pay towards the cost of that care. Those with capital above an upper threshold have to meet all of their care costs and where care is provided in a care home, the value of a person's home is usually included in their capital. If their capital is below the threshold, they have to contribute to the cost of their care from their income.

The reforms planned to start in April 2020 introduce a lifetime cap on individual liability for care costs. For care in a care home, only the part attributed to care counts towards the cap. The component of care home fees attributed to 'daily living costs' (sometimes referred

to as 'hotel costs') does not count towards the cap. To reach the cap people will need to have eligible needs for a considerable period (typically around at least 3 years depending on the cost of meeting their care needs).

The long-term care reforms also increase the upper capital threshold for people in residential care. As now, people who are initially not entitled to public support with their care costs may become entitled to some support if their savings fall below the upper threshold even if they have not yet reached the cap.

People with care needs may also be eligible for one of two non means-tested cash benefits for people with disabilities, and to supplements to any means-tested benefits. The treatment of these benefits in the long-term care means test is complex. It is explained along with further details of the current long-term care funding system and planned reforms to it Box 2.

If an individual's net income changes as a result of increases or decreases in their state pension entitlement, the contribution they are required to pay towards their care costs can change. Thus, an increase in state pension income can be wholly or partially offset by an increase in liability for care charges. For those not entitled to public support with their care costs, increases in income can also slow down the rate at which they need to deplete their capital to pay for care.

Box 2: Details of the current means test for long-term care and reforms planned for 2020

An individual's entitlement to state help with the costs of long-term care depends on an assessment of their care needs and on a means test, both of which are administered by a Local Authority (LA)

The current system

- If the individual has capital above an '**upper capital threshold'**, currently £23,250, the individual pays the full cost of their care. For residential care, the value of the home is usually included in capital after the first 12 weeks.
- When capital is below £23,250, the state meets some of the cost depending on the individual's assessable income.
- Assessable income includes a notional weekly income, known as '**tariff income'** on capital between a '**lower capital threshold**', currently £14,250 and the upper capital threshold. The rate of tariff income is £1 for each £250 between the lower and upper capital thresholds. Capital up to the lower capital threshold, and any income from it, is ignored completely in the means test.
- People with capital below the upper threshold are required to put all their assessable income apart from a '**personal expenses allowance**' of £24.90 towards the costs of care in a care home; or all assessable income above 125% of the Pension Credit standard Guarantee Credit level towards the cost of care at home. (The 25% above the Guarantee Credit level is known as the '**buffer**')
- For care at home, assessable income excludes any income from the Savings Credit component of Pension Credit. Assessable income in a care home excludes a small disregard on income from savings which is related to the Savings Credit but not limited to those actually receiving Savings Credit.
- The NHS makes a non means-tested contribution to assessed nursing care needs in a care home.
- A small number of people have their care needs funded fully by the NHS.

The planned reforms

- To benefit from the **lifetime cap** on care costs, a person will have to be assessed by a LA, as having **eligible care** needs. The LA will work out the weekly costs of meeting those needs taking account of local care costs and set a personal budget for the person's care. It will keep track of the cumulative amount of those costs through the person's **Care Account**. For home care users the amount included in the Care Account is not the person's actual expenditure on care but the personal budget. For people in care homes, the amount included in the Care Account is neither the person's actual expenditure nor the total home care fee. It is the care home fee covered by the personal budget minus an allowance for the **daily living** (or 'hotel') **costs** component of the fee. Neither the daily living cost nor any excess of the care home fee above the amount the LA is willing to meet (and has included in the personal budget) counts towards the cap. Until their Care Account reaches the cap, the LA will apply the current means test to determine how much the person must pay towards the cost of their care.
- Progress towards the cap is based on the total costs of individuals' care needs, not the amount they pay towards that cost. Once the cap is reached, the state will meet the cost of their eligible care needs (calculated as above) without a means test. Daily living costs will continue to be means-tested even after the cap has been reached. The lifetime cap was expected to be £72,000 if implemented in 2016 and the daily living component £12,000 per year or £231 a week.
- The upper capital threshold in residential care will be increased. It was expected to be £118,000 in 2016.
- We assume that since the Savings Credit is removed for those reaching State Pension age from 2016, the disregard of savings income for people in care homes will not apply for people reaching State Pension age from 2016.

Disability Benefits

- People with care needs may also be eligible for one of two cash disability benefits – **Attendance Allowance** or **Disability Living Allowance**. Receipt of these benefits can also trigger increases in Pension Credit, Housing Benefit and Council Tax Support through a **Severe Disability Addition**, currently £61.85 per week which is added to the standard Guarantee Credit level.
- If someone receives help with care home fees from their LA, payments of these disability-related benefits cease. Payments to those initially not receiving LA support will cease when they reach the cap and become entitled to LA support.
- LAs can include income from disability benefits in assessable income for home care but if they do so must make an allowance for any **disability-related expenditure** that the person incurs.

Uprating requirements

- Legislation on uprating policy for long-term care is less prescriptive than for pensions.
- Recent practice for many parameters has been, at best, price-linking. Capital thresholds have been unchanged for some years.
- The Government has indicated that the cap on care costs and the allowance for daily living costs in care homes will be linked to average earnings increases.
- Disability benefits have been uprated by price increases in recent years.

3. State pensions and long-term care uprating policy

There has been considerable debate about the merits and affordability of the policy of uprating the new State Pension (or the basic State Pension for those who reached State Pension age before April 2016) by the highest of the increase over the previous year in prices, earnings or 2.5% – the 'triple lock'. At a time when benefits for younger people have been subject to much smaller annual increases and the economic position of pensioners as a group has improved relative to other groups, some see the triple lock as overly generous (Johnson 2015; Willets 2015). The current legislative position is that the new State Pension (nSP) must be uprated annually by at least the rate of increase in earnings. This has not always been the case and there has been considerable variation in legislative requirements and government policy (Thurley 2014). There is also a requirement that the minimum income level for pensioners – the Guarantee Credit level – which is embodied in the means-tested benefit Pension Credit be uprated by movements in earnings.

There has been less debate about how the parameters of the long-term care system – whether the current or the reformed system – or indeed the disability benefit system which also provides help to people with care needs, should be uprated over time. As with pensions, the potential for substantial cumulative effects of different approaches exists, suggesting that the long-run effects of the long-term care reforms may differ considerably depending on how key parameters of the system are uprated over time. The suggestion that recent pensions uprating has been generous to pensioners has not recognised that disability prevalence is relatively high among pensioners. Disability brings care and other costs and most state support for these costs has not risen as fast as state pensions. There could therefore be a case for rebalancing state spending on pensioners away from pensioners in general, towards those who face care and other disability-related costs.

The aim of our analysis is to illustrate the effects of alternative uprating policies for the two systems in terms of their aggregate public costs and their effects on different income groups. The focus is on the long-term care system, but taking account of different possible uprating policies for state pensions.

4. Alternative uprating scenarios

Five reform scenarios are compared with a base case. The base case involves the state pension system as it currently exists, with the new State Pension operating for those reaching State Pension age from April 2016, and the current long-term care system continued indefinitely. The triple lock is applied to state pensions, the Guarantee Credit level is linked to earnings and recent practice on uprating the long-term care and disability benefits system in line with prices is assumed to continue (Box 3).

Box 3: Base case projections

Our base case projections assume that:

- The state pension reforms are in place for those reaching State Pension age in 2016 and the new State Pension (nSP) and basic State Pension (bSP) are uprated by the triple lock indefinitely.
- State Second Pension/State Earnings Related Pension for those who reached State Pension age before April 2016 is uprated by prices.
- The current long-term care funding system continues indefinitely with most components uprated by prices (the NHS contribution to nursing care in nursing homes is linked to earnings).

The alternative scenarios all replace the current long-term care system with the planned reforms from 2020. The Government previously indicated that under the reforms, the cap on care costs and the daily living costs would be linked to earnings, while other components of the system would continue to be uprated according to general price movements. This is what is assumed for Scenario 1.

The alternative scenarios have been selected to illustrate some possible routes to shifting some public spending from pensioners in general to pensioners with care needs and to demonstrate the effects that changing state pension uprating can have on long-term care costs.

Scenarios 2 and 3 are increasingly generous in their uprating of long-term care and disability benefits. Scenarios 3 and 4 make savings on state pensions by moving away from the triple lock to earnings or prices uprating. Thus Scenarios 2 to 4 all represent a shift in the balance of state spending on pensioners away from pensioners as a whole towards those with disabilities. The final scenario (Scenario 5) investigates a low cost uprating policy in which long-term care and disability benefits uprating is as in Scenario 1, but state pensions are uprated by only prices.

Scenario 2 uprates the cap and daily living costs in line with prices, as for other long-term care and disability benefits parameters. Uprating the cap and daily living costs by prices rather than earnings is more generous than linking them to earnings. The cap is reached sooner because it is lower than it would be if linked to earnings and because the part of care home costs that is treated as eligible care costs is higher. The part that remains means-tested after reaching the cap is smaller. The triple lock is applied to pensions in this scenario.

Scenario 3 retains price linking of the cap and daily living costs, but links other long-term care and disability benefits parameters to earnings growth. It also links state pensions to

earnings rather than the triple lock. Scenario 4 goes a step further and links state pensions to the Consumer Price Index (CPI).[5] A final 'low cost' scenario is examined which combines Scenario 1 uprating of the long-term care and disability benefits with CPI uprating of the state pension. This scenario enables us to assess how much of the public expenditure savings that would be made from prices uprating of pensions would be offset by increases in spending on long-term care as a result of the lower incomes of care users.

The scenarios are summarised in Box 4.

Box 4: Uprating Scenarios

Scenario 1:

- Long-term care reforms implemented in 2020
- nSP and bSP uprated by triple lock
- cap and daily living costs uprated by earnings
- other components of the long-term care and disability benefits systems are uprated by prices, except the NHS contribution to nursing costs in care homes is earnings linked.

Scenario 2:

As Scenario 1 but

- the cap and daily living costs are uprated by prices

Scenario 3:

As Scenario 2 but

- long-term care parameters and disability benefits are linked to earnings
- nSP and bSP uprated by earnings

Scenario 4:

As Scenario 3 but

- nSP and bSP uprated by prices

Scenario 5:

As Scenario 1 but

- nSP and bSP uprated by prices

[5] Note that a change to linking the new State Pension and basic State Pension to the CPI would require primary legislation.

5. Methods and assumptions

The analysis uses three models to examine the effects of these alternative scenarios on the aggregate costs of long-term care and state pensions and the distribution of gains from them that would be experienced by recipients of care.[6] The models and assumptions are described in detail in the Appendices.

The PSSRU long-term care model is used to produce projections of the aggregate costs of the base case and alternative uprating scenarios. It takes input from and provides inputs to CARESIM, which is a model used to analyse the distributional effects of scenarios. PPI's dynamic microsimulation model is used to provide CARESIM with projected future state and private pension incomes, under different policy scenarios, of people aged 50 to State Pension age.

PPI's aggregate and distributional models (Appendix A) are used to provide the aggregate public costs of state pensions and means-tested benefits under the base case and alternative state pension uprating policies. The PPI aggregate model provides estimates for the UK. To make them comparable to the long-term care analysis which is for England, the PPI estimates have been scaled down by the ratio, in the relevant year, of projected numbers of people over State Pension age in England to the numbers in the UK as a whole. The projections of numbers of people over State Pension age come from Office for National Statistics (ONS) official 2014-based population projections.

The models use a range of economic and demographic assumptions. Key to the analysis presented here are assumptions on real earnings growth and the triple lock. These are consistent with those produced by the Office for Budgetary Responsibility (OBR).[7] Until 2020, growth in earnings and the triple lock are projected to be the same, but from 2021, earnings are assumed to grow by 1.8% a year in excess of prices and the triple lock is assumed to average 2.1% a year above prices. The models produce projections under stated assumptions rather than forecasts.

Projections of long-term care and state pension costs are provided up to 2030, by which time recipients of care would be benefiting in full from the long-term care reforms implemented in 2020. All analyses relate to older people and to England. Monetary amounts are expressed at constant 2015 prices.

[6] There would also be consequences for all people receiving state pensions or disability benefits but the focus of our distributional analysis is on care recipients.
[7] They do not incorporate the latest OBR projections published alongside the November 2016 Autumn Statement.

6. Results

a. Aggregate projections

The Office for National Statistics (ONS) 2014-based principal population projections for England project that the numbers of people aged 65 or over will rise from 9.7 million in 2015 to 13.2 million in 2030, an increase of 36%. The numbers of those aged 85 or more are projected to rise faster during this period by 66%, from 1.3 million in 2015 to 2.1 million in 2030. Much of this increase is a result of a projected rise in male life expectancy.

Projections of the future numbers of older service users and the costs of their care clearly depend on projections of future numbers of disabled older people. We project that the number of older people unable to conduct at least one personal care task, or activity of daily living (ADL), without help will rise from 1.8 million in 2015 to 2.5 million in 2030, an increase of 44%. It will then continue to rise beyond the period covered by our expenditure projections to 3.1 million in 2040 and 3.6 million in 2050. This projection is on the basis that the total number of older people by age and gender rise in line with the official ONS 2014-based principal population projection and that disability rates remain constant by age and gender. It is inevitably sensitive to these assumptions.

We project that the number of unpaid carers of older people will rise from 2.1 million in 2015 to 3.0 million in 2030, an increase of 44%. This is on the assumption that the probability of receiving unpaid care remains constant by age, gender, level of disability, household composition and housing tenure of the older person. If the supply of unpaid care does not rise in line with this projection of demand, there will be rising unmet need unless formal services expand to meet the shortfall.

The number of older users of formal services will need to rise considerably over the period 2015 to 2030 (and beyond) to keep pace with demographic pressures (Table 1). Our projections are on the assumption that the probability of receiving services remains constant by age, gender, level of disability, household composition and housing tenure of the older person. This implies no change in eligibility criteria for services, in the balance between unpaid care and formal services or in the balance between home-based care and residential care.

The number of recipients of local authority funded home care services or direct payments would need to rise by 54%, from 262,000 in 2015 to 402,000 in 2030, to keep pace with demographic pressures (Table 1). The number of users of privately funded home care is projected to rise less rapidly, by 45% over this period.

The number of older people in local authority funded residential care would need to rise by 26%, from 194,000 in 2015 to 245,000 in 2030 to keep pace with demographic changes. The number of privately funded residents is projected to rise by 74% over this period. The main reason for this difference is the projected rise in the proportion of older people who own their own home and so are generally not eligible for local authority support.

Projections of expenditure on long-term care need to incorporate an assumption about future rises in care costs. We assume that an increase in line with projected rises in average

hourly earnings will be sufficient to ensure that the supply of formal care will increase in line with projected demand, as discussed in Appendix C.

Public expenditure on long-term care for older people is projected to rise by 81% under the current funding system from around £10.8 billion (0.67% of GDP) in 2015 to £19.6 billion (0.86% of GDP) in 2030 at constant 2015 prices (Table 2). Local Authority Personal Social Services (PSS) expenditure, net of user charges, is projected to rise by 78% from £7.1 billion in 2015 to £12.5 billion in 2030. PSS expenditure on community-based care is projected to rise much more rapidly than expenditure on residential care (97% as against 59%) over the period 2015 to 2030 (Table 3).

Private expenditure is projected to rise from £7.9 billion in 2015 to £17.3 billion in 2030, an increase of 117% (Table 2). Total expenditure on social services for older people is projected to rise by 96%, from £18.8 billion (1.16% of GDP) in 2015 to £36.8 billion (1.62% of GDP) in 2030 at constant 2015 prices. It should be noted that the figures for private expenditure are estimates drawn from various sources on the numbers of privately funded care home residents, the numbers of privately funded home care users and the weekly costs of privately funded care. This means that the projections for private expenditure should be treated with caution.

Table 1: Projected numbers of older people aged 65 and over using long-term care services 2015-2030, England, under the base case assumptions, in thousand persons

	2015	2020	2025	2030	% growth 2015-2030
Publicly funded home care users	216.5	247.1	285.6	334.1	54%
Privately funded home care users	97.9	105.5	119.6	140.4	45%
Direct payment recipients	45.7	51.5	57.9	67.4	47%
Publicly funded care home residents	193.7	210.0	237	245	26%
Privately funded care home residents	153.7	174.7	202.8	267.6	74%

Note: The figure for care home residents includes older people funded by the NHS.

Table 2: Projected public and private expenditure on long-term care services for older people 2015-2030, England, under the base case, in £billion

	2015	2020	2025	2030	% growth 2015-2030
Public expenditure	10.8	12.7	15.9	19.6	81%
Public expenditure as % of GDP	0.67%	0.71%	0.79%	0.86%	28%
Private expenditure	7.9	9.8	12.5	17.3	117%
Private expenditure as % of GDP	0.49%	0.55%	0.62%	0.76%	54%
Total expenditure	18.8	22.5	28.4	36.8	96%
Total expenditure as % of GDP	1.16	1.26	1.41	1.62	39%

Note: Public expenditure is made up of Local Authority Personal Social Services Expenditure net of user charges, the NHS contribution to long-term care costs and disability benefits that are put towards the cost of care.

Table 3: Projected Local Authority Personal Social Services net expenditure on long-term care services for older people 2015-2030, England, under the base case assumptions, in £billion

	2015	2020	2025	2030	% growth 2015-2030
Residential care	3.3	3.8	4.7	5.3	59%
Non-residential care	2.7	3.2	4.2	5.2	97%
Assessment, care management and strategy	1.1	1.3	1.6	2.0	87%
Total PSS net expenditure	7.1	8.3	10.5	12.5	78%

Projected growth in public expenditure under the five scenarios compared with the base case is shown in Table 4, while Table 5 shows projected growth in private spending on long-term care services. Scenarios 1 to 4 all increase public expenditure and reduce private expenditure as compared with the base case. Scenario 1, implementation of the long-term care reforms on the uprating basis announced by the Government, would lead to additional public expenditure in 2030 of £1.3 billion at 2015 prices above continuation of the current system (the base case). Scenario 4 generates the highest projected public expenditure on

long-term care at £23 billion compared with £19.6 billion under the base case. Under Scenario 4, public expenditure on long-term care in 2030 is projected to correspond to 1.01% of GDP compared with 0.86% under the base case. The growth between 2015 and 2030 in public spending on long-term care is projected to be around 80% under the base case but would grow by 112% under Scenario 4. Projected public expenditure on long-term care under Scenario 5 is a little higher than under the base case despite the same assumptions on uprating of long-term care parameters. This is because the state pension is assumed to be linked only to prices under Scenario 5, leading to lower incomes of care users, a consequent reduction in what they pay towards their care and an increase in what the state pays.

Table 4: Projected public expenditure on long-term care services for older people 2015-2030, England, under alternative uprating scenarios, in £billion

	2015	2020	2025	2030	% growth 2015-2030
Public expenditure					
Scenario 1	10.8	12.7	16.8	20.9	93%
Scenario 2	10.8	12.7	17.4	22.4	107%
Scenario 3	10.8	12.7	17.7	22.7	110%
Scenario 4	10.8	12.7	17.8	23.0	112%
Scenario 5	10.8	12.7	17.0	21.2	96%
Base case	10.8	12.7	15.9	19.6	81%
Public expenditure as % of GDP					
Scenario 1	0.67%	0.71%	0.83%	0.92%	37%
Scenario 2	0.67%	0.71%	0.86%	0.98%	46%
Scenario 3	0.67%	0.71%	0.88%	1.00%	49%
Scenario 4	0.67%	0.71%	0.88%	1.01%	50%
Scenario 5	0.67%	0.71%	0.84%	0.93%	39%
Base case	0.67%	0.71%	0.79%	0.86%	28%

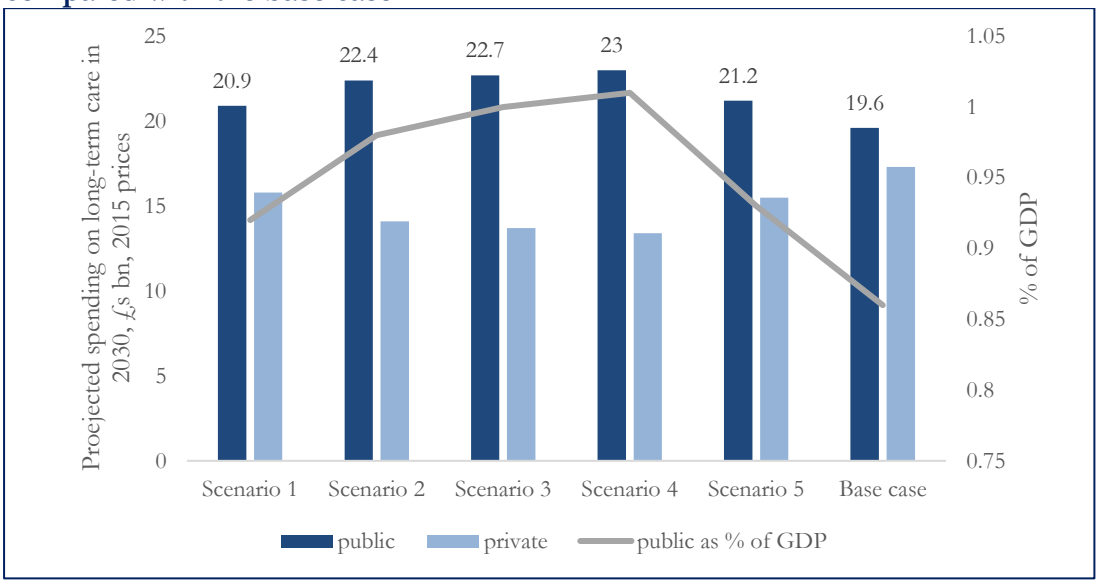
Note: Public expenditure is made up of Local Authority Personal Social Services Expenditure net of user charges, the NHS contribution to long-term care costs and disability benefits that are put towards the cost of care.

Table 5: Projected private expenditure on long-term care services for older people 2015-2030, England, under alternative uprating scenarios, in £billion

	2015	2020	2025	2030	% growth 2015-2030
Private expenditure					
Scenario 1	7.9	9.8	11.5	15.8	99%
Scenario 2	7.9	9.8	10.8	14.1	77%
Scenario 3	7.9	9.8	10.5	13.7	72%
Scenario 4	7.9	9.8	10.3	13.4	69%
Scenario 5	7.9	9.8	11.3	15.5	95%
Base case	7.9	9.8	12.5	17.3	117%
Private expenditure as % of GDP					
Scenario 1	0.49%	0.55%	0.57%	0.69%	41%
Scenario 2	0.49%	0.55%	0.53%	0.62%	25%
Scenario 3	0.49%	0.55%	0.52%	0.60%	22%
Scenario 4	0.49%	0.55%	0.51%	0.59%	20%
Scenario 5	0.49%	0.55%	0.56%	0.68%	38%
Base case	0.49%	0.55%	0.62%	0.76%	54%

Chart 1 summarises the effects of the alternative uprating scenarios on public and private expenditure on long-term care for older people by 2030.

Chart 1: By 2030, the most generous long-term care uprating scenario increases public expenditure on long-term care for older people by £3.4 billion (17%) compared with the base case



Notes: (1) Long-term care public expenditure includes NHS-funded care and disability benefits used to pay for care. Private expenditure includes payments from users from their other sources of income including their state pensions. (2) Scenarios are described in Box 4 on page 8

Finally, Table 6 and Chart 2 compare the additional public spending (as against the base case) on older people's long-term care under each scenario with the changes (again as against the base case) in spending on state pensions and means-tested benefits.

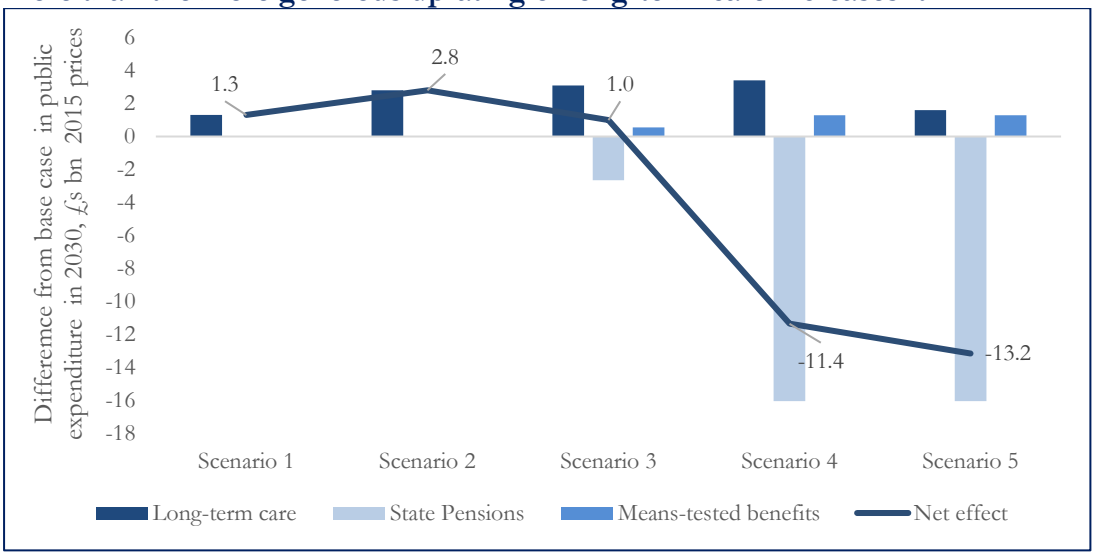
Table 6: Difference between projected public spending under alternative uprating scenarios and base case, 2030 in £ billion 2015 prices

	Long-term care (including disability benefits used to pay for care)	State pensions	Means-tested benefits for older people	Net effect on public spending
Scenario 1	1.3	0.0	0.0	1.3
Scenario 2	2.8	0.0	0.0	2.8
Scenario 3	3.1	-2.7	0.5	1.0
Scenario 4	3.4	-16.0	1.3	-11.4
Scenario 5	1.6	-16.0	1.3	-13.2

Note: (1) Projections of the effects on aggregate state pensions and means-tested benefits for older people use the PPI Aggregate Model. (2) The net effect on public spending excludes the effect on disability benefits not used to pay for care. Scenarios 3 and 4 which link disability benefits to earnings would increase spending on disability benefits not used to pay for care so the net increase/decrease in public spending would be a little higher/lower than indicated.

The net effect of Scenarios 1 to 3 is to increase overall public spending across these three areas, whereas Scenarios 4 and 5 decrease it considerably as a result of uprating state pensions by only prices. In Chart 2, the net effect is shown by the line on the chart while the effect for each of the three areas is shown by the bars.

Chart 2: By 2030, the less generous pensions uprating reduces public spending far more than the more generous uprating of long-term care increases it



Notes: (1) Long-term care public expenditure includes NHS-funded care and disability benefits used to pay for care. Private expenditure includes payments from users from their other sources of income including their state pensions. (2) Scenarios are described in Box 4 on page 8

b. Distribution of gains

The distributional effects of the scenarios are investigated by examining how average gains from the long-term care reforms vary across quintiles (fifths) of the income distribution, for recipients of residential or home care aged 65 and over. Gains are calculated by comparing an individual's net income, after meeting care costs, under the reformed long-term care system with their net income under the base case. Gains within each income group are expressed as averages in absolute terms (pounds per week in 2015 prices) and as average proportions of individuals' incomes. Since the scale of the effects of the various uprating assumptions differ considerably, average gains within income group are also expressed relative to the average gain for all income groups (the average gain for all groups is set to 100) to facilitate comparison across uprating scenarios. The effects of the different uprating assumptions are shown for the year 2030.

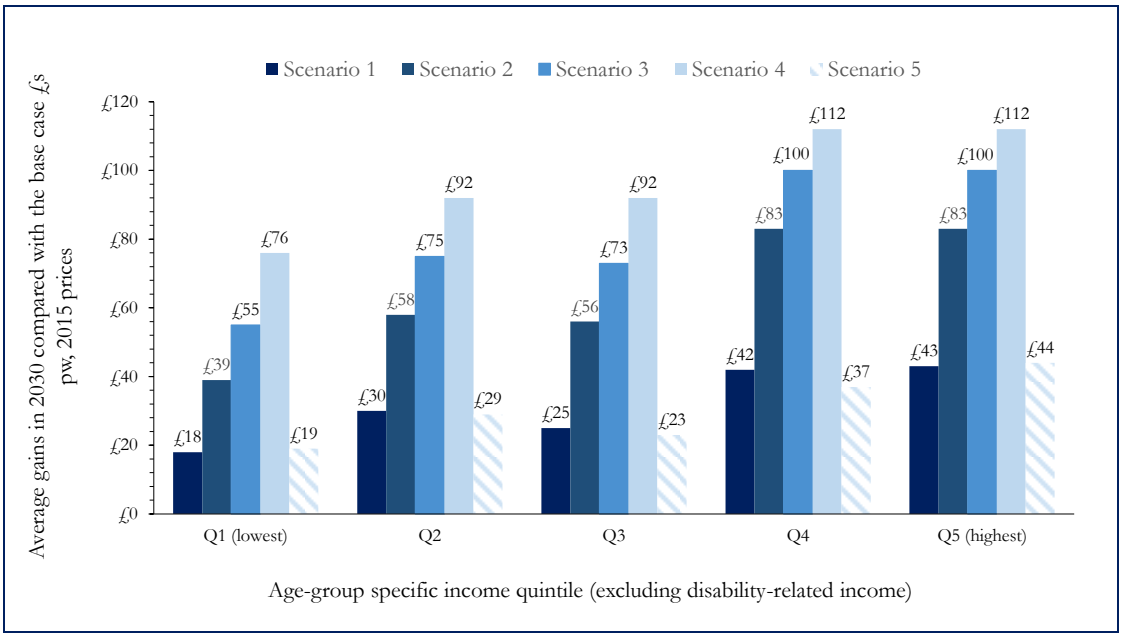
Charts 3 to 5 illustrate the gains by income group from each scenario for recipients of residential and home care combined. Chart 3 presents absolute gains in £s per week, Chart 4 shows these gains as a proportion of income and Chart 5 standardises for the different scale of gains, as described above.

All income groups gain from the long-term care reforms. Even people with low incomes can benefit from the introduction of the cap on care costs if they would otherwise be disqualified from help with residential care costs by their housing wealth – within the lowest income group around two-thirds are owner-occupiers.

Expressed in absolute (£s per week) terms (Chart 3), the gains from the planned long-term care reforms are largest for those on higher incomes as they stand to gain most from the introduction of the cap. A different picture emerges if gains are expressed as a percentage of income (Chart 4). These percentages vary less by income than the absolute amounts and for Scenarios 2 to 4 are highest for the lowest income group.

Chart 3: Expressed in absolute terms (£s per week), gains from the long-term care reforms are largest for higher income care users but more generous uprating narrows the gap between the gains for those on high and low incomes

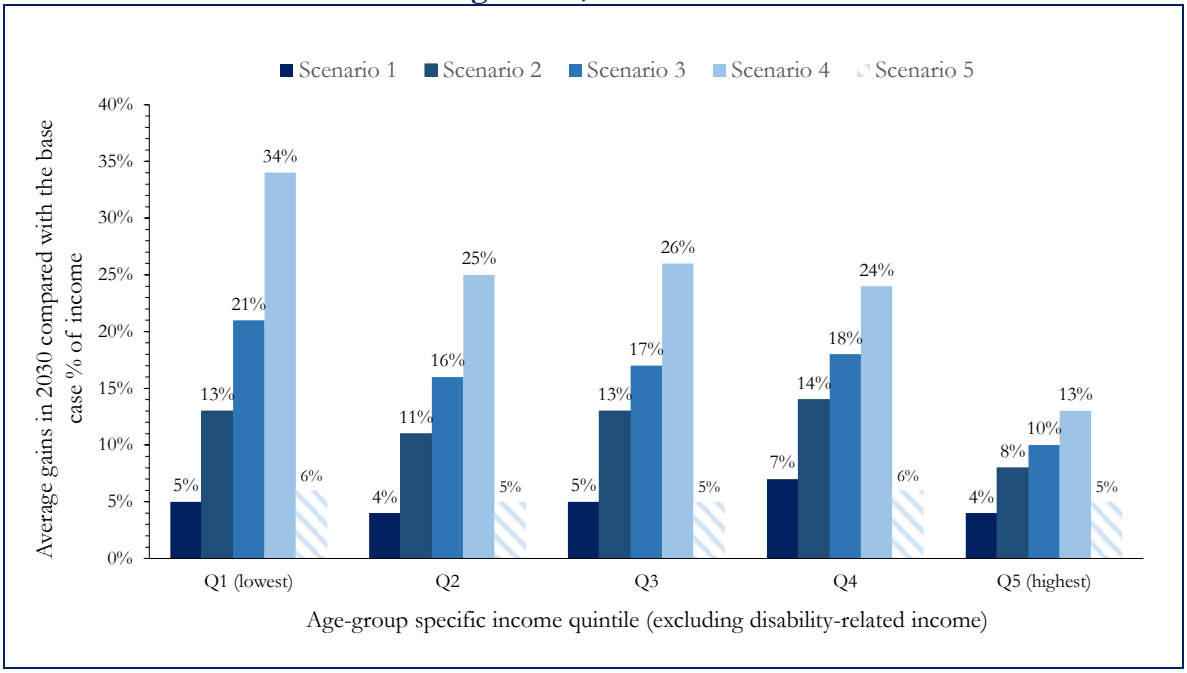
Users of residential or home care aged 65+, 2030



Note: Scenarios are explained in Box 4 on page 8

Chart 4: Expressed as percentages of income, gains vary less by income and for two scenarios are highest for the lowest income group

Users of residential or home care aged 65+, 2030

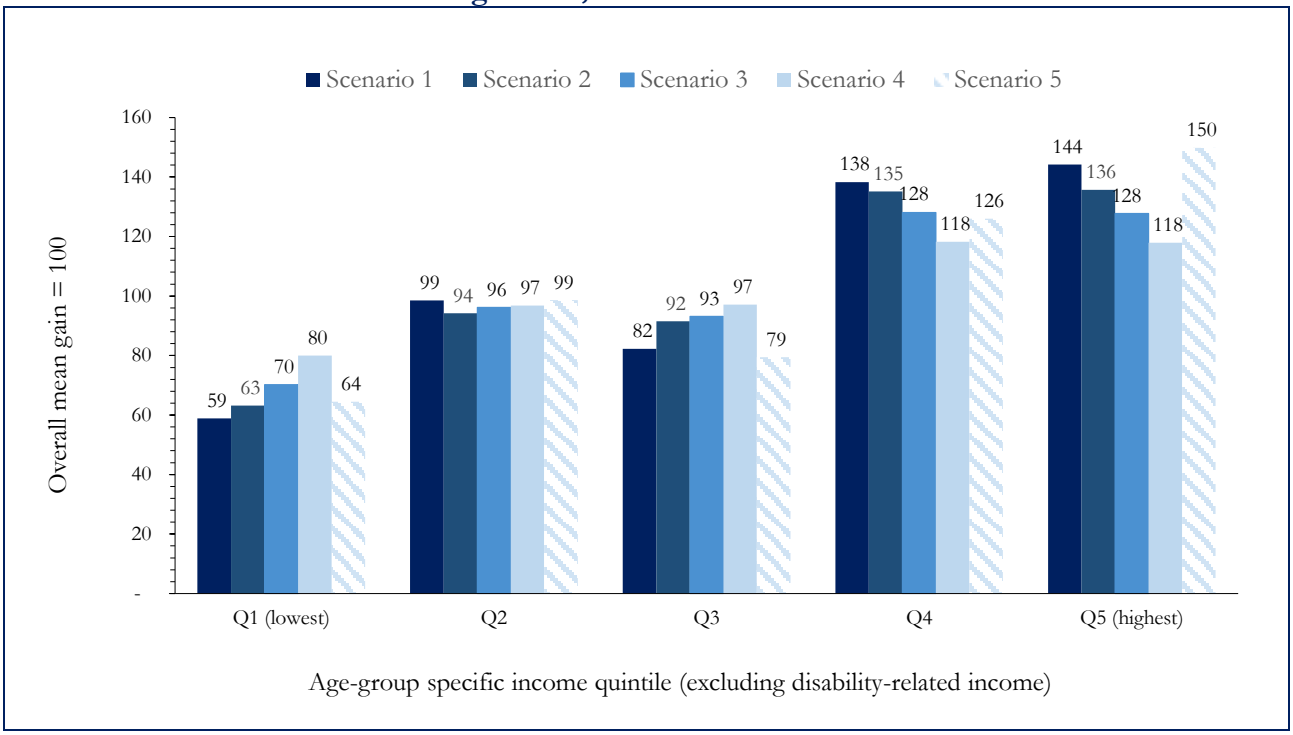


Note: Scenarios are explained in Box 4 on page 8

Gains are larger from Scenarios 2 to 4 than for Scenario 1. Their distributional effects are also different as is clear from Chart 5. For example, under Scenario 1, the average gain in the highest income group is 44% more than the overall gain and in the lowest income group it is just 41% less than the overall gain. Under Scenario 4, the corresponding comparison is 18% more for the highest income group and only 20% less in the lowest income group. The scenarios which uprate long-term care parameters more generously are particularly beneficial for those on lower incomes.

Chart 5: Over time, more generous uprating of long-term care would reduce the regressivity of the planned long-term care reforms

Users of residential or home care aged 65+, 2030



Note: Scenarios are explained in Box 4 on page 8

7. Conclusions

In this report we have presented analysis of the costs and distributional effects of alternative policies on annual adjustment for inflation ('uprating') of key parameters of the state pension system and of the long-term care funding system under the reforms planned for implementation in 2020. The alternative scenarios have been selected to illustrate some possible routes to shifting some public spending from pensioners in general to pensioners with care needs and to demonstrate the effects that changing state pension uprating can have on long-term care costs.

Our analysis has shown that by 2030, the cumulative effects of difference in uprating policy can be large in terms of their effects on the public costs of the two systems and on the extent to which the long-term care reforms differentially effect those on lower and higher incomes.

If the long-term care funding system is reformed according to previous government announcements, we project that public spending on long-term care for older people would reach 0.92% of Gross Domestic Product (GDP) by 2030 compared with around 0.67% in 2015, and 0.86% in 2030 if the current funding system continued. By 2030, uprating the state pension by earnings rather than the triple lock would go some way to paying for the more generous long-term care uprating scenarios. Uprating pensions by prices – although not allowed under present legislation – would more than pay for more generous uprating of the care system.

More generous uprating scenarios for the reformed long-term care system, in combination with less generous uprating of the state pension system would focus resources for older people on those at risk of costly care in late old age. Moreover, the more generous care uprating scenarios all increase public spending on long-term care by 2030 but unlike the long-term care reforms themselves, they tend to favour those on lower incomes.

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Appendix A: Model Descriptions

a. Pension Policy Institute (PPI) dynamic model

The PPI Dynamic Model projects retirement cashflow outcomes for individuals taken from the English Longitudinal Study of Ageing (ELSA) wave 5 (2010-2011) dataset. For this project, it has been used with a deterministic retirement approach assuming that individuals retire at their State Pension age (SPa).

Using information from ELSA to inform the base year position, the model projects each individual or benefit unit in future years. Given the short projection period to retirement for those of working age, it is assumed that there is no change to behaviour over this period (e.g., the employee pension contribution rate is assumed to remain constant).

The microsimulation projects all individuals within the ELSA wave 5 dataset who are aged 50 and over. It thus covers people who are above and below State Pension age at the start of the simulation. The model simulates pension incomes for individuals and entitlements to means-tested social security benefits for the benefit units[8] in which they live. However, for this project only the projections of individual incomes are used as the simulation of means-tested benefits is done within CARESIM (see below).

Economic assumptions are derived from those published by the Office for Budget Responsibility (OBR) in their Economic and Fiscal Outlook and Fiscal Sustainability Report.[9] The model is capable of projecting variations of the current pension system framework and behavioural assumptions.

The projection of an individual takes in:

- Private pension accrual to State Pension age
- Retirement income from private pension
- Retirement income from state pension
- Means-tested benefits in retirement, including pensions credit (although done within CARESIM for this project)
- Individual taxation (again done within CARESIM for this project)

Private pension accrual to State Pension age

For individuals currently below SPa, current pension wealth is taken from the ELSA dataset and projected to their State Pension age. For Defined Contribution (DC) entitlement, this is subject to economic assumptions taken from OBR and an assumed portfolio composition as well as deductions from charges (assumed annual management charge of 0.5% of the fund). Further benefit accruals are based upon current contribution data from ELSA where savers are assumed to continue to contribute at their current rate, based upon income.

[8] A benefit unit is a single person or a couple, with any dependent children.

[9] The OBR assumptions used here pre-date the forecasts they published alongside the November 2016 Autumn Statement.

Those who do not currently make pension contributions are assumed to join an automatic enrolment workplace pension scheme subject to eligibility criteria. This is projected at the legislated minimum levels of contributions based upon band salary.

Individuals are assumed to continue working and saving until their SPa, and the accrued funds are subject to the same assumptions as existing pension wealth from the dataset.

Retirement income from private pension
For individuals above SPa their private pension income is taken from the data and projected in the future.

For those below SPa it is assumed that they do not access private pension saving until SPa. Those with Defined Benefit (DB) entitlement are assumed to convert 25% of their benefit into a lump sum. Those with a DC benefit who retire before 6th April 2015 are assumed to be ineligible for 'Freedom and Choice' drawdown arrangements. They are assumed to take 25% of their pension in the form of a tax-free lump sum and purchase a single life level annuity. Those who reach SPa after 6th April 2015 are eligible for Freedom and Choice and have more options for accessing their pension savings subject to behavioural assumptions.

Retirement income from state pension
Individuals receive their state pensions at their SPa as currently announced and legislated for. The two tier basic State Pension (bSP) system is in place for those reaching SPa until 2016. The single-tier new State Pension (nSP) is introduced for those reaching SPa after that date.

The state pension may be uprated by the triple-lock assumption, as is currently applied, throughout the projection period or by alternative uprating approaches.

State pension income for those who are already in receipt of their pension is taken from the ELSA data. For those yet to receive state pension, individuals are assumed to qualify for a full new State Pension if they retire after April 2016. A foundation pension based on the basic State Pension and additional State Pension under the pre-2016 system is calculated for those who reach SPa after the introduction of the nSP. If the foundation amount is greater than the nSP level, the individual is assumed to receive a CPI linked "protected amount".

Means-tested benefits
Means-tested benefit eligibility is assessed according to the current legislation taking the circumstances of the entire benefit unit into account. As mentioned above, for this project, entitlement to means-tested benefits is calculated within CARESIM.

b. Personal Social Services Research Unit (PSSRU) long-term care projections model

The PSSRU long-term care projections model aims to make projections of four key variables: the future numbers of disabled older people, the likely level of demand for long-term care services and disability benefits for older people, the public and private costs associated with meeting this demand and the social care workforce required.

The model does not make forecasts about the future. It makes projections on the basis of specific assumptions about future trends. The approach involves simulating the impact on demand of specified changes in demand drivers, such as demographic pressures, or specified changes in policy, such as the introduction of a lifetime cap on care costs. It does not involve forecasting future policies or future patterns of care.

The model is cell-based (a macro-simulation model) and takes the form of an Excel spreadsheet. It consists of five main parts:

- A first part estimates the numbers of older people with different levels of disability by age group, gender, household type and housing tenure.
- A second part estimates the levels of unpaid care, long-term care services and disability benefits required by attaching a probability of receiving care to each cell.
- A third part of the model estimates total health and social services expenditure.
- In the fourth part, total expenditure is allocated to the various sources of funding.
- A fifth part relates to the social care workforce, although this has not been used in CASPeR.

The first part of the PSSRU long-term care projections model divides the older population according to a number of characteristics relevant to the use of services, such as the level of functional disability (measured in terms of activities of daily living), marital status, whether living alone, with a partner or children, housing tenure, education and housing tenure. The model uses the Office for National Statistics (ONS) 2014-based population projections as the basis for the numbers of people by age band and gender in each year under consideration until 2035.

The projected older population by age band and gender are separated into disability groups. Disability is a crucial factor in considering need for long-term care, as it is disability rather than age which influences need for care. The model uses as a measure of disability the ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs). The section on disability in the model uses data from the 2011 and 2012 Health Surveys for England (HSE). It includes six categories of functional disability, ranging from no disability to inability to perform three or more activities of daily living (ADL) without help.

The projections of household composition in the model are driven by the 2008-based ONS marital status and cohabitation projections (ONS 2010). The household type classification in the model is based, in the first instance, on de facto marital status. Older people who are married or cohabiting are distinguished from those who are single, separated, divorced or widowed. The two marital status groups, those who are de facto married and those who are de facto single, are broken down into five household types - living alone, single living with their children, single living with others, married living with partner, married living with partner and others - using analyses of 2011 and 2012 HSE data.

The model includes, for those living in private households, a simple breakdown by housing tenure, between those living in owner-occupied tenure and those living in rented accommodation. One reason for the inclusion of housing tenure is that it can be regarded as a simple proxy for socio-economic group. Another is that it is relevant, in the case of older people living alone, to the division between those who fund their own residential or nursing home care and those who are funded by their local authority. The current means

test for public support in care homes generally takes account of the value of the person's home (unless it is occupied by their spouse or an older or disabled relative). This means that older home-owners who live alone generally need to fund their residential care privately, while older tenants and older home-owners living with their spouse are often eligible for public funding. The rates of home ownership, by age, gender and marital status, are from the Family Resources Survey with projected rates for future years produced by the UEA CARESIM model.

The model also includes, following model development as part of this study, a simple breakdown by education, between those leaving full time education at age 15 or below or above age 15. Analysis of HSE data for 2011 to 2014 showed that the age an individual left full-time education is associated with the person's age, disability and housing tenure. The inclusion of this variable means that the modelling now takes greater account of variation in the socio-economic characteristics of older people. The projected future trend in education level by age, gender and marital status is based on CARESIM projections produced in a manner similar to that for owner-occupation.

The second part of the model projects the numbers of users of unpaid care and formal care services and volumes of services demanded. This is achieved by combining the output of the first part of the model (the projected numbers of older people by disability, household type and other characteristics) with functions that assign receipt of unpaid care and formal care services to each sub-group of the older population. The services covered include a range of health and social services relevant to meeting long-term care needs. Disability benefits are also included.

Use of official data on supported residents, 2011 Census data and data from PSSRU surveys of care homes enabled the proportion of disabled older people in residential home care, nursing home care and long-stay hospital care to be estimated for the model base year. The number of older people in these care settings was expressed as a proportion of the overall number of highly disabled older people (those unable to perform three or more ADLs without help or in care homes), for each subgroup by age band, gender, previous household type and previous housing tenure. These proportions were then used in making projections for future years.

The probability of receipt of unpaid care and of formal community-based care was estimated through multivariate analysis of the 2011 to 2014 HSE data. Bivariate probit regression analyses were run to determine the factors associated with receipt of unpaid care and receipt of formal community-based care. In each analysis, the dependent variable was receipt of care. The intensity of care was not accounted for at this stage. The independent variables were age, gender, level of disability, household composition, housing tenure and education.

Demand for unpaid care and formal community-based care was calculated by using the fitted values from the probit regression models as the estimated probabilities of receipt of each type of care by age band, disability and the other factors described above. These fitted values were then multiplied by the projected numbers of older people within each cell by age band and other needs-related circumstances to produce estimates of the numbers of care recipients.

We produce projections of both unpaid care by family and friends and formal home-based and residential care services, both publicly funded and privately funded. Our method takes account of the interaction between unpaid care and formal services. This is important because local authorities take account of the availability of unpaid care when determining the level of personal budget offered to meet people's care needs and family and friends seem likely to take some account of the amount of formal care funded by the local authority when deciding how much care to supply and what caring tasks to undertake. Three principal sources of unpaid care are distinguished in the model: care from children (i.e. adult sons and daughters), from spouses and from others. The proportion of recipients of unpaid care receiving care from each of these sources (or combinations of them) is treated as varying by household composition. The projections assume that within each household composition group the proportions receiving unpaid care from a spouse, child, spouse and child or others remains unchanged over the projection years.

The total numbers of recipients of formal services are divided between local authority home care, day care, direct payments and private care, and the estimated numbers of recipients of each of these services except private care are grossed to match official data. The probability of receiving different intensities of home care was estimated through further multivariate analysis of the 2011 to 2014 HSE data. Three intensity groups - low (1-5 hours), medium (6-10) hours, and high (10+ hours) – were used. Intensity varied by age, gender, household composition, housing tenure and education.

The third part of the model projects total expenditure on the formal services demanded, applying unit costs of formal care to the volume of services projected in the second part of the model. The fourth part of the model breaks down projected aggregate expenditure on services by source of funding: NHS, social services and service users. The costs of the health services included are assigned to the NHS. They relate to long-stay hospital care and to care in nursing homes. The costs of social services are divided between local authorities and service users. As there are no national data on the quantities of privately funded care, the projections for privately funded care, especially non-residential care, need to be treated with caution as it is not possible to verify that all privately funded care is captured by the model.

The breakdown for 2014 of residents of residential care, nursing homes and home care users into privately and publicly funded residents is based on official data. Thereafter it is based on analyses using the CARESIM model. Privately funded residents are assumed to meet their care home fees from their own funds (including disability benefits), except that the NHS meets nursing costs in nursing homes. Expenditure on local authority funded residential care and home care is divided between local authority social services and users on the basis of CARESIM modelling (see section 4). The full costs of privately funded residential and nursing home care and privately funded home care are thus assigned to users.

Estimated net and gross expenditure on local authority funded services plus expenditure on assessment and care management is grossed to match local authority PSS EX1 expenditure data for 2013/4. The grossing factors estimated for 2013/4 are applied to all projection years.

Expenditure on disability benefits is estimated separately, by multiplying the numbers of recipients by the weekly average amounts. This expenditure is split between sums used to fund care and sums not so used through CARESIM modelling.

The modelling includes assumptions about rises in the real unit costs of care. The weekly costs of home care and other community-based services and most of the weekly costs of residential care are assumed to rise in line with average hourly earnings in the economy. These are in turn proxied by Office for Budget Responsibility (OBR) assumptions of future productivity rates. The exception is that element of care home costs which relate neither to staff nor to capital (such as costs of food and fuel) which are assumed to remain constant in real terms. Weekly disability benefit costs are also assumed to remain constant in real terms. GDP is assumed to rise in line with OBR projections. Specific values used for CASPeR are shown in Appendix C.

c. University of East Anglia (UEA) CARESIM model

CARESIM is a dynamic microsimulation model which uses a sample of people aged 65 and above living in England drawn from the UK Family Resources Survey (FRS). Detailed information on the incomes, wealth, housing and other relevant characteristics of sample members are used to simulate what each older sample member would be required to pay towards his or her care costs should he or she need care. For every simulation sample member, the considered needs are either home care (three different levels: low, medium, high; and a category covering all Direct Payments) or care home (four types: nursing care in independent sector homes; places which provide personal but not nursing care in independent homes; places in local authority run homes which also provide personal but not nursing care; and NHS fully funded nursing home places). The main aim of the model is to assess the distributional effects of alternative care charging regimes and how they affect the split of long-term care costs between the state and the individual.

The simulation sample consists of all unpartnered people of age 65 and above and one partner in all couples where both are over State Pension age. The default in the case of couples is for care charges to be modelled for the older partner. The FRS excludes people living in care homes and therefore represents the population from which future entrants to care homes will come, but may provide a less accurate picture of the incomes and assets of people already resident in care homes.

The simulations are performed for a base year and for future years. Money values from the FRS are uprated to the prices of the base year. For future years, the initial sample of people aged 65 and above is aged but, until recently, was not refreshed with new entrants. This meant that projections for 20 years ahead could be made only for people then aged 85 and above. As part of the CASPeR project, we have developed a method, explained in Appendix B, for refreshing the sample and so extending the model's time horizon and/or the age group for which projections remain valid.

Sample members are aged yearly as follows:

1. Official projections of age and gender specific survival rates are used to predict stochastically the survival of each member of all FRS households containing a member of the simulation sample;
2. Survivors whose partners have died are assigned widowhood status;

3. The state and private pension income and wealth of survivors who were of pension age at the start of the simulation are projected by applying simple assumptions about growth from the base year in their values relative to prices;
4. For those under State Pension age at the start of the simulation who have reached State Pension age by the output year, incomes in that year are taken from matched projections from the PPI dynamic simulation model (see Appendix B).
5. Any inheritance of income and capital of the surviving partner, if there is one including inherited pensions, is modelled.

Divorce, remarriage or other changes in household composition are not currently modelled. The onset of disability is not modelled but is taken into account by a re-weighting process (see below).

When simulating liability to pay towards care in a care home, each sample member is allocated an uncompleted care home duration (in weeks). The durations are based on analysis of the 2000 Health Survey for England (HSE) which included a sample of care homes and for each resident recorded how long he/she had been in the home within certain bands. Predictions of exact (in weeks) lengths of stay for HSE care home residents were formed from an interval regression to estimate the underlying distributions of uncompleted lengths of stay, distinguishing nursing and residential homes. These distributions were used to assign randomly a length of stay, conditional on type of care home. Liability to contribute to care home fees is calculated allowing for asset depletion to have taken place during the assigned time in a care home. In effect for each projection year, this mimics the observation of a cross-section of care home residents, producing results which can be used with the PSSRU model.

For home care, information on length of time in receipt of services taken from the Health and Social Care Information Centre's User Experience Survey and is used to determine time in receipt of home care. As for residential care, the approach mimics a cross-section of home care recipients. Liability to pay towards home care is assessed at that point, allowing for capital depletion to have occurred.

Underlying entitlements to Attendance Allowance and Disability Living Allowance (AA/DLA) are also assigned for each type of care home place using Monte Carlo techniques. In the absence of up-to-date data on receipt of AA/DLA in care homes we assume that all care home residents are entitled to the higher rate of AA (or equivalently the highest rate of DLA).[10] Receipt of AA/DLA among home care recipients is based on analysis of the 2012 HSE distinguishing the three levels of home care described above.

Income tax liability and entitlement to means-tested social security benefits are then simulated to arrive at net income on which liability to pay for care home fees and home care is assessed. In determining care home residents' contributions to their care home fees we assume that they first allocate income apart from the personal expenses allowance, to these costs and draw on capital (financial assets followed by housing wealth) only if income is insufficient. For self-funders in receipt of AA or DLA, our assumption is that they use that income before other income. For home care, we also assume that AA/DLA in excess of assumed disability-related expenditure (Appendix C) is used to meet home care charges before other income which in turn is used before capital is drawn upon.

[10] Those who are entitled to public support with their care home costs, including those in NHS fully-funded nursing places, cease to receive AA/DLA.

d. Linkages between models

Linkages between the three models consist of

- Inputs from the PPI dynamic model to CARESIM in the form of projections of future pension incomes.
- Weights produced by the PSSRU model which are passed to CARESIM to adjust the CARESIM population to be representative of the older population in receipt of care in the base and future years.
- Aggregated results from CARESIM which are passed to the PSSRU model to enable it to split projected future expenditure on long-term care into private and public expenditure.

Each of these is explained in more detail below.

CARESIM refreshment from PPI dynamic model

By 20 years from the base year, CARESIM simulations based on the FRS sample of people aged 65+ in the base year would be representative only of people aged 85 and over. By adding to the simulation sample for future years, people aged 50-64 in the base year, we are now able to extend the projections to cover all people aged 65 and over for up to 15 years from the base year and/or for people aged 85 and over for up to 35 years ahead of the base year. The future pension incomes of people aged 50-64 in the base year are provided by the PPI ELSA-based dynamic via a statistical matching procedure explained in Appendix A.

CARESIM weights from PSSRU model

As explained, CARESIM calculates what each person in a representative sample of older people would be required to contribute to the costs of residential or home care. In order to make each aged sample representative of the older population, CARESIM results are reweighted according to projection year, housing tenure, marital status and education level,[11] within gender and 5-year age group. The weights are based on the PSSRU model projections of the (previous) housing tenure, marital status and education level of service users, by age and gender. They are used as grossing-up factors which reflect the PSSRU model projections of the composition of the population in these age groups in each of the eight care categories. Members of the simulation sample are assigned eight grossing-up factors to allow them to be grossed-up to the population in each of these categories.

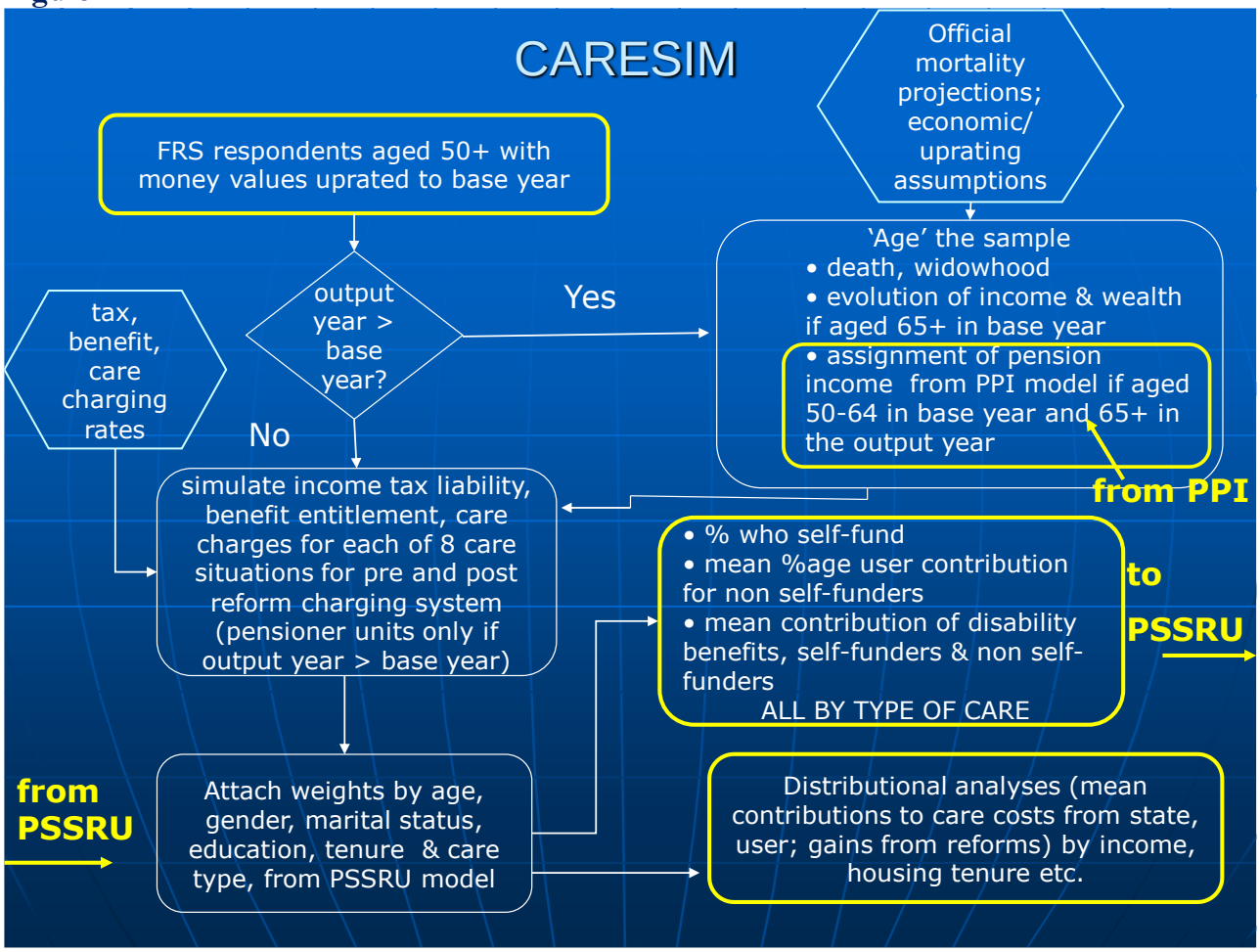
CARESIM output to PSSRU model

CARESIM provides to the PSSRU model, estimates for those aged 75+ in the output year, of: the proportion of residents who self-fund; the proportion of costs which are met from AA/DLA; and the proportion contributed by LA-supported users met from their assessed income and assets. These are then used in the PSSRU model to apportion total expenditure amongst its constituent components and funding sources. If, for example, CARESIM estimates that the proportion of nursing home residents who are self-funders is expected to be 10% higher in 2015 under a reform option than under the current funding system, this uplift of 10% is applied in the PSSRU model.

[11] The classification by education level is still in the process of being implemented in CARESIM but is expected to be implemented for the final version of the main report.

Figure A1 below provides a schematic overview of CARESIM showing its links with the PSSRU and PPI models.

Figure A1



e. PPI Aggregate and Distributional models

Overview of Aggregate Modelling of state and private pensions

The PPI Aggregate Model links changes in the UK population, the labour market and economic assumptions to project forward state and private pension cashflows. Population projections are taken from 2014-based figures published by the ONS.

Current distributions of individuals across pension scheme types are taken from the Lifetime Labour Market Database (LLMDB) a panel dataset of 1% of UK National Insurance records. The workforce data includes numbers of individuals and average earnings split by age, gender and earnings band. The data are further split between public and private sector contracted-in schemes and those who, when applicable, are considered to be contracted-out of the State Second Pension (S2P).

Spending on state pensions

The starting point for this projection is a set of official projections of the future number of people in the UK by age and sex. This is broken down further by employment status

using a projection of future employment rates, which are in turn based on an official projection of activity rates. Finally, an earnings distribution is superimposed, which is based on an anonymised 1% sample of National Insurance records supplied by the Department for Work and Pensions.

Based on this labour market projection, the model projects future state expenditure on State Second Pension, State Earnings Related Pension Scheme (SERPS), and contracted-out rebates, as well as contributions to and income from private pensions. Future state expenditure on state pension is projected using data supplied by the Department for Work and Pensions on the projected eligibility and take-up of state benefits.

Spending on means-tested benefits

The Distributional Model projects the future distribution of pensioner incomes. Based on this projection, it calculates Pension Credit entitlements, other means-tested benefit entitlement and income tax liabilities.

The Distributional Model is a static microsimulation model. This means that it contains a representative set of households from the pensioner population. In the projection, the income received by these individuals is adjusted over time, to take account of plausible future changes. The individuals are also reweighted to allow for demographic changes. The Distributional Model allows for changes in the average amount received through a linkage to the PPI's Aggregate Model projections of total expenditure.

Distributional Modelling cannot reflect everything that will impact on the pensioner income distribution over time. Its aim is to allow comparison of the impact on the shape of the income distribution between different reform options.

Appendix B. Linking pension projections from the Pensions Policy Institute's dynamic model to the University of East Anglia's CARESIM model

The version of CARESIM in use at the start of the CASPeR project had two limitations: because of its cohort-base nature, after 20 years from the base year, simulations were valid for only those aged 85 and over; and structural reforms in the state pension system, which usually only affect new retirees, are not modelled by CARESIM.

Refreshing CARESIM's base year sample (i.e. introducing new cohorts of people in working-age) allowed the extension of the coverage (i.e. extending the analysis for people aged 65 and over for the next 20 years of simulation) or the time horizon (e.g. performing the analysis for people aged 85 and over for the next 35 years). However, refreshing the sample is not a straightforward task. It implicitly requires simulating for the coming years the evolution of the socio-economic characteristics of the new cohorts of people, including their retirement decisions and their subsequent pension incomes stream, accounting for the phasing-in of the pension reforms that would affect the new cohorts.

The approach adopted avoids the addition of such considerable extra complexities. It does so by a linkage with the dynamic microsimulation model, developed by the Pensions Policy Institute (PPI), which is specifically designed to project future pension incomes for those currently at work. The current version of PPI's microsimulation model derives its base-year population from wave 5 (2010) of the English Longitudinal Study of Ageing (ELSA). It 'ages' the sub-sample of people aged 50 and over in the base year and applies (deterministically) the retirement rules in force to simulate future pension incomes under different scenarios. The new linkage procedure enables CARESIM to use pension projections produced by the PPI model for the "refreshment cohorts", representing people aged between 50 and 64 in the base year.

The aim of this Appendix is to document the procedure developed to perform this linkage. The first subsection discusses the possible linking strategies between CARESIM and PPI's model. Both models are fully documented in the core sections of this technical report.

a. Possible linkage strategies between CARESIM and PPI's dynamic model

One approach to linking the PPI and CARESIM microsimulation models would involve conditional imputations of PPI model's projections to CARESIM. Under this approach, the PPI model's projections could be "imputed" to the refreshed CARESIM sample by means of regression-based (donor) imputation techniques or by conditional hot-deck imputations. However, traditional regression-based imputation approaches are unstable in the sense that small errors in the econometric specifications can cause very large errors in the way variables are imputed. In other words, they would require the specification of an econometric model for each imputed variable, with results that can be significantly affected by misspecifications[12] of the regression models. Moreover, regression towards the mean

[12] Specification errors occurs when the covariates used in the model are correlated with the error term. This may occur because: *i)* a relevant covariate that has a relationship with both the dependent and one or

underestimates the variance of the estimates and leads to a reduced sample variation of the imputed variables in CASESIM.[13]

Another issue to consider is the level of flexibility. Modelling different policy scenarios would require running a different linking procedure for each scenario of policy considered. This would be time consuming and prone to errors if done in haste as scenarios are explored. Also, each variable (e.g. retirement age, income from public and private pensions, etc.) would be treated independently despite being inherently related. In this case, partial correlations among imputed variables (e.g. between retirement age and pension incomes) would be difficult to maintain in CARESIM without making assumptions on the joint distributions of the imputed variables.

A second approach would link the initial base populations of the two models, so that micro-unit level projections can be easily exchanged between the two models. Although each sample is representative of the same underlying population, observed at the same (or a close) point in time, they do not refer to the *same* individuals.

A third approach is to link the initial base populations (UK Family Resources Survey (FRS) and ELSA samples) of CARESIM and the PPI dynamic model by means of a statistical matching technique. Statistical matching is a data merging technique that allows each FRS individual to be 'matched' (in a statistical sense) with a comparator respondent in ELSA, chosen to be as close as possible in terms of set of common variables available in both samples. This approach enables the generation of a new dataset from the two datasets (FRS and ELSA samples) that contains common variables (the matching variables) as well as variables that are available in only one of the two donor samples. We perform a non-parametric matching approach because we do not want to rely on assumptions of *a priori* specification of the shape of the relationship between the variables we aim to impute and their covariates.

Linking the initial base populations through statistical matching is a complex task but it is a good investment. Unlike a direct imputation between models, a matching procedure can preserve variability of the imputed variables. Secondly, being a non-parametric econometric approach, it imposes fewer restrictions than those imposed by more common parametric approaches, such as the regression-based imputations. Thirdly, statistical matching allows a broader "exchange" of estimates from the two models, which are independent of the type of policy scenario to be simulated. Finally, it allows the two models to use a fuller set of base-year information. In other words, CARESIM could potentially use some variables from ELSA (i.e. information on health/disability status) and the PPI model could use variables which are in the FRS but not ELSA.

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more of the other covariates has been omitted from the model; *ii)* the use of incorrect functional forms (for example on financial variables) in the specification of the models; *iii)* measurement errors that affect the independent variables; *iv)* irrelevant covariates included in the models.

[13] While often neglected, the reduced variance of the imputed variables could be very problematic in a micro-simulation model aiming at assessing the distributional effect of policy reforms.

b. Trade-off quantity-quality: iterative Mahalanobis matching

Matching techniques determine for every unit (e.g. individuals or households) in a sample S^1 (e.g. FRS) one or more unit(s) in a second sample S^2 (e.g. ELSA) with similar observable characteristics. The possible considered characteristics, which can be expressed as a random vector **X** of *matching variables*, will be limited by the information collected within the two surveys, while concepts like the similarity between two units and the minimum acceptable degree of similarity for a match need to be defined taking into account the data and application. Matching techniques are particularly appropriate when the two samples have similar distributions (e.g. both are randomly sampled from the same population), which requires the distributions of the observable characteristics $\boldsymbol{X}^1$ and $\boldsymbol{X}^2$ to be close to each other. This is in sharp contrast with other regression-based techniques which rely on distributional assumptions (e.g. propensity score matching). Non-parametric matching techniques (e.g. Mahalanobis metric matching, nearest neighbour matching) lie in between, since they are model-independent and therefore less sensitive to deviations from standard distributional assumptions.

In **Mahalanobis metric matching**, the similarity between two units *i, j*, is measured using their (squared) *Mahalanobis distance* between their vectors of characteristics $\boldsymbol{X}_i^1$ and $\boldsymbol{X}_j^2$:

$$\mathrm{D}\left(\boldsymbol{X}_i^1, \boldsymbol{X}_j^2\right) = \left(\boldsymbol{X}_i^1 - \boldsymbol{X}_j^2\right)' C^{-1} - \left(\boldsymbol{X}_i^1 - \boldsymbol{X}_j^2\right),$$

where $\boldsymbol{C}$ is the covariance matrix of the distribution of the random vector $\boldsymbol{X}$, which can be estimated empirically using the observed data $\boldsymbol{X}^1$ and $\boldsymbol{X}^2$. A unit *i* in S^1 is matched to a unit *k* in S^2 given that:

- $\mathrm{D}\left(\boldsymbol{X}_i^1, \boldsymbol{X}_k^2\right)$ is the minimum of all Mahalanobis distances $\mathrm{D}(\boldsymbol{X}^1_i, \boldsymbol{X}^2_j)$, j in S^2;
- $\mathrm{D}\left(\boldsymbol{X}_i^1, \boldsymbol{X}_k^2\right) < \varepsilon$, where the *caliper* parameter ε avoids distant pairs to be accepted.

In the case that there are multiple units satisfying both conditions (i.e. multiple units *k* in the second sample S^2 with characteristics $\boldsymbol{X}_k^2$ at minimum distance to the characteristics of unit *i* and such distance being below the caliper ε), one is picked up, ideally at random and if possible avoiding replacement. The randomness of the matches is usually achieved by randomly ordering the units prior to running the method, and then selecting the first closest and acceptable match in case of multiple ones.

There is a high risk of encountering few matches if the tolerance caliper is set relatively small and the number of matching variables (size of $\boldsymbol{X}$) is high. This occurs because the Mahalanobis distances increase with the number of matching variables (for a fixed caliper), with the likely effect that the common support[14] size decreases as the number of matching variables increases. However, having many matching variables increases the quality of a match, defined as the "similarity" of *i* in S^1 with the *k*- unit in S^2. Therefore, it seems natural to look for an optimal trade-off between the number of matches (common support size) and the inversely proportional quality of those matches. Given that the Mahalanobis distance increases with the number of variables, a **trade-off between quantity and quality** can be achieved by starting by using a Mahalanobis metric matching with a high number of matching variables (outputting fewer but highly similar matches) and then

[14] The common support is essentially the overlap between values of $\boldsymbol{X}$ for the S^1 and S^2 samples. In our case, it will be measured as the percentage of FRS individuals successfully matched with a comparator in the ELSA sample.

sequentially removing variables and matching only the remaining units (e.g. those FRS sample members who did not obtain a pair-matched sample member from the ELSA). In this way, a sequence of sets of matches is constructed, each with a smaller number of matching variables being used for its computation (and so less quality). The process concludes when either there are no units to be matched or there are no more variables to be removed. In this way, representativeness of the matched sample to the universe which is intended to represent is achieved by having matched *all* sample members from either the recipient *or* the donor survey.

The described iterative process requires the definition for each step of a set of matching variables that is reducing in number. As well as the selection of the matching variables in each step, the value of the caliper threshold is also important in this iterative process. A very high caliper value will produce poor quality matches, independently of the number of matching variables, since it will allow for gross dissimilarities between units to be accepted as matches. In contrast, a very small caliper will practically require matching units of identical characteristics, which is theoretically desirable but can be too demanding in practice, resulting in few output matches.

c. Statistically matching ELSA and FRS

In order to apply the iterative statistical matching described in the previous section to link ELSA to FRS, we need to define different sets of matching variables to be used by the iterative calls to Mahalanobis metric matching, a caliper parameter being also needed to select the validity of a matching pair. Broadly similar in sampling design, the two surveys differ considerably in their initial response and cumulated attrition, and in methods of constructing weights. ELSA is a panel of individuals aged 50 years and older and their partners in approximately 8,000 private households in England. Panel membership is based on participation in the 1998, 1999 or 2001 Health Surveys for England (HSEs). Wave 5 of ELSA is thus potentially affected by non-response in the HSE and further rounds of attrition. The FRS has a sample size of over 15,000 private households living in England with a member aged 50 years or older. It is an annual cross-section and therefore suffers from non-response but not accumulated attrition.

We restricted our matching to people aged 50 years or over, living in England. Both restrictions are imposed by the ELSA sampling frame. Given that sample members in both surveys are randomly selected from the same underlying population, a priori the sample distributions will be similar for any selected set of common variables.
The two surveys differ in questionnaire content. The FRS collects very detailed income and benefit information, used as the basis for most official statistics on welfare and disability programme targeting, but a limited set of disability indicators. ELSA provides a richer range of health and disability measures but slightly more limited income data than the FRS (for example, the ELSA collects some income components gross of tax and others net). On the other hand, ELSA collects a large set of information on past pension contribution histories, which are relevant for simulating retirement incomes. Both surveys collect similar socio-demographic information. We therefore applied a harmonization procedure to get consistent variables in both surveys to be included in the **X** vector of common characteristics.

For our application, we use the wave 5 of ELSA and the FRS cross-section 2010/11. Table B1 (first two columns) summarizes the variables in common between the ELSA and FRS

samples that were used for matching the two base populations of PPI and CARESIM models. The matching variables were selected as the subset of common variables in the two surveys that captured socio-demographic differences and variation in current/permanent income[15], health status and receipt of public support. The selected variables contain most of the factors typically used to model long-term care and pension outcomes. In several cases, corresponding variables in the two surveys differ in detail. Where this is the case, the variables have been harmonised. Age was coded in years, and top-coded at age 80 (aged 80 and above being in a single age group). Income was grouped into bands (net weekly income of up to £50, £100, £200, £300, £400, £500, £600, £700, £900, £2000, and above), supplemented by deciles, quintiles and tertile income groups defined with respect to its distribution within each sample after applying appropriate sample weights.

Table B2 (FRS and ELSA columns), shows that the means of the matching variables are quite similar except that the proportion of the ELSA sample with a high education qualification is significantly higher than in the FRS.

In case of non-parametric estimation, the common support assumption is crucial. This is because we want to generate a matched dataset that maintains the sample representativeness of one of the donor samples. If measured as the percentage of FRS, individuals successfully matched with a comparator in the ELSA sample, the "optimal" scenario, would be 100% so that valid inference to the whole population is possible with the matched dataset. In achieving this, rather than imposing an almost-exact match of all matching variables in Table B1, we searched a trade-off between "quality" of the matching and the ability to preserve FRS representativeness (support size). Specifically, we imposed an exact matching on the three "stratification variables" (being female, being part of a couple, and receiving a state pension), which we considered important determinants of long-term care charging and pension outcomes, and an approximate matching on the remaining variables. In order to maximize the quality of the matching sample, we ran Mahalanobis metric matching in 16 iterations for different sets of variables. CARESIM weighting regime uses PSSRU projections by year, housing tenure, marital status and education level, within gender and 5-year age group. Accordingly, FEMALE, COUPLE and SP were chosen as stratification variables, and AGE, HIGHED and OWNING as very relevant matching variables.

We started by considering all matching variables (matching step 1 in Table B1), and then proceeded by sequentially removing variables as described by the last column in Table B1 (steps 2 to 16). We adjusted experimentally the value of the caliper threshold to 0.2, which implied in practice a maximum difference of two years in age (rarely occurring).

The matching heuristic imposes a match on income bands (steps 1-2), income percentiles (steps 1-5), disability (steps 1-7), income sources (steps 1-10), household composition (steps 1-12), tenure (steps 1-14), and individual demographic variables (steps 1-16).

[15] Permanent income is a term used by economists to convey the concept of lifetime economic resources of an individual or household, in which temporary fluctuations (e.g. due to unemployment or a promotion) are "smoothed" over the life-cycle.

Table B1. Variables used for the matching: names, description, whether imposed as exact matching or allowing a minimum distance error, and in which steps of the matching heuristic are finally used (see text)

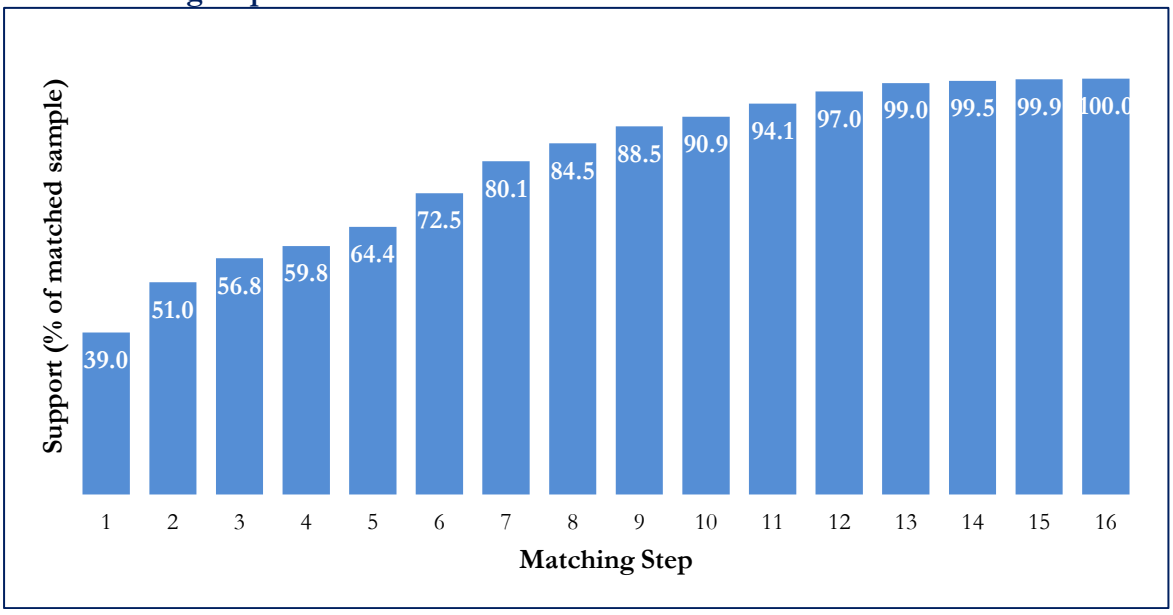
Variable Name	Variable Description	Stratification Variable	Matching Step
FEMALE	Whether being female	Y	1-16
COUPLE	Whether being in couple	Y	1-16
SP	State pension receipt	Y	1-16
AGE	Age in years	N	1-16
HIGHED	Whether having a high education qualification	N	1-15
OWNING	Whether owning their house	N	1-14
INWORK	Whether being in-work	N	1-13
NCOMPHH	Number of components in household	N	1-12
NBUS	Number of benefit units in household	N	1-11
NCOMPBU	Number of components in benefit unit	N	1-11
PP	Private pension receipt	N	1-10
IS	Income support	N	1-9
PC	Pension credit receipt	N	1-9
HB	Housing benefit receipt	N	1-8
CTB	Council tax benefit receipt	N	1-8
AA	Attendance allowance receipt	N	1-7
DLA	Disability living allowance receipt	N	1-7
LSI	Long-standing illness	N	1-6
LIMLSI	Limiting long-standing illness	N	1-6
YTERT	Income tertile	N	5
YQUINT	Income quintile	N	4
YDEC	Income decile	N	1, 3
YGRP	Income groups	N	1, 2

Table B2. Mean of variables for FRS, ELSA, and matched samples.

Variables	FRS	ELSA	Matched Sample
FEMALE	52.6%	55.1%	52.6%
COUPLE	68.3%	71.2%	68.3%
SP	56.0%	61.8%	56.0%
OWNING	60.2%	65.7%	60.0%
AGE	65.0	66.4	65.1
HIGHED	19.4%	34.7%	19.3%
INWORK	34.6%	31.3%	34.5%
NCOMPHH	1.99	1.99	1.98
NBUS	1.20	1.26	1.21
NCOMPBU	1.75	1.75	1.74
PP	63.3%	71.1%	65.8%
IS	1.6%	1.7%	1.6%
PC	9.1%	7.3%	8.6%
HB	12.2%	8.9%	11.7%
CTB	19.0%	17.8%	19.0%
AA	4.5%	4.4%	4.0%
DLA	9.3%	7.0%	7.5%
LSI	51.1%	54.7%	50.0%
LIMLSI	34.1%	34.8%	33.6%
WEEKLY NET INCOME	£295.2	£268.1	£272.2

For only about 39% of FRS sample members was an exact match with an ELSA sample member found in the first step. About 51% of matches were found after 2 steps, and about a 65% of matches after 5 steps. The iterative procedure concluded by finding a pair from ELSA for 21,600 of the 21,609 sample members of FRS being aged 50 or above. See details in Chart B1. The last column in Table B2 shows the mean of variables of the final ELSA sample matched to the FRS sample. It can be seen that socioeconomic status distributions in the matched samples "mimic" FRS ones.

Chart B1. Percentage of support of the final matched sample that is achieved after each matching step



Appendix C: Economic assumptions, including uprating assumptions for taxes, benefits and care charging

Table C1: Economic Assumptions

Year	Earnings	CPI	Triple lock	Real earnings (deflated by CPI)	Real terms triple lock (deflated by CPI)	Care costs (staff and capital in care homes,[a] total home care)
2016	3.0%	0.0%	3.0%	3.0%	3.0%	2.2%
2017	3.5%	0.7%	3.5%	2.8%	2.8%	2.2%
2018	3.5%	1.6%	3.5%	1.9%	1.9%	2.2%
2019	3.3%	2.0%	3.3%	1.3%	1.3%	2.2%
2020	3.8%	2.1%	3.8%	1.7%	1.7%	2.2%
2021	3.8%	2.0%	3.8%	1.8%	1.8%	2.2%
thereafter	3.8%	2.0%	4.1%	1.8%	2.1%	2.2%

[a] Costs other than staff and capital in care homes are assumed to remain constant in real terms.

Projections of public and private expenditure on long-term care need to incorporate an assumption about future annual rises in care costs. It is important that this assumption is realistic: care providers need to set or negotiate price rises sufficient to meet rises in their costs, in particular rising wages of their staff, if they are to remain financially viable. We make an assumption that the hourly or weekly costs of care will rise in real in line with rising productivity as projected by the OBR. We then assume that an increase in unit costs of care in line with productivity, as a proxy for projected rises in average hourly earnings, will be sufficient to ensure that the supply of formal care will increase in line with projected demand.

Table C2: Care costs, tax and benefit uprating assumptions

	Base case	Scenario 1	Scenario 2	Scenario 3	Scenario 4
State pension					
basic State Pension/new State Pension	Triple lock	Triple lock	Triple lock	Earnings	Prices
Second State Pension	Prices	Prices	Prices	Prices	Prices
Attendance Allowance/Disability Living Allowance	Prices	Prices	Prices	Earnings	Earnings
Pension Credit[b]					
Standard Guarantee Credit (GC) threshold[c]	Earnings	Earnings	Earnings	Earnings	Earnings
Severe disability addition	Prices	Prices	Prices	Earnings	Earnings
Savings credit threshold/maximum amounts[d]	Prices	Prices	Prices	Prices	Prices
Capital thresholds for people in care homes	Prices	Prices	Prices	Earnings	Earnings
All other components including capital thresholds for people not in care homes[e]	Prices	Prices	Prices	Prices	Prices
Income tax thresholds	Earnings	Earnings	Earnings	Earnings	Earnings
Care charging parameters					
Capital thresholds for home care[e]	Prices	Prices	Prices	Earnings	Earnings
Capital thresholds for residential care[e]	Prices	Prices	Prices	Earnings	Earnings
Residential care Personal Expenses Allowance	Prices	Prices	Prices	Earnings	Earnings
Cap on lifetime liability under reforms	n/a	Earnings	Prices	Earnings	Prices
Revaluation of Care Account (metered eligible costs)	n/a	Earnings	Prices	Earnings	Prices
Daily living ('hotel') cost component of care home fees under reforms	n/a	Earnings	Prices	Earnings	Prices
NHS contribution to registered nursing care in a care home[f]	Earnings	Earnings	Earnings	Earnings	Earnings
Allowance for disability-related expenditure in home care means tests[g]	Prices	Prices	Prices	Prices	Prices
Eligible care costs under reforms	Calculated as the difference between assumed fee for LA-funded residential care home place, less NHS contribution if any, and daily living costs				

[a] All calculations are performed in constant prices; parameters linked to prices therefore remain constant throughout the projection years.
[b] Also the equivalent parameters for Housing Benefit and Council Tax Support
[c] The GC threshold also controls the (pre-buffer) threshold for home care charging
[d] Savings Credit applies only to people reaching State Pension age before April 2016. Recent practice has been to reduce the maximum savings credit levels. However, no firm commitment has been given on its future uprating so we hold it constant in real terms at its 2015 level.
[e] In practice capital thresholds tend to be uprated only intermittently.
[f] In July 2016 the Government announced a large increase in this contribution from £112 to £156.25 backdated to April 2016 but subject to further review which could see it reduced. Our analysis does not take account of this increase but assumes that the contribution of £112 is subsequently uprated by real earnings growth.
[g] Assumed weekly allowances in 2015: low home care package: £21.76; medium home care package: £36,33; high home care package and people receiving Direct Payments: £52.64.

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