UNIVERSITY of STRATHCLYDE
FRASER OF ALLANDER INSTITUTE

Affordability of water and sewerage charges, 2020/21 – 2027/28

Final report

July 2019

Contents

1. Introduction

Previous research undertaken for Citizens Advice Scotland by the Fraser of Allander Institute estimated that, in 2015/16, 12% of Scottish households spent more than 3% of their net income on water and sewerage charges. This estimate was derived from the Family Resources Survey, an annual survey of 3,000 households in Scotland which includes questions on household income and household water charge.

In future, are more or fewer households likely to spend more than 3% of their income on water and sewerage? The answer to this question clearly depends on the future growth of the water and sewerage charge relative to the growth of household income.

In April 2019, Citizens Advice Scotland commissioned the Fraser of Allander Institute to estimate the proportion of Scottish households likely to pay a charge for water and sewerage equivalent to more than 3% of net household income in 2021/22 and 2027/28. The years 2021 and 2027/28 were selected as these represent the start and end year of the next price setting period.

This report documents the study findings.

In order to estimate the proportion of households spending more than 3% of net income on water and sewerage, the latest version of the FRS survey was 'inflated' to 2021/22 and 2027/28 based on reasonable assumptions of income growth, housing cost growth and demographic change. As well as a central scenario, a better case and worse case scenario are also identified.

As in the previous report, household net income is defined taking into account all sources of income after direct taxes (income tax, national insurance contributions and council tax), and after housing costs. Income is equivalised, that is to say it is adjusted to reflect household composition, as is standard practice in assessments of the distributional consequences of policy decisions.

The primary objective of this work was to identify what proportion of Scottish households would be likely to spend more than 3% of income on water and sewerage under four scenarios for the growth of the water and sewerage charge in Scotland between 2021/22 and 2027/28. The scenarios are for annual growth in the water charge of 2%, 2.5%, 3% and 3.5% respectively.

The secondary objectives of the work were to:

First, identify how the proportion of households spending more than 3% of net income on water and sewerage varies across household characteristic;

Second, to examine how the proportion of all households identified as spending more than 3% of income on water and sewerage are distributed by characteristic.

The remainder of this report is structured as follows:

- Chapter 2 sets out the methodology and assumptions
- Chapter 3 presents the headline results – the proportion of households spending more than 3% of income on water and sewerage in 2021/22 and 2027/28 under each of the four price growth scenarios and three income growth scenarios.
- Chapter 4 examines how the prevalence of spending more than 3% of income on water and sewerage varies by household characteristic.

- Chapter 5 examines how all households identified as spending more than 3% of income on water and sewerage are distributed by characteristic.
- Chapter 6 concludes.

In the remainder of the report we use the shorthand “>3%W&S” to mean “greater than 3% of household net equivalised income on water and sewerage”.

2. Approach

The latest versions of the Households Below Average Income (HBAI) and Family Resources Survey (FRS) are for 2017/18. These surveys (in fact the FRS and HBAI are derived from the same survey, but each contain different sets of variables relevant for this study) include data on household income from different sources, housing costs, water and sewerage costs, and a variety of household characteristics (such as tenure, composition and economic activity).

In order to identify a robust sample for this analysis, we merged the 2016/17 and 2017/18 versions of the HBAI/FRS into one file, giving us a sample of 6,200 Scottish households.

But in order to estimate the likely affordability of water and sewerage charges in future years (specifically, 2021/22 and 2027/28), assumptions need to be made about how net household income is likely to evolve over time for different types of households. Effectively what we need to do is to create updated versions of the HBAI/FRS that correspond to how we think the FRS might look in 2021/22 and 2027/28.

Specifically, assumptions are required about how household income and housing costs may grow, and how the distribution of households by type may change to reflect demographic and household formation patterns. Specifically we require assumptions on:

- The likely future growth of income by type (employment income, pension income, benefit income, etc.);
- Likely changes to tax policy (which influence disposable income);
- Likely changes to housing costs, mainly rent and mortgage costs (which inform the assessment of 'after housing cost' income); and
- Demographic changes, in terms of the changing distribution of households by age and composition (which could affect the assessment of affordability, for example if there was anticipated growth in the number of single person households).

This chapter sets out these assumptions.

CPI inflation

The assumption for CPI inflation is important for two main reasons. First, the rate of CPI inflation often forms the default uprating policy for tax thresholds and benefit rates. Second, the rate of CPI inflation determines the rate of 'real' (inflation adjusted) household income.

We take the forecast for CPI inflation from the Office for Budget Responsibility's (OBR's) latest (March 2019) Economic and Fiscal Outlook, which was published alongside the UK Government's 'Spring Statement'. This is shown in Table 2.1. Inflation is forecast to be stable at 2 per cent from 2021/22.

Table 2.1: Forecast CPI inflation

	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28
CPI	1.11	2.82	2.28	2.03	1.90	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Source: data for 16/17 and 17/18 is outturn. Forecasts for 18/19 – 23/24 are from OBR's March 2019 EFO. After 2023/24, we assume CPI inflation continues at the long-run rate of 2%.

Income growth

The assumptions we make about income growth by income type are taken directly from the latest forecasts of official forecasting organisations – the Scottish Fiscal Commission (SFC) and the Office for Budget Responsibility (OBR) – that were available at the time our analysis commenced. Both organisations have recently published forecasts covering individual years up to and including 2023/24. For years 2024/25 and beyond, we assume a continuation of the final year growth assumption unless otherwise stated (this is on the grounds that both SFC and OBR forecasts are both made on the assumption that growth rates by the end of the forecasting period will essentially have converged to an implied long-run growth trend).

The source of the specific assumptions is as follows (and shown explicitly in Table 2.2, along with the CPI forecast for comparison):

- Forecast growth in average **employment income** is taken from the December 2018 SFC economic and fiscal forecasts for Scotland (see Table 5 of the SFC publication). (Incidentally, the SFC's forecasts for employment income growth in Scotland are broadly equivalent to the OBR's for the UK; the SFC's forecast is for slightly slower growth in earnings across the forecast period, but converging to a rate of 3.2% by 2023/24, compared to 3.3% assumed by the OBR for the UK as a whole).
- We assume that **self-employment income** grows at the same rate as employment income.
- The SFC's assumption about the growth of **private pension income** is based on analysis of historic trends in the growth of annual occupational pension income, and is projected to grow 3.2% per annum.
- '**Other income**' includes income from savings and dividends, property, and other miscellaneous income. The specific numbers have been provided to us by the SFC, based on their forecasts.
- Most **working age benefits** have been frozen in cash terms from 2015/16 to 2019/20. We incorporate this assumption into our modelling. In 2020/21 and beyond, it is assumed that working age benefit rates are uprated in line with CPI inflation, which is the default 'normal' policy for benefit uprating.
- **Disability benefits** (working age and non-working age) have continued to be uprated in line with CPI inflation, and we assume that this uprating policy continues in future.
- **Non-working age benefits**, which are largely accounted for by the state pension, are assumed to be increased in line with the 'triple lock'. The 'triple lock' policy says that the State Pension (and some related benefits including the Pension Credit) will increase each year by the higher of: the growth rate of earnings; CPI inflation; or 2.5 per cent. The consequent growth factor for each year is taken from Table 3.10 of the March 2019 OBR forecasts.

Table 2.2: Assumptions for income growth by type

	Employment income	Self-employment income	Private pension income	Other income	Working-age (non-disability) benefit income	Disability benefits	Non-working age benefit income	CPI inflation
2017/18	1.50	1.50	3.20	1.40	0.00	1.11	2.5	2.82
2018/19	1.97	1.97	3.20	2.09	0.00	2.82	3.00	2.28
2019/20	2.27	2.27	3.20	2.34	0.00	2.28	2.60	2.03
2020/21	2.51	2.51	3.20	2.54	1.90	2.03	3.50	1.90
2021/22	2.75	2.75	3.20	2.81	2.00	1.90	2.90	2.00
2022/23	2.96	2.96	3.20	3.01	2.00	2.00	3.10	2.00
2023/24	3.13	3.13	3.20	3.17	2.00	2.00	3.10	2.00
2024/25	3.20	3.20	3.20	3.20	2.00	2.00	3.20	2.00
2025/26	3.20	3.20	3.20	3.20	2.00	2.00	3.20	2.00
2026/27	3.20	3.20	3.20	3.20	2.00	2.00	3.20	2.00
2027/28	3.20	3.20	3.20	3.20	2.00	2.00	3.20	2.00

See text for sources

Tax policy

In order to calculate net household income, we need to know how tax policy is likely to change.

We of course know exactly what tax policy looks like in 2019/20. We therefore programme in the 2019/20 tax rates and thresholds for income tax and national insurance. We also take account of the average band D council tax bill in Scotland in 2019/20 (£1,251) and the changes to the ratios between council tax bands that were announced in 2017/18.

Beyond 2019/20, we assume that all income tax and national insurance thresholds are increased in line with CPI inflation. The exception to this is in relation to the Additional Rate threshold (which we assume fixed at £150,000), and the threshold for the withdrawal of the Personal Allowance (which we assume fixed at £100,000). These are the standard assumptions used by the SFC and OBR regarding default uprating policy for tax. In the absence of explicit policy change, allowances and thresholds are assumed to increase in line with (the previous year's) CPI inflation with the exception of the Additional Rate and Personal Allowance withdrawal threshold which are assumed to remain unchanged – this reflects the fact that these thresholds have remained unchanged since they were introduced.

We assume no changes to income tax or national insurance rates.

Of course, one might assume that the Additional Rate may be increased at some point, and in recent years the Personal Allowance has tended to increase by more than inflation – but before such policies are made explicit, it is difficult to justify any policy other than the standard default policy.

We assume that the band D council tax is increased in line with CPI inflation beyond 2019/20. We also assume that thresholds for Council Tax Reduction also increase in line with CPI (implicitly therefore there is no change to the 'generosity' of Council Tax Reduction over time).

Housing costs

In order to calculate 'after housing cost' income, we need to forecast the likely evolution of housing costs. Housing costs include rent net of housing benefit, mortgage interest payments, water charges, buildings insurance (for owner occupiers), and any ground rent and service charges.

Our assumptions are as follows (Table 2.3):

- The housing costs for private renters will increase in-line with forecast earnings growth. This is consistent with OBR projections for the UK (and the projections made by similar studies, as set out in the following chapter).
- We assume that the housing costs for social renters will increase in line with the average annual increase in social rents in Scotland between 2014/15 and 2016/17, as identified in Table 5.2 of the Scottish Government publication 'Social tenants in Scotland 2016'. This implies an average annual growth of around 2.4%, slightly higher than CPI inflation.
- For those who own their property with a mortgage, we assume that mortgage costs will increase in line with OBR forecasts for mortgage inflation, provided in Table 1.7 of the OBR's Supplementary Economy tables, consistent with most similar studies. Non-mortgage elements of housing costs are assumed to increase in line with CPI inflation.
- Housing costs for those who own their property outright are assumed to increase in line with CPI inflation (these costs basically include structural insurance, ground rents and service changes).

The projected growth of mortgage interest may appear high, particularly in the context of projected increases in interest rates. Note however that the interest payments on a mortgage increase disproportionately to a given increase in the interest rate (repayments of capital are excluded from the standard definition of housing costs[1]). Beyond 2023/24, we assume mortgage interest payments increase at 4.1% annually, which is the average annual change observed over the past 30 years. This implies a gradual (but slow) increase in interest rates, which, like all assumptions, is subject to uncertainty.

Table 2.3: Assumptions for annual housing cost growth

	Rents in private rented sector	Social housing rents (local authority and social landlords)	Mortgage interest payments	Non-mortgage costs for owner occupiers
2017/18	1.50	2.36	-2.29	2.82
2018/19	1.97	2.36	4.19	2.28
2019/20	2.27	2.36	8.34	2.03
2020/21	2.51	2.36	7.22	1.90
2021/22	2.75	2.36	5.58	2.00
2022/23	2.96	2.36	5.59	2.00
2023/24	3.13	2.36	5.22	2.00
2024/25	3.20	2.36	4.1	2.00
2025/26	3.20	2.36	4.1	2.00
2026/27	3.20	2.36	4.1	2.00
2027/28	3.20	2.36	4.1	2.00

See text for sources

[1] The historic trend in this variable is available at https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/czcr/mm23

Re-weighting for demographic change

Our assumptions for demographic change are taken from the Registers of Scotland's 'Household projections for Scotland – principal projection' tables.

Specifically, we reweight the FRS/HBAI survey data so that the number of households – by age of the household head and by household type – match the Registers of Scotland's projections.

What this means in terms of the number of households in each category is shown in Tables 2.4 and 2.5 below. The total number of households is projected to grow over the period. Within this however, there is anticipated to be growth in the number of single-person households, one-parent households and childless couple households, but a decline in the number of couple households with children. The proportion of households headed by people aged under 30 is anticipated to decline, whilst the proportion of households headed by people aged over 30 is anticipated to grow.

Table 2.4: Number of households in Scotland by type

Household type	2016	2019	2021	2027
1 adult male	419,924	444,248	460,025	504,117
1 adult female	469,784	481,934	488,830	509,114
2 adults	761,030	785,209	799,478	830,699
1 adult, 1 child	92,428	95,482	97,308	103,092
1 adult, 2+ children	66,755	68,981	70,400	73,987
2+ adult 1+ children	434,061	426,841	423,056	413,468
3+ person all adult	202,188	198,515	195,365	182,432
Total	2,446,170	2,501,210	2,534,462	2,616,909

Source: Registers of Scotland, 2016-based household projections

Table 2.5: Number of households in Scotland by age of household head

Age of head	2016	2019	2021	2027
16-29	285,755	287,357	281,299	259,803
30-39	382,778	408,545	421,766	444,731
40-49	439,884	413,776	409,111	438,879
50-59	471,359	485,213	486,043	437,137
60-69	393,195	394,525	407,489	452,508
70+	473,200	511,793	528,752	583,851
Total	2,446,171	2,501,209	2,534,460	2,616,909

Source: Registers of Scotland, 2016-based household projections

In principle there could be a case for reweighting the data to account for anticipated change in employment. However, the SFC does not forecast material change in the 16+ employment rate over the period – it is 58.2% in 2016/17, our base year, and forecast to be 58.2% in 2020/21, falling to 58.0% in the final year of the latest SFC forecast (2023/24). It might be hypothesised that, whilst the average employment rate might not change, this may mask changes in employment rate by age or gender. However we have decided not to undertake a reweighting exercise on the basis of employment rates by age and gender, largely because we are not aware of Scottish specific forecasts.

Sensitivity analysis – alternative scenarios

All of the forecast judgements made above are subject to uncertainty. Uncertainty is particularly heightened currently, given the inconclusive nature of the Brexit negotiations. Certain scenarios (such as a disorderly 'no deal' Brexit) could result in abrupt changes in the growth of economic output, and/or a further depreciation of the pound, higher inflation and pressure on interest rates.

Having said this, forecasts of employment income are subject to uncertainty even during times of relative political and economic stability. The main determinant of employment income (earnings) is the assumed path of productivity. As the OBR notes in its latest (March 2019) forecast, 'the outlook for productivity growth remains hugely uncertain'.

For sensitivity analysis, we model an 'upper income growth' scenario in which income from employment, self-employment and private (occupational) pensions grow by 20% more each year than under the base scenario each year, and a 'low income growth' scenario in which income from employment, self-employment and occupational pensions grow by 20% less each year than under the base scenario.

The choice of the +/-20% growth parameter for sensitivity analysis was informed by the SFC's own sensitivity analysis. The key factor influencing the SFC's forecast of earnings growth is its productivity assumption. In its central forecast, productivity is assumed to increase from a growth rate of 0.4 per cent in 2018-19 to 1.2 per cent by 2023-24.

The SFC also considers the effect of a 'low productivity variant', where the growth rate of productivity is assumed to reach 0.5 per cent by 2023-24, (this is consistent with the historically low growth in productivity seen post-2008). In its 'high productivity variant' scenario, the growth rate of productivity is assumed to converge to 1.5 per cent by 2023-24, (in line with pre-2008 average growth).

What is the effect of these scenarios on earnings growth? Under the SFC's core scenario, average earnings growth is anticipated to be 2.7% per year. Under its 'low productivity' growth scenario, average earnings growth is 2.2% per annum (which is almost 20% lower than the core scenario), whilst under the 'high productivity' scenario it averages 3.2% per year (almost 20% higher than the core scenario).

For the purposes of illustrating the sensitivity of results to varying housing costs, we overlay these two income growth scenarios with scenarios for faster and slower growth of housing costs. Specifically, the 'upper income growth' scenario, as well as including faster income growth, is overlaid with an assumption that housing costs grow 20% more slowly each year than under the base case; and a 'lower income growth' scenario is overlaid with an assumption that housing costs grow 20% more quickly each year than under the base case. In other words, the upper growth scenario combines faster income growth with slower housing cost growth, and the lower growth scenario combines slower income growth with faster housing cost growth.

Water and Sewerage Charge

The Water Charge is known until 2019/20, and is anticipated to decline by 0.3% (cash terms) in 2020/21, in order to meet the requirements of the 2015-2021 price setting period.

From 2020/21 onwards, four scenarios for the potential growth in the water and sewerage charge are modelled, as shown in Table 2.6.

Table 2.6: scenarios for annual growth in water and sewerage charge, 2021/22 – 2027/28

	Annual growth in charge
Scenario 1	2%
Scenario 2	2.5%
Scenario 3	3%
Scenario 4	3.5%

It is assumed that there are no changes to the structure of water and sewerage charges. The ratio of the water charge by council tax band remains as currently, and no changes are made to the current eligibility criteria for discounts and reductions.

Estimating the water charge as a percentage of net household income

The calculation of the water charge as a percentage of household income is made in an identical manner in this study as in previous studies for Citizens Advice Scotland.

Household income is defined to include income from all sources (employment, self-employment, pensions, savings and investments, benefits); is net of direct taxes and some other costs (student loan repayments and maintenance payments); is measured after housing costs; and is equivalised to take account of household composition.

The water charge is removed from the measure of household income when calculating household spending on the water charge as a percentage of income. This is to ensure that the water charge does not appear in the denominator as well as the numerator.

For further detail on the methodology for calculating household income see the Fraser of Allander's 2017 report for the Citizens Advice Scotland[2], and for further detail on the process of equivalisation see the 2018 'Addendum' study[3].

Implications of assumptions

The implications of the assumptions used in terms of household income growth are shown in Chart 2.1. In cash terms, average household income growth is projected to increase from 1.5% in 2018/19 to just over 3% in 2020/21. Over the period to 2027/28 it is projected to grow at 3.5% per annum on average.

Intuitively, if average household incomes grow at 3.5%, we would anticipate that the proportion of households spending >3%W&S will decline between 2020/21 and 2027/28, certainly for the three price growth scenarios that involve price growth of less than 3.5% per annum.

A legitimate question to ask is why are after housing cost (AHC) household incomes projected to grow at 3.5% per annum when the assumption is that most forms of income will grow at 3.2% in this period? The answer relates to the fact that a disproportionate share of housing costs are anticipated to grow more slowly than 3.2%. And given that housing costs are deducted from before housing cost (BHC) household income to arrive at the AHC income measure, this means that AHC incomes grow slightly more quickly than BHC incomes.

Chart 2.1 also shows that AHC incomes are anticipated to grow more quickly in lower banded properties than higher banded properties. This reflects the nature of assumptions about different

[2] The affordability of the water and sewerage charge in Scotland. FAI, 2017
[3] The affordability of water and sewerage charges in Scotland; addendum – equivalised income. FAI, 2018

rates of income and housing cost growth, and the distribution of households with different sources of income and different tenure types across council tax band.

Chart 2.1: Annual growth (% change on previous year) in equivalised AHC household income growth (cash terms)

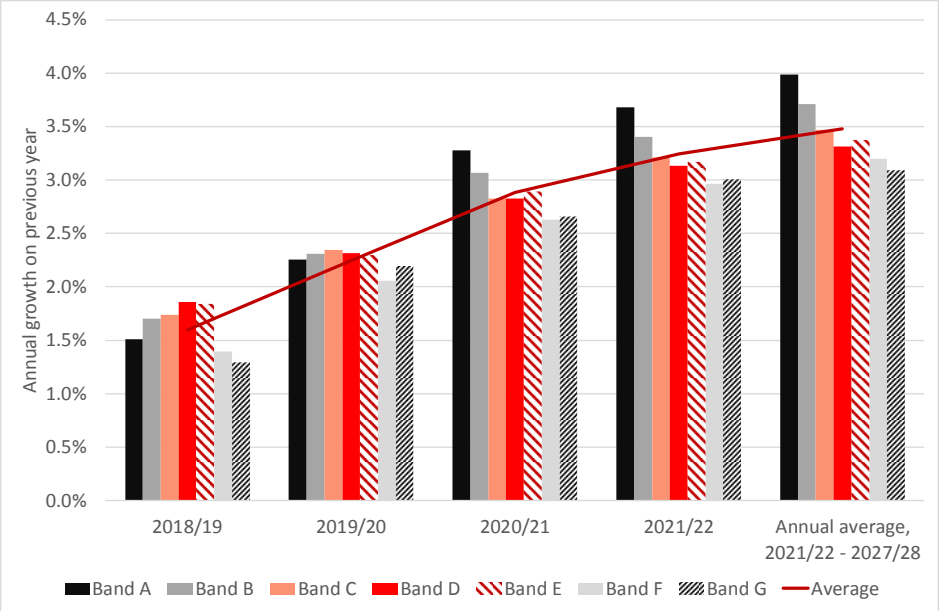
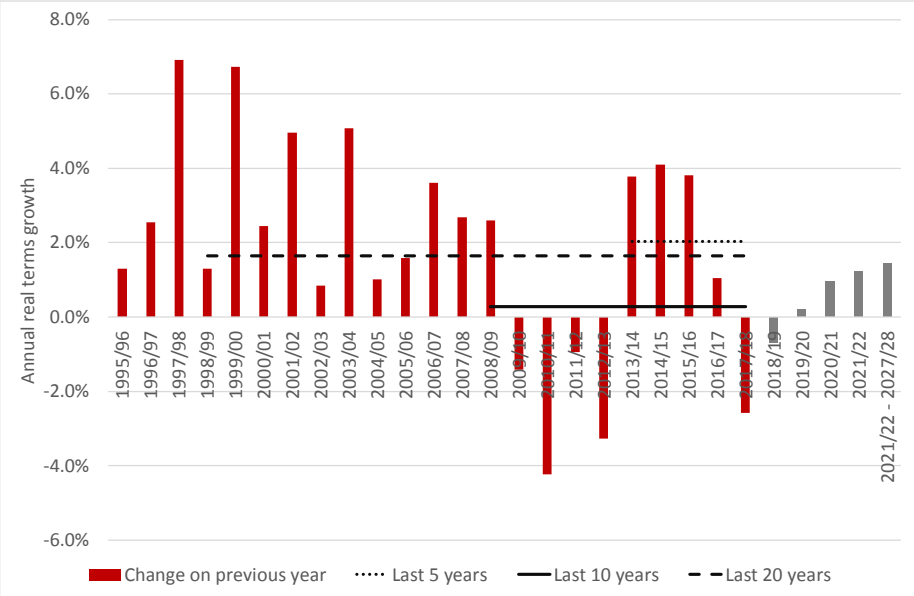


Chart 2.2 shows the implications of our assumptions for real terms annual AHC income growth, in the context of the recent past. Real terms household income growth is expected to improve in 2018/19 and become positive in 2019/20 (after a particularly bad year in 2017/18 – due in part to higher inflation as a result of the depreciation of the pound, which lowered real earnings growth).

Over the period 2021/22 to 2027/28, real terms AHC household income is projected to grow 1.4% per annum on average, higher than the average of the past ten years, but slightly below the 20 year average of 1.65%.

Chart 2.2: Annual real terms growth in equivalised AHC household income growth in Scotland – outturn and forecast



Notes: red bars show outturn, grey bars denote projections

3. Headline results

Overview: proportion of households spending >3% of net household income on water and sewerage

Table 3.1 shows the proportion of Scottish households projected to spend more than 3% of net equivalised household income on water and sewerage, in both 2021/22 and 2027/28, under the four scenarios for water charge inflation and three scenarios for household income growth.

Consider initially the central scenario for 2021/22. Recall that in 2015/16, 12% of households spent >3pcW&S. Under all price growth scenarios, fewer households than this are projected to spend >3pcW&S in 2021/22 (ranging from 10.0% to 10.2%).

For context, there are 2.53 million households in 2021/22, so just over 250,000 are projected to spend >3%W&S.

The reason for the decline from 2015/16 is due to the below inflation increases in the water charge in the period since 2015/16. Over the same period, household income growth has been slow in a historic context, but faster on average than the increase in the water charge.

There is relatively little difference in the result across the four price increase scenarios in 2021/22. This is not surprising given that the scenarios have applied to just one year.

By 2027/28 the different price growth scenarios have applied for seven years. There is therefore a wider spread of outcomes: if the water charge is increased 2% per annum, 7.9% of households are projected to spend >3pcW&S, rising to 9.2% if the water charge increases by 3.5% each year.

For context there are projected to be 2.6 million households in 2027/28.

What about changes between 2020/21 and 2027/28?

In all scenarios, the proportion of households spending >3pcW&S is projected to decline between 2021/22 and 2027/28. This might seem counterintuitive, particularly under the 3.5% growth scenario for the water charge.

It is intuitive that the proportion of households spending >3%W&S should fall between 2021/22 and 2027/28 under the first three price scenarios. This is because household AHC income is projected to grow at 3.5% per annum, which is clearly faster than the proposed growth in water charge for three of the four scenarios.

Why then does the proportion of households spending >3%W&S fall between 2021/22 and 2027/28 even under the 3.5% water charge scenario? The explanation is that there is a small subset of households which spend only slightly more than 3% on water and sewerage in 2021/22, and whose AHC income grows by slightly more than 3.5% over the period to 2027/28, just sufficiently to take these households out of the 3% threshold. Annex A1 analyses this in further detail.

The ‘upper’ and ‘lower’ scenarios for household income growth have intuitive explanations – proportionately more households spend >3pcW&S under the lower growth scenario, and proportionately fewer do so under the upper growth scenario. By 2027/28, the proportion of

households spending >3pcW&S ranges from 8.4% under the upper scenario to 10.3% under the lower growth scenario.

Table 3.1: Proportion of households spending more than 3% of net equivalised income on water and sewerage

Year	Water charge inflation scenario	Lower growth scenario	Central scenario	Upper growth scenario
2021/22	2%	10.4%	10.0%	9.6%
	2.50%	10.4%	10.0%	9.7%
	3%	10.5%	10.1%	9.8%
	3.50%	10.6%	10.2%	9.9%
2027/28	2%	8.8%	7.9%	7.2%
	2.50%	9.3%	8.3%	7.7%
	3%	9.7%	8.7%	8.1%
	3.50%	10.3%	9.2%	8.4%

Source: FAI analysis, based on FRS and HBAI, 2016/17 and 2017/18

4. Likelihood of spending >3%W&S by characteristic

This chapter examines the proportion of households spending >3%W&S by household characteristic. Each chart shows the results of the central scenario in bars, with the results of the 'upper' and 'lower' scenarios shown in error bars.

Council tax band

Chart 4.1 shows the proportion of households spending more than 3% of net AHC income on water and sewerage in 2021/22. The proportion of households spending >3%W&S is higher in bands E-H than in bands A-D. Fewer than 10% of households in bands A-D spend >3%W&S, rising to over a fifth of households in band G[4]. This is consistent with previous analysis considering the position in 2015/16. The increasing likelihood of spending >3%W&S as we move through the bands reflects the fact that the water charge increases as we move through the bands. And whilst average household incomes also increase as we move through the bands, there is a great deal of dispersion of income within each band, including a large proportion of relatively low income households (relative to the water charge) in higher banded properties.

In 2020/21 there is little difference in the proportion of households spending >3%W&S across the four price growth scenarios. This is because these marginal differences have applied in just one year.

The different income growth scenarios make relatively little difference to the pattern of results. In some cases, particularly in bands E-G, the effect of the higher and lower income growth scenarios seems to only change the results in one direction. For example, in band E the 'lower' scenario seems to be no different from the central scenario, whilst in band G the 'upper' scenario seems no better than the central scenario. The reason for this is simply that, given the distribution of households across the sample, it is possible that slightly faster or slower household income growth (applied in this case for just one year), might not make sufficient difference to push any more households above or below the 3% threshold.

Chart 4.2 shows the proportion of households spending more than 3% of net AHC income on water and sewerage in 2027/28. There is now greater variation in outcome across the four price growth scenarios. As would be expected, faster increases in the annual water charge result in a higher proportion of households spending >3%W&S.

However the differences between council tax band remain more striking than the differences between price growth scenario. The effect of the 'lower' and 'upper' scenarios is now also more evident and intuitive than in 2020/21.

[4] The results for band H are broadly in line with those for band G. However, the band H results are not reported, as there are only 35 band H properties in the sample (in contrast there are 332 band G properties in the sample).

Chart 4.1 Percentage of households spending >3pcW&S by council tax band, 2021/22

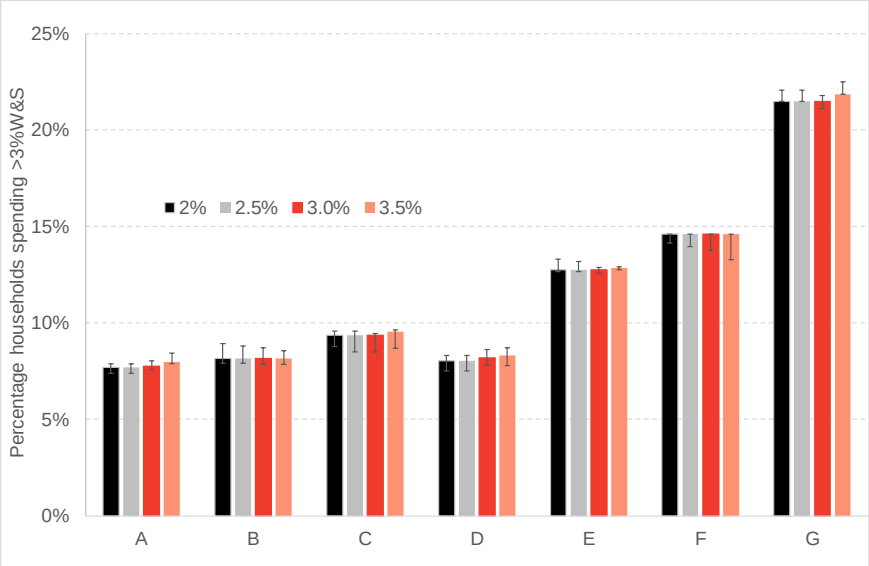
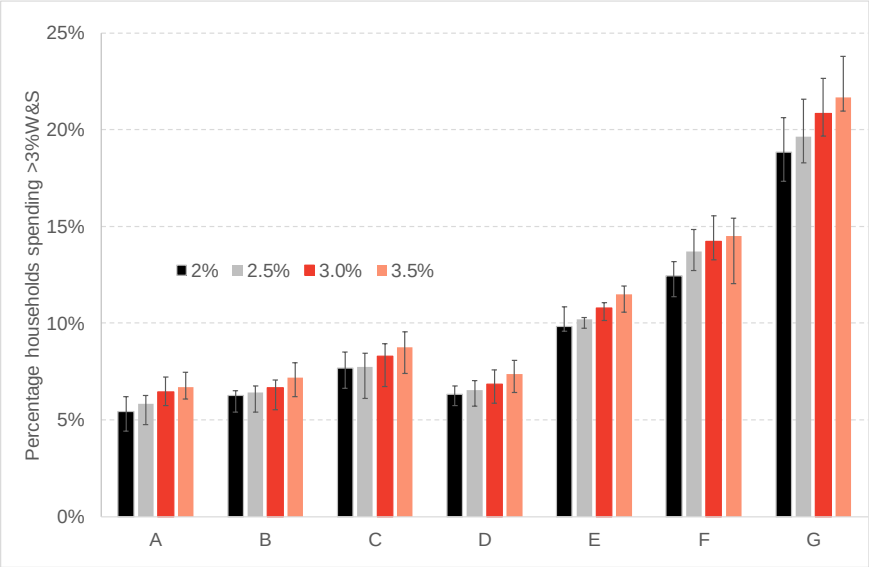


Chart 4.2 Percentage of households spending >3pcW&S by council tax band, 2027/28



Income

Unsurprisingly, the percentage of households spending >3%W&S is highest in the lowest decile of income (i.e. among the poorest households). Around 68% of households in the bottom decile are projected to spend >3%W&S in 2021/22 (Chart 4.3). By 2027/28, between 60% and 66% of households in the bottom decile spend >3%W&S under the central scenario. Effectively zero households in the top half of the income distribution spend >3%W&S.

This reiterates the finding of previous research that income is the biggest determinant of the likelihood of a household spending >3%W&S. Remember however that this is income measured after housing costs and equivalised. It is possible that some individuals with relatively high earnings may appear lower down the distribution of AHC equivalised income if those individuals support a relatively large family and/or have relatively high housing costs.

Chart 4.3: Percentage of households spending >3pcW&S by income decile, 2021/22

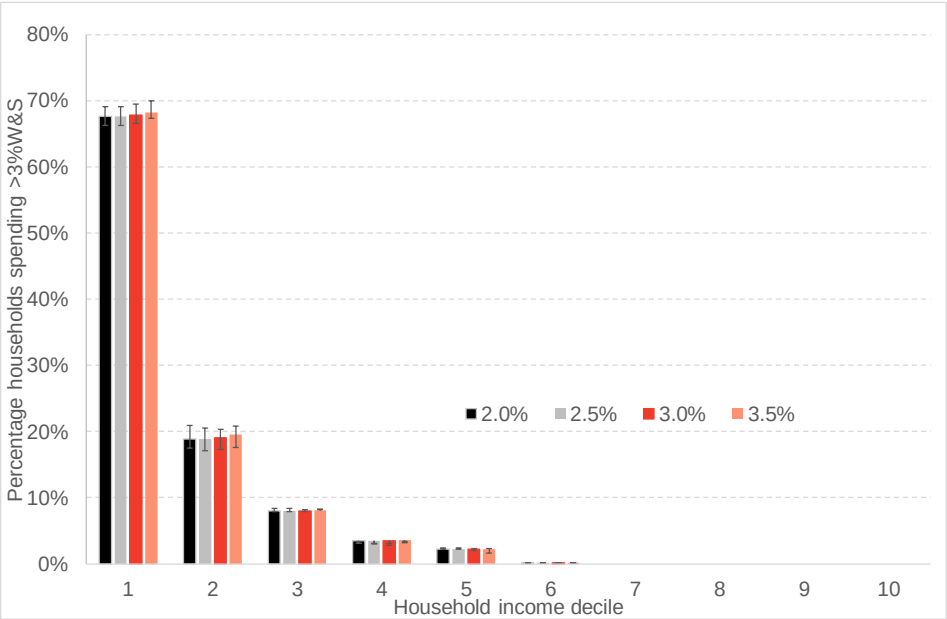
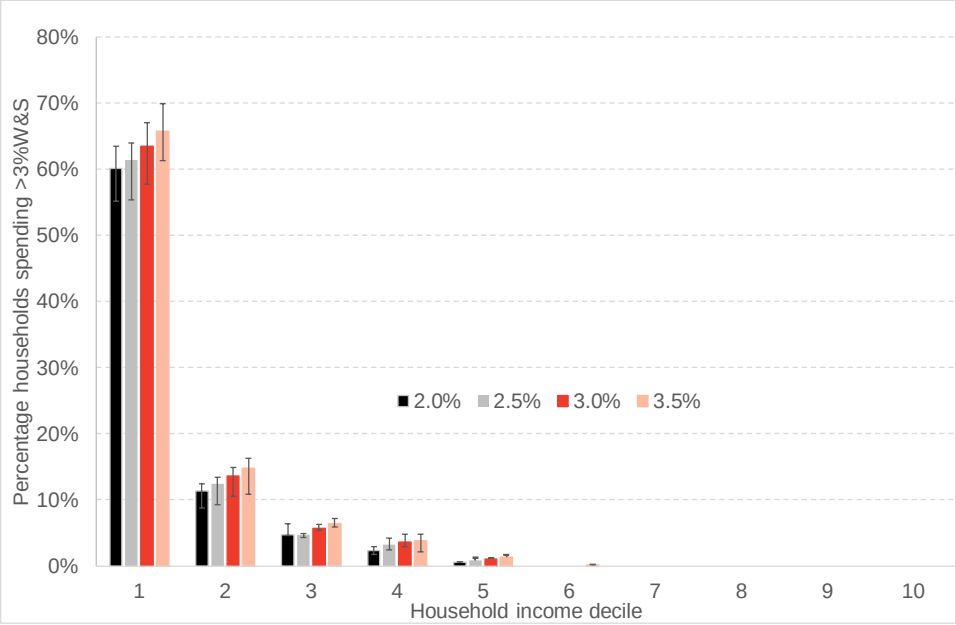


Chart 4.4: Percentage of households spending >3pcW&S by income decile, 2027/28



Household composition

Chart 4.5 looks at the proportion of benefit units in households spending >3&W&S by composition of the benefit unit. This chart considers benefit units (a benefit unit is a single adult or couple plus any dependent children) – it asks what proportion of benefit units of a particular type live in a household which spends >3%W&S.

Looking first at 2021/22, Chart 4.5 shows that single pensioners have the lowest prevalence of spending >3%W&S at around 5%. The prevalence of spending >3%W&S is lowest for single pensioners, due to a combination of factors including: lower than average water bills as a result of a tendency to occupy lower banded properties and the single person discount, lower than average housing costs, the equivalisation process, and a tendency for low income pensioners to either be in

receipt of some form of income top-up (such as pension credit) or to qualify for council tax reduction.

Pensioner couples and working age couples without children have a similar prevalence of spending >3%W&S, at around 9%.

Single parent families and single adults have a relatively higher proportion of spending >3%W&S. But the highest proportion of spending >3%W&S is observed among two-parent families. This probably reflects the tendency of these families to have, in some cases, relatively low incomes relative to water bills – arising through a combination of high housing costs (because they tend to live in larger properties, often with a mortgage), and the equivalisation process effectively reduces those families incomes, relative to a couple without children.

By 2027/28, the proportion of households spending >3%W&S has fallen for all benefit unit types. But it has fallen more rapidly among pensioner rather than working age benefit units. Among those of working age, the prevalence of spending >3%W&S is highest amongst couples with children and lowest amongst couples without children.

As noted previously, by 2027/28 there is a greater difference between the price growth scenarios in terms of the proportion of households spending >3%W&S. For example, the proportion of couples with children living in a households that spends >3%W&S rises from 11% under the 2% annual water charge growth scenario to 13% under the 3.5% scenario.

Chart 4.5: Percentage of benefit units in households spending >3%W&S by household composition, 2021/22

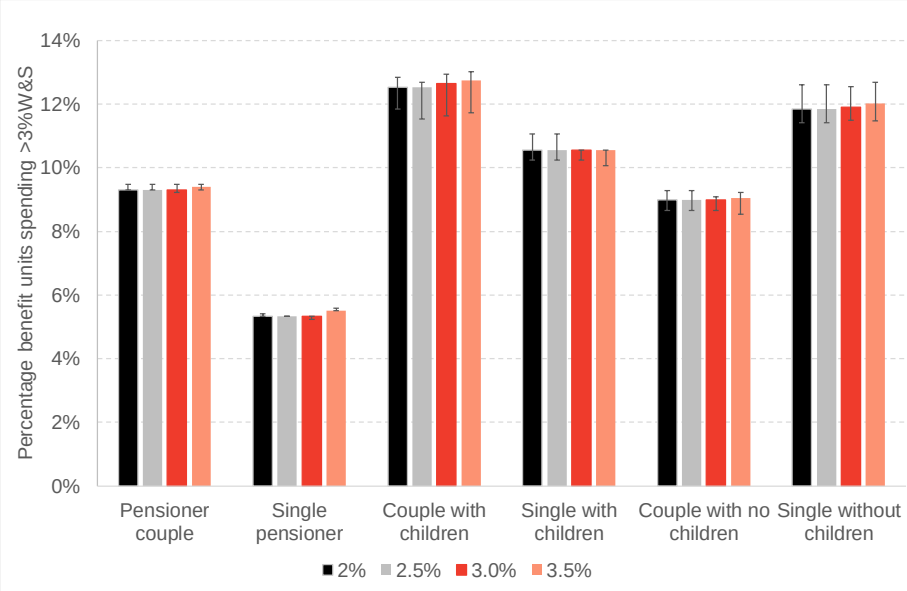
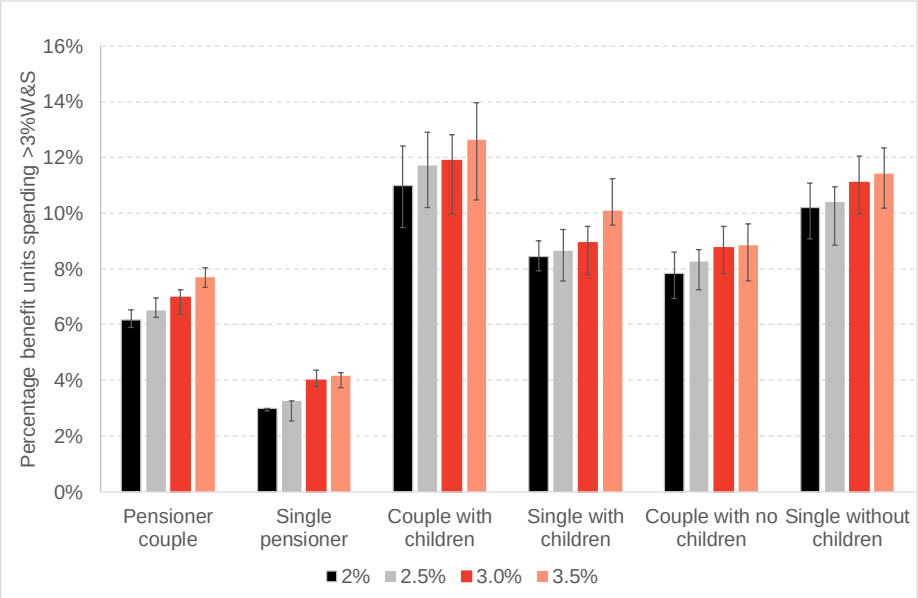


Chart 4.6: Percentage of benefit units in households spending >3%W&S by household composition, 2027/28



Economic status

Charts 4.7 and 4.8 show the percentage of benefit units in households spending >3%W&S by economic status in 2021/22 and 2027/28 respectively.

Unsurprisingly, the proportion of households spending >3%W&S is correlated with economic status. The proportion of households spending >3%W&S is lower in households where all adults are in full-time work (3% in 2021/22) than in households where one or more adults are not in work or where one or both work part-time (14-15%).

The proportion of households spending >3%W&S is particularly high (55%) amongst households in which one or both adults are unemployed (i.e. not in work and actively seeking work).

The proportion of households spending >3%W&S is comparatively lower (14%) in households that are 'economically inactive' – this category can include households where members are not in work for reasons including study, disability/illness, or being 'inactive' for some other reason. This is partly because these households are likely to have higher incomes (potentially through additional benefits associated with disability or caring responsibilities), and partly because these households may be more likely to qualify for exemptions to the water charge (e.g. if they are students).

The proportion of benefit units in households spending >3%W&S falls between 2021/22 and 2027/28, particularly under the slower water charge growth scenarios. The reasons why the proportion of households spending >3%W&S can fall even under the 3.5% price growth scenario have already been discussed. But it might nonetheless be seen as a puzzle as to how the proportion of workless benefit units spending >3%W&S can fall even under the 3.5% price growth scenario. By definition, these households rely on benefit income, and our assumptions are that this grows in line with CPI inflation, i.e. more slowly than 3.5%.

The explanation relates to the fact that charts 4.7 and 4.8 show benefit unit analysis, and asks: what proportion of *benefit units* of a particular type live in *households* that spend >3%W&S. It turns out that are reasonably minority of workless benefit units live in a household in which someone else is in-work (such households could include for example a young adult living with parents, or a household consisting of several single young people). And because these households have income

from other sources (and tend to have high housing costs relative to BHC income), some workless benefit units do see their income rise sufficiently to take them below the 3% threshold by 2027/28.

Chart 4.7: Percentage of benefit units in households spending >3%W&S by economic status, 2021/22

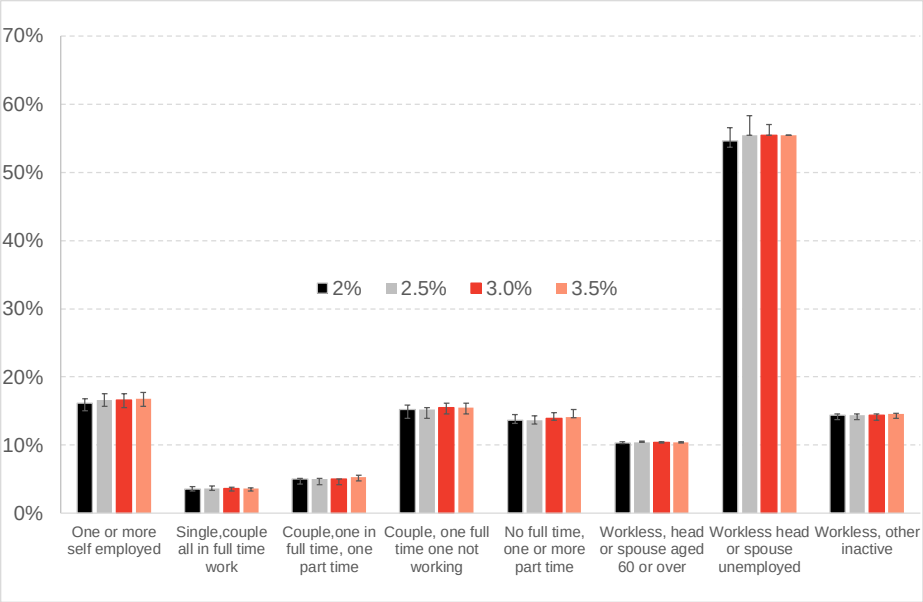
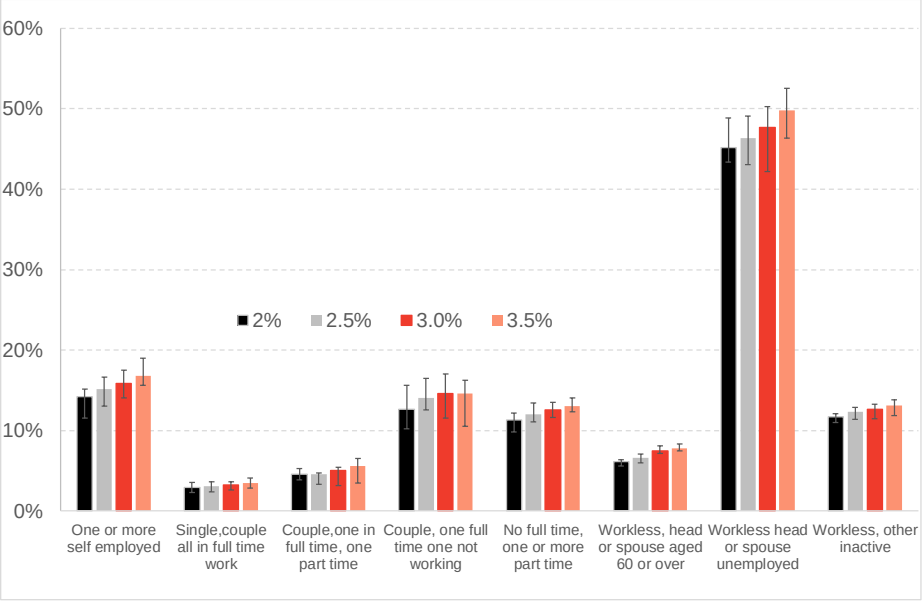


Chart 4.8: Percentage of benefit units in households spending >3%W&S by economic status, 2027/28



Tenure

Charts 4.9 and 4.10 show the proportion of households spending >3%W&S by tenure, in 2021/22 and 2027/28 respectively. The proportion of households spending >3%W&S is highest in the social rented sector, reflecting lower than average incomes in this tenure type. It is also relatively high in the private rented sector, in part reflecting the higher than average housing costs in this tenure type (which has the effect of reducing AHC income).

Perhaps surprisingly, the proportion of households spending >3%W&S is higher amongst those who own their properties outright than among those who own with a mortgage. This is partly because

those who own their properties outright have lower housing costs, and thus higher AHC income, than those who own with a mortgage.

Chart 4.9: Percentage of households spending >3%W&S by tenure, 2021/22

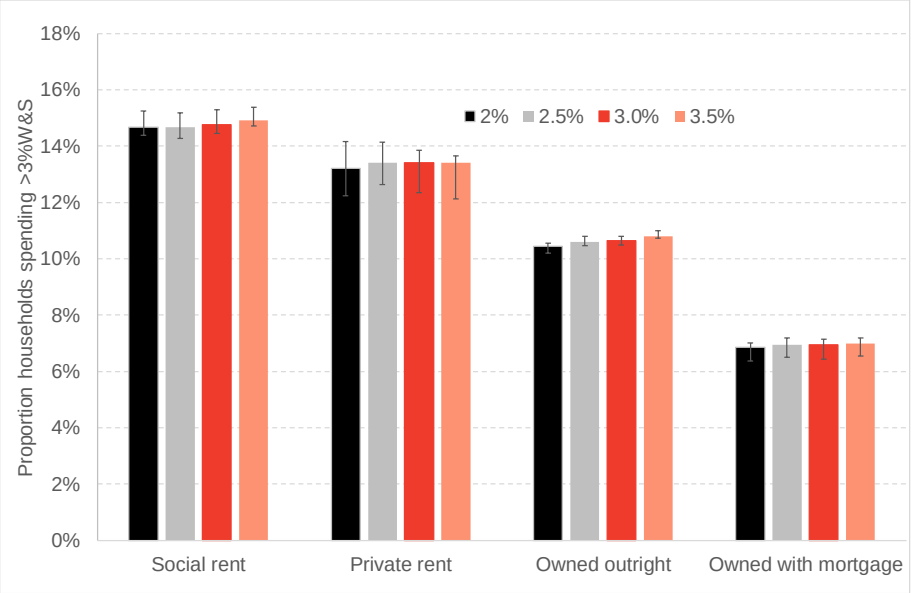
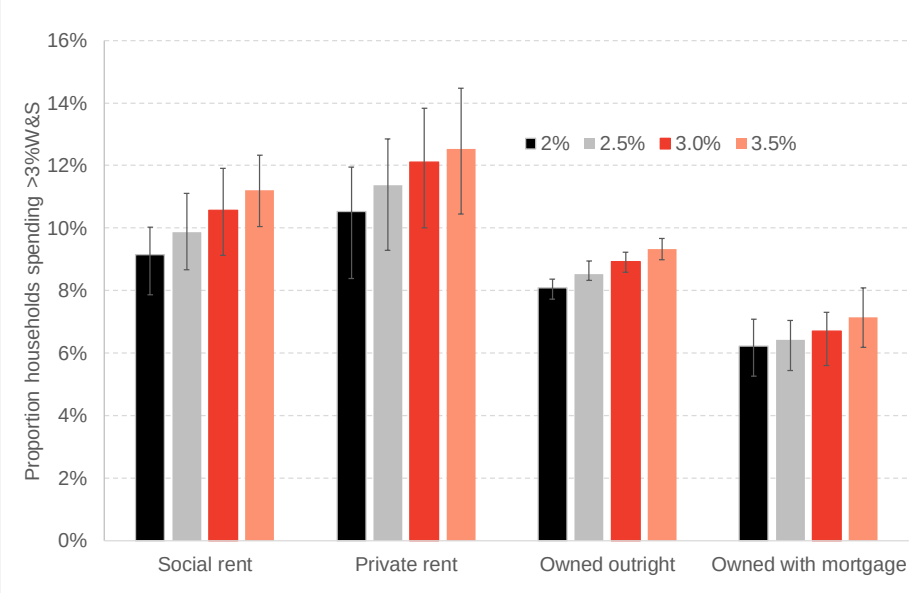


Chart 4.10: Percentage of households spending >3%W&S by tenure, 2027/28



Benefits

Charts 4.11 and 4.12 consider the proportion of households spending >3%W&S by benefit type in 2021/22 and 2027/28 respectively. 'Sickness and disability benefits' include DLA/PIP, ESA, Carer's Allowance, Attendance Allowance, and various smaller benefits. 'Low income' benefits include Housing Benefit, Tax Credits, Universal Credit, and Income Support. We consider Council Tax Reduction separately, given its importance to the water charging process.

The proportion of households spending >3%W&S who are in receipt of Child Benefit (11%) or who are in receipt of the State Pension(6%) is similar to the proportion for pension-aged benefit units and

benefit units with children shown in Chart 4.5 respectively (which showed a figure of 5-9% for pensioner households and 11-13% for households with children.

The proportion of households in receipt of Pension Credit who spending >3%W&S is comparatively low (2%), perhaps because it passports recipients to Council Tax Reduction, which lowers water bills.

The proportion of households in receipt of a sickness or disability benefit who spend more than 3%W&S is also comparatively low (7%). This may be explained partly by the fact that households in receipt of these benefits tend to be pension-aged (and these households, as we have observed, tend to have lower rates of spending >3%W&S generally), and partly by the fact that receipt of these benefits helps to raise the incomes of these households.

The proportion of households in receipt of low income benefits who spend >3%W&S is higher than average, but not markedly so (13%).

Of households in receipt of JSA, around 35% are projected to spend >3%W&S. This is very similar to the finding of the previous report for 2015/16. It is also consistent with the finding in Chart 4.7 and 4.8 that households where nobody is in work tend to be particularly likely to spend >3%W&S. Presumably the relatively low level of this benefit, which by definition cannot be supplemented by any 'in-work' income, is what drives this finding.

Finally, note that, of those who are identified in the data as being in receipt of CTR, the proportion who spend >3%W&S is in line with the population average (9-10%). But amongst households whom we estimate to be eligible for CTR, the proportion is much higher. The implication is that there are households which spend >3%W&S who could be eligible for CTR and either do not claim it, or do receive it but did not declare so in the survey.

By 2027/28, the proportion of households in receipt of each benefit and spending >3%W&S has declined across all benefits, although the general pattern remains as described.

Chart 4.11: Percentage of households spending >3%W&S by benefit type, 2021/22

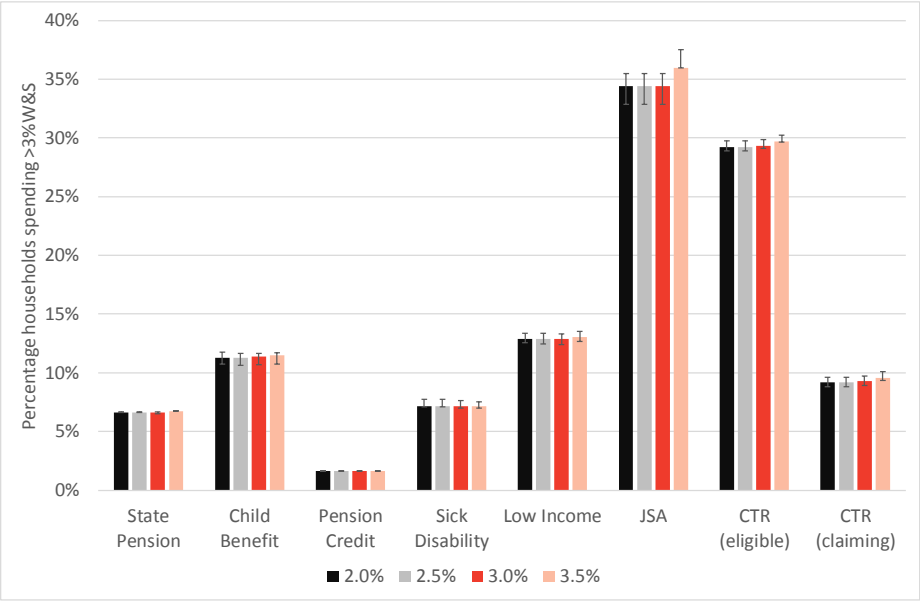
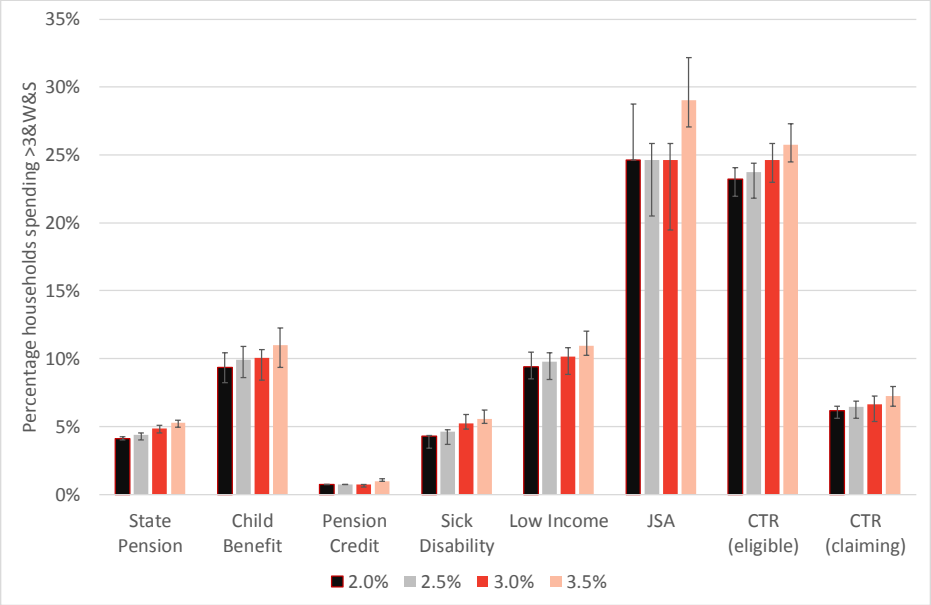


Chart 4.12: Percentage of households spending >3%W&S by benefit type, 2027/28



5. Distribution of households spending >3%W&S by characteristic

This chapter considers how all households that spend more than 3% of income on water and sewerage are distributed by characteristic.

Unlike the previous chapter, we present the result of the central scenario only. We do not present the results of the upper and lower growth scenarios. The reason for this is that the different income growth scenarios make little if any difference to the results – here we are looking at how all households which do spend >3%W&S are distributed across a given characteristic. If it is assumed that incomes grow faster or slower than under the central scenario, this *does* make a difference to the proportion of households who spend >3%W&S (as we saw in the previous chapter). But generally it does not make a difference to the way that all households spending >3%W&S are distributed, or shared, across a particular characteristic.

Council tax band

Chart 5.1 shows how households spending >3%W&S are distributed across council tax band in 2021/22. It also shows the total distribution of households by band.

The previous chapter showed that the proportion of households spending >3%W&S is higher in higher banded properties. At an aggregate level however, the proportion of all households who spend >3%W&S is relatively concentrated in the lower banded properties. This reflects the much higher proportion of these properties relative to higher banded properties in the overall distribution (although band E contains a relatively large share of the total).

The picture in 2027/28 is generally the same, in terms of how households spending >3%W&S are distributed by band (Chart 5.2).

The different price growth scenarios make little difference to the general picture. Intuitively this makes sense. A given price growth scenario is applied to all households, so there is no particular reason to believe that different price growth scenarios should lead to a significant difference to the share of households which spend >3%W&S across council tax band.

Chart 5.1: Distribution of households spending >3pcW&S by council tax band, 2021/22

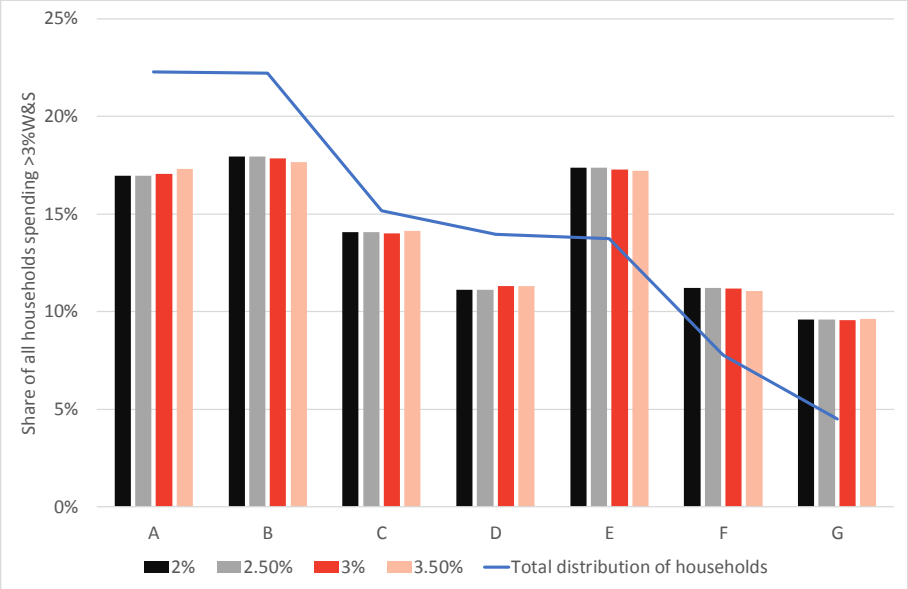
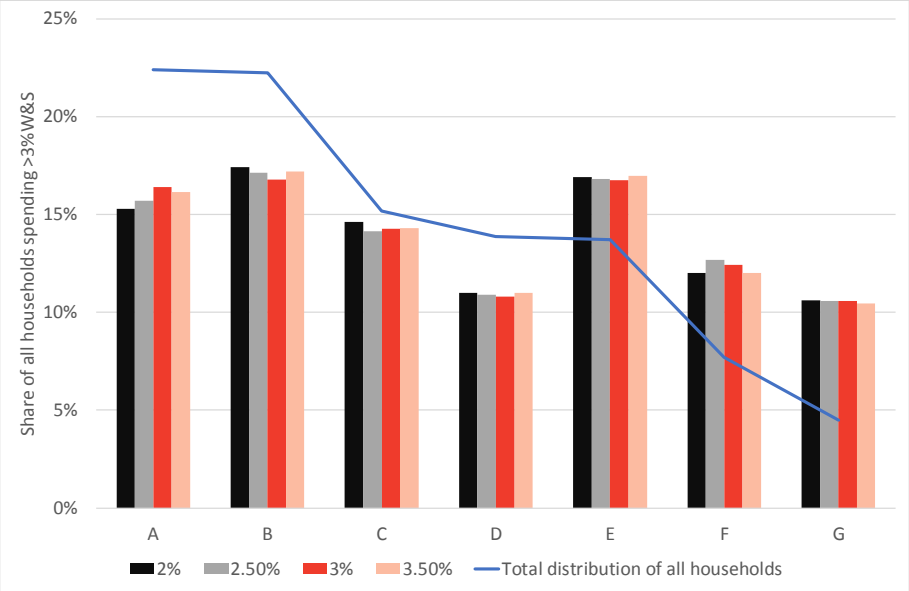


Chart 5.2: Distribution of households spending >3pcW&S by council tax band, 2027/28



Income

In 2021/22, around 67% of all households which spend >3%W&S are projected to be in the bottom decile of the income distribution; just under 20% are from the second decile and just under 10% are in the third decile (Chart 5.3).

By 2027/28, the share of households spending >3%W&S who are in the bottom decile has increased slightly, whilst the share of households spending >3%W&S in deciles 2 and 3 has decreased (Chart 5.4). It is worth reiterating that, by definition, the sum of the shares across the deciles has to add up to 100%. As we saw from Charts 4.3 and 4.4, the proportion of households in all deciles spending >3%W&S falls between 2021/22 and 2027/28. But because the fall is proportionately larger in deciles 2 and 3 as opposed to decile 1, then it follows that the share of all households spending >3%W&S that are in decile 1 increases (even if the proportion of households in decile 1 that spend >3%W&S has decreased).

Note however that faster price growth scenarios reduce the share of households spending >3%W&S in the bottom decile but slightly increase the share of deciles two and three. This is because higher price growth scenarios raise the proportion of households spending >3%W&S slightly more in deciles two and three than in the first decile (where the proportion is already quite high).

Chart 5.3: Distribution of households spending >3pcW&S by income decile, 2021/22

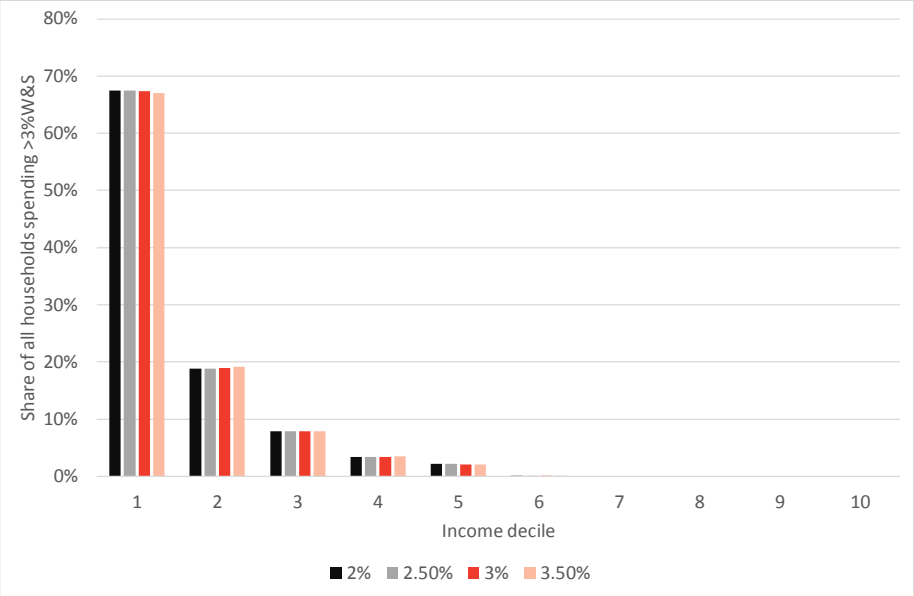
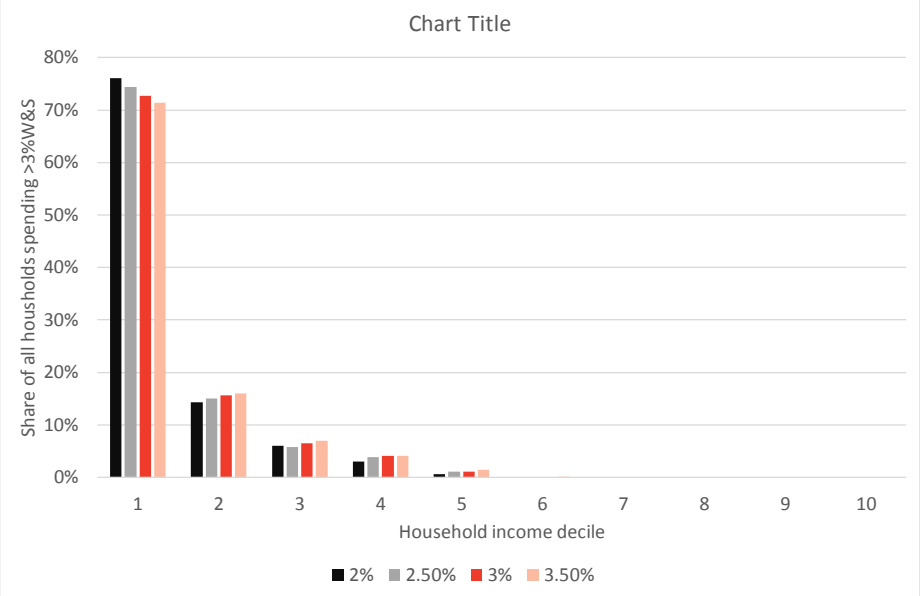


Chart 5.4: Distribution of households spending >3pcW&S by income decile, 2027/28



Household composition

In terms of household composition, 40% of benefit units in households that spend >3%W&S are single, working age benefit units without children. As we saw in the last chapter, these benefit units are relatively more likely to spend more than >3%W&S, and they account for around one third of all benefit units.

In 2027/28, as we move from the 2% price charge scenario to the 3.5% price growth scenario, there is a small fall in the share of single without children benefit units spending >3%W&S and a small increase in the share of pensioner benefit units in households spending >3%W&S. This simply reflects small differences in the way that different price growth scenarios affect the different groups relatively.

In other words, moving from the 2% to the 3.5% price scenario does not affect single without children benefit units quite as much as it effects pensioner couple benefit units. In turn this will just reflect small differences in the location of these benefit units in relation to the 3% threshold in 2021/22, and not too much significance should be attached to it.

Chart 5.5: Distribution of benefit units in households spending >3pcW&S by composition, 2021/22

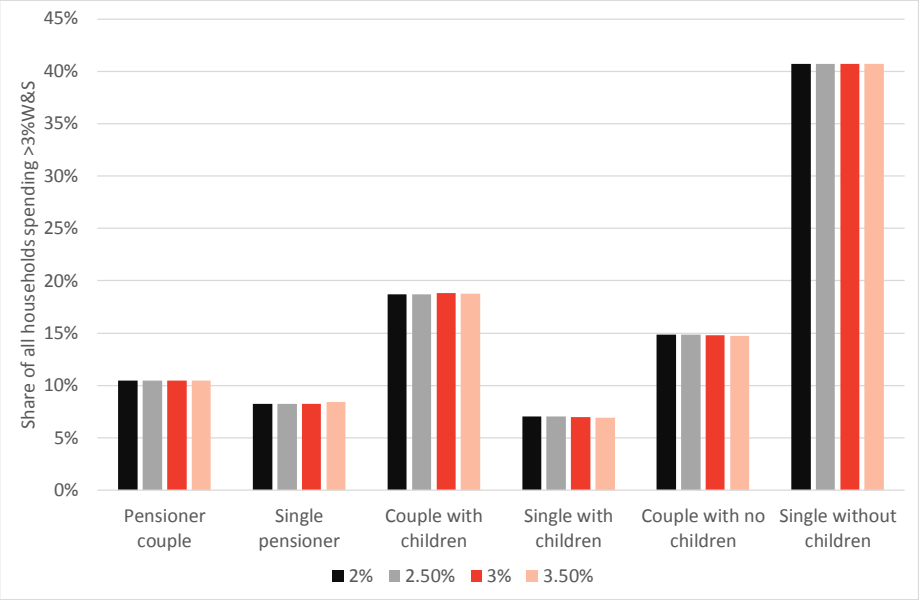
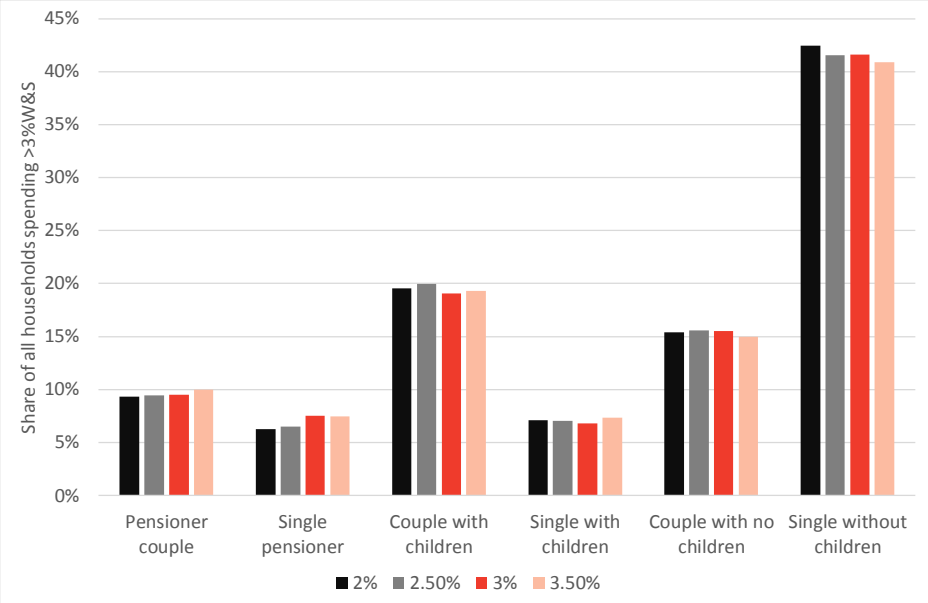


Chart 5.6: Distribution of benefit units in households spending >3pcW&S by composition, 2027/28



Economic status

Chapter 4 showed that benefit units that are unemployed are significantly more likely to spend >3%W&S than benefit units of other status. But these households account for less than 15% of all households spending >3%W&S (Chart 5.7), given their relatively low frequency in the total population.

Benefit units aged over 60, whilst having a relatively low proportion of spending >3%W&S, account for around one fifth of all benefit units in this status. Benefit units where at least one person works full-time account for around one third of all benefit units in households spending >3%W&S.

Recall that these charts show the share of households spending >3%W&S by household type, and the bars for any scenario must sum to 100%. If moving from price scenario 2% to scenario 3.5% has a relatively greater effect on a given group X relative to another group Y, then X's share of all households spending >3%W&S will rise whilst Y's share will fall – even if the prevalence of spending >3%W&S is falling for both groups.

Chart 5.7: Distribution of benefit units in households spending >3pcW&S by economic status, 2021/22

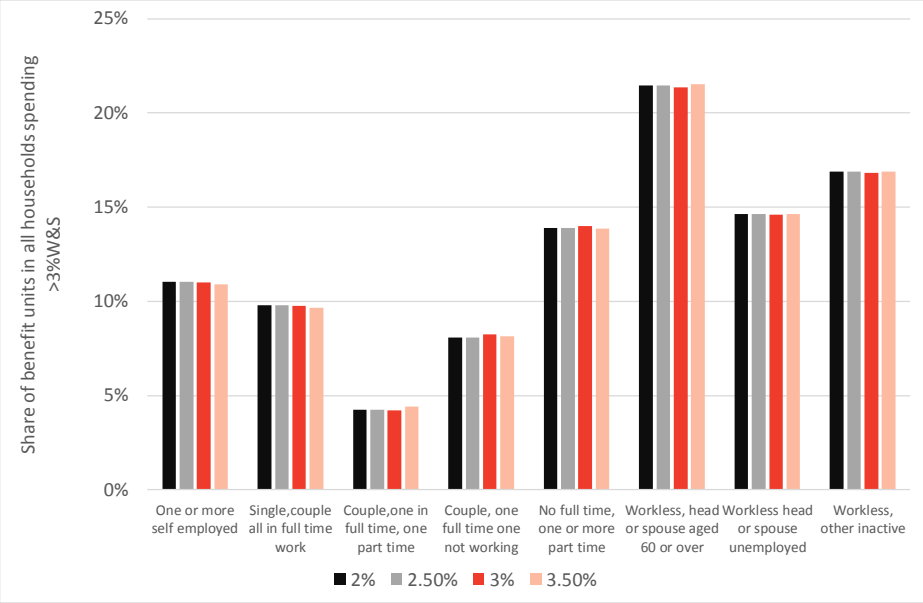
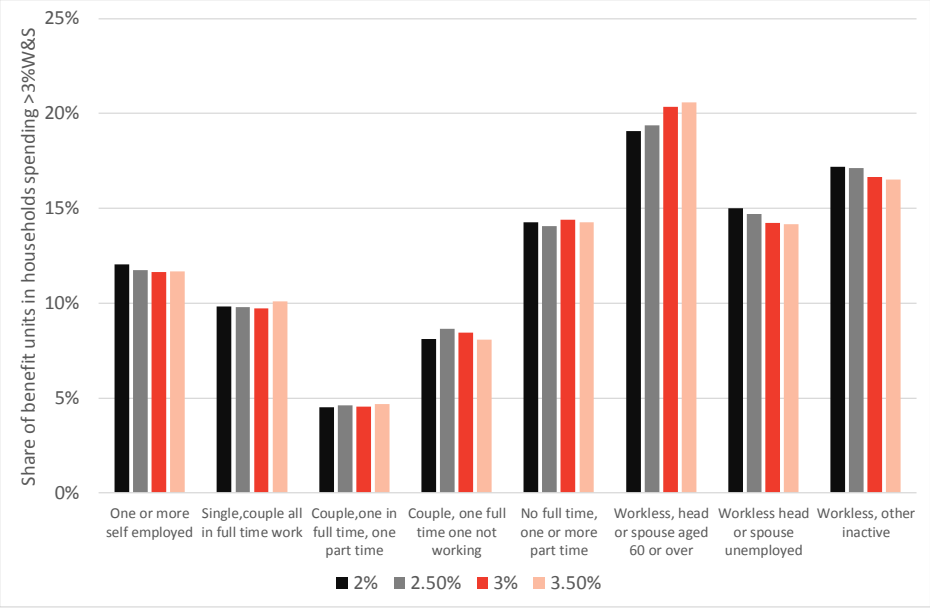


Chart 5.8: Distribution of benefit units in households spending >3pcW&S by economic status, 2027/28



Tenure

Of all households spending >3%W&S, one third are owned outright, around 28% are in the social rented sector, and somewhat less than a fifth are in private rented or mortgaged tenures. The general pattern does not change markedly across water charge scenarios or time periods. This is to be expected given that the different price growth scenarios are relatively marginal in the context of household income. These patterns of course reflect the combination of the prevalence of spending >3%W&S (described in the previous chapter) combined with the distribution of all households by tenure.

Chart 5.9: Distribution of households spending >3pcW&S by tenure, 2021/22

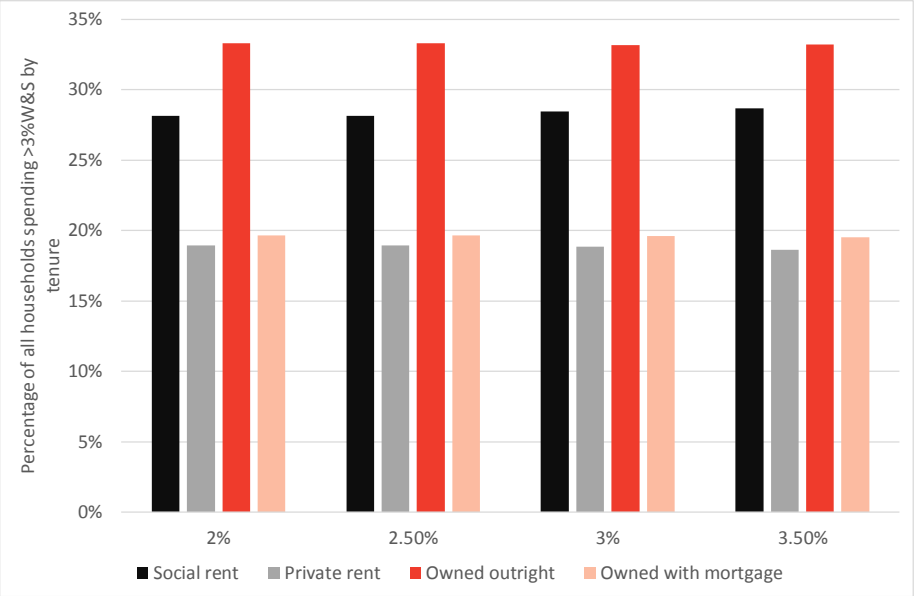
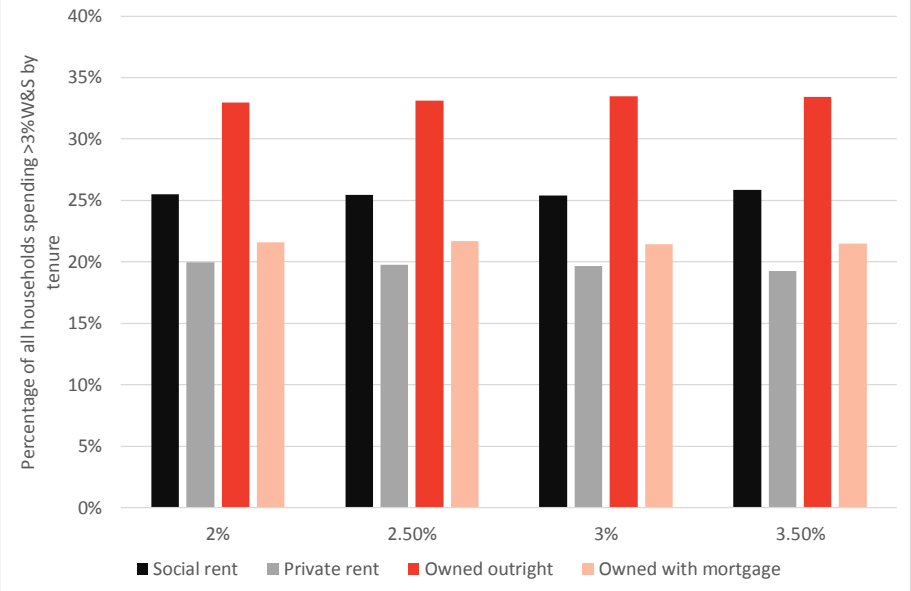


Chart 5.10: Distribution of households spending >3pcW&S by tenure, 2027/28



Benefits

The interpretation of the 'shares' chart for benefits is different compared to other characteristics. Specifically, because receipt of one benefit type is not necessarily exclusive of receipt of another benefit type, the 'shares' sum to more than one.

In 2020/21, around one fifth of households spending >3&W&S are anticipated to be pensioner households. This proportion is projected to fall somewhat over the period to 2027/28, reflecting slightly faster growth of pensioner household incomes compared to non-pensioner incomes.

Around 24% of households spending >3%W&S are projected to be in receipt of Child Benefit.

Around 12% of households spending >3%W&S are projected to be in receipt of a sickness or disability benefit in 2020/21, falling slightly by 2027/28.

Around 30% of households spending >3%W&S are projected to be in receipt of a working-age low income benefit, falling slightly by 2027/28. (Low income benefits are defined in the same way as in Chapter 4; they include working tax credits and child tax credits, Universal Credit, Housing Benefit and Income Support).

Although the prevalence of spending >3%W&S is relatively high amongst households in receipt of JSA, the share of all households spending >3%W&S is quite low, reflecting the fact that unemployment is particularly low at present (the unemployment rate is currently below 4%).

Around 17% of households spending >3%W&S are projected to be in receipt of Council Tax Reduction. This is not dissimilar to the figure of 21% estimated for 2015/16 in previous work.

Chart 5.11: Distribution of households spending >3pcW&S by benefit, 2021/22

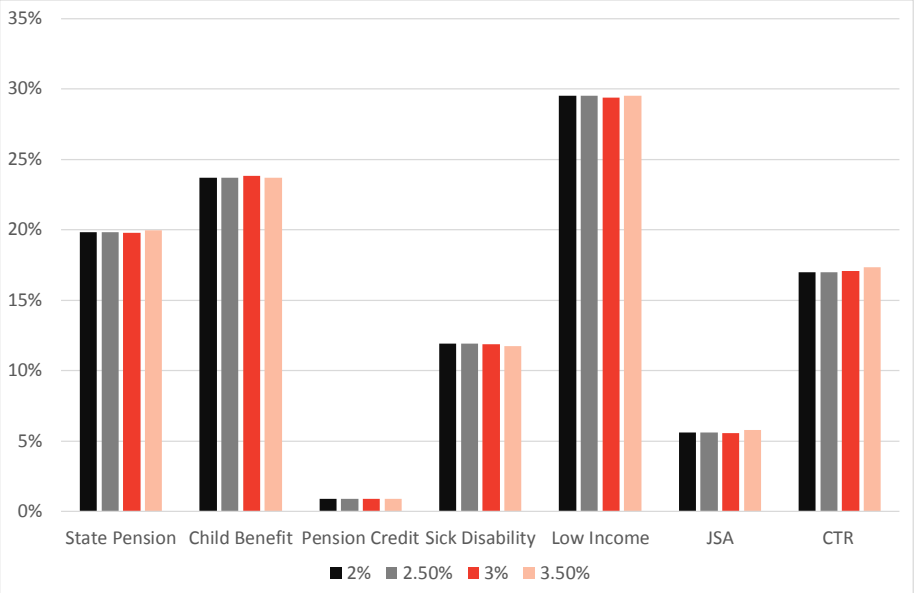
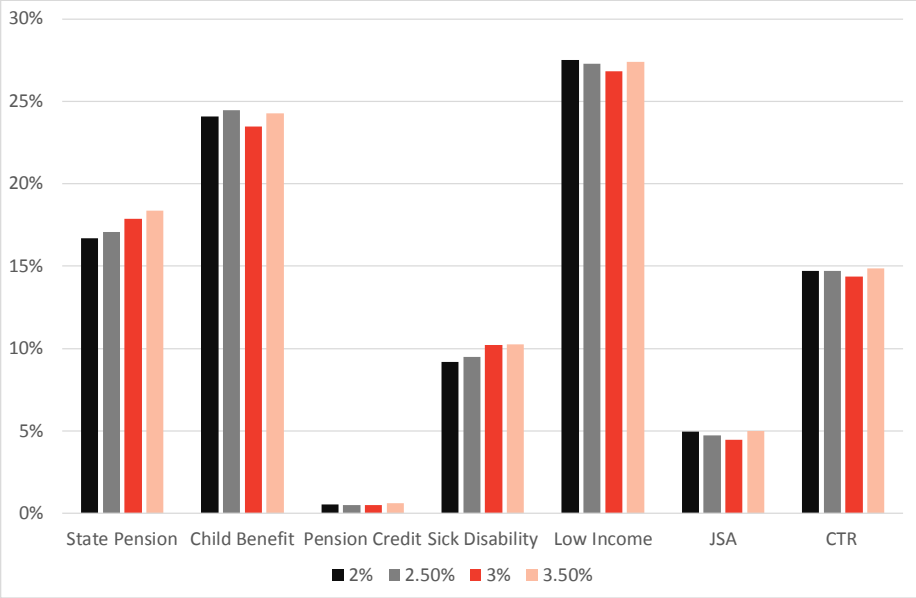


Chart 5.12: Distribution of households spending >3pcW&S by tenure, 2027/28



6. Conclusions

The proportion of households spending >3%W&S is projected to be lower (around 10% under the central scenario) in 2021/22 than in 2015/16 (when it was 12%). The reason for this decline is straightforward – despite relatively slow household income growth in that period, household incomes are projected to grow faster than the water charge.

The proportion of households spending >3%W&S is also anticipated to fall between 2021/22 and 2027/28. The reason for this is that average household AHC incomes are projected to grow faster than the water charge under three of the four pricing scenarios. Even under the 3.5% price growth scenario, the nature of the assumptions used means that some households in the lower part of the overall income distribution will see AHC income growth slightly faster than 3.5%, and thus the proportion of households spending >3%W&S is projected to fall.

Under the 2% price growth scenario, the proportion of households spending >3%W&S is projected to range from 7.2% under the upper income growth scenario to 8.8% under the lower growth scenario by 2027/28.

Under the 3.5% price growth scenario, the proportion of households spending >3%W&S is projected to range from 8.4% under the upper income growth scenario to 10.3% under the lower growth scenario by 2027/28.

Of course the further into the future we look, the greater the uncertainty around projections for household income growth. But the central scenario is based on the latest forecasts made by the UK's official forecasting organisations, and thus represent the most robust basis on which such projections can be made.

Not surprisingly, households with low net AHC equivalised income are more likely to spend >3%W&S than those with higher incomes. No household in the top half of the income distribution spends >3%W&S.

However, because of the multitude of factors that determine net AHC equivalised income, there is a wide range of income across most household characteristics (tenure, council tax band, household composition, etc.). In turn this means that the prevalence of households spending >3%W&S tends is quite ubiquitous across many types of characteristic. It is therefore difficult to identify one or two characteristics that would identify with high probability whether a household would be spending >3%W&S.

What we can say is that the prevalence of households spending >3%W&S is higher amongst households who are not in work than those who are in work; slightly higher amongst households in socially rented tenure than in other tenures; and slightly higher amongst working age rather than pensioner households.

Similarly, when we look at the distribution of all households spending >3%W&S, it is difficult if not impossible to identify one or two unifying characteristics that characterise the majority of those households.

This partly reflects the fact that the existing charging structure – linked to council tax band, with discounts for single people, reductions for those on low incomes – does a reasonable (if by no means perfect) job at protecting some of those households that might face the greatest difficulty in paying

for their water charge. But it does also mean that, on an after housing cost and equivalised income basis, the characteristics of households spending >3%W&S are diverse. This limits the possibility of being able to propose quick-fixes based on council tax band or even benefit eligibility as means of providing further support.

It is perhaps surprising that households in receipt of CTR make up less than a fifth of households spending >3%W&S. This may reflect the fact that the reduction in the charge for these households – combined with associated income from other benefits – does a good job of protecting households from this charge. However, we have also found evidence that there are a potentially large number of households who are either eligible for council tax and not claiming it, or who are claiming CTR but have not reported this in the FRS survey.

A priority for future research is therefore to attempt to shed light on this issue, as it matters for policy. If the CTR issue is mainly one of under-reporting, then it may be the case that the proportion of households spending >3%W&S is less than identified here. On the other hand, if this issue is mainly one of under-claiming, then further reductions in the proportion of households spending >3%W&S could be achieved through exercises to promote take-up.

Annex A: Additional analysis of changes over time

This Annex provides further analysis of how the proportion of households spending >3%W&S can fall between 2021/22 and 2027/28 even under the 3.5% water charge increase scenario.

A key point to note is that AHC income will grow faster than BHC income, if housing costs are growing less quickly than BHC income.

Table A1 shows a hypothetical case for a household with BHC income of £100 per week and housing costs of £25 per week, resulting in AHC income of £75 per week.

BHC income is assumed to grow at 3.2% per annum. Housing costs are assumed to grow at 2.2% per annum. The combined effect of these assumptions is that AHC income grows at slightly more than 3.5% per annum initially, (although the rate of increase declines slightly over time, as housing costs decline relative to BHC income).

Table A1: Illustrating the relationship between BHC income growth, housing cost growth, and AHC income growth

Year	BHC income (growing 3.2% per year)	Housing costs (growing 2.4% per year)	AHC income	Annual growth of AHC income
1	100	25	75	
2	103.2	25.6	77.7	3.53%
3	106.5	26.1	80.4	3.53%
4	109.9	26.7	83.2	3.52%
5	113.4	27.3	86.2	3.52%
6	117.1	27.9	89.2	3.52%
7	120.8	28.5	92.3	3.51%
8	124.7	29.1	95.6	3.51%
9	128.7	29.8	98.9	3.50%
10	132.8	30.4	102.4	3.50%
11	137.0	31.1	105.9	3.50%
12	141.4	31.8	109.6	3.49%
13	145.9	32.5	113.5	3.49%
14	150.6	33.2	117.4	3.49%
15	155.4	33.9	121.5	3.48%

On a practical basis, what happens under the 3.5% water charge scenario is that the proportion of households spending >3%W&S declines by one percentage point, from 10.2% to 9.2%. This is equivalent to a fall of 26,000 in the number of households in Scotland spending >3%W&S.

We can use the model to look specifically at the characteristics of the 26,000 households who move from spending >3%W&S in 2021/22 to spending less than 3% on water and sewerage in 2027/28.

It turns out that all of these households spent only slightly more than 3% on water and sewerage in 2020/21. So they only need to see their incomes grow by slightly faster than 3.5% to see their water charge as a percentage of income to fall below 3%.

Around half of the 26,000 households which move from spending above to below 3% on the water charge between the two years are pensioner households, whilst a majority of the rest include some employment income. Thus BHC income growth is projected to be relatively fast for these households.

As we discussed earlier, when housing costs are high relative to BHC income, the difference between growth in BHC income and the growth in AHC income will be greater.

Of the 26,000 households, the vast majority are either owner occupied (9,000) or in the social rented sector (14,000). Both of these tenure types are projected to have relatively slow growth in housing costs over the period to 2027/28 (see Table 2.3).

Moreover, housing costs for these 26,000 households are a high proportion of BHC income. Specifically, average housing costs as a percentage of BHC income for the 26,000 households are 25%, compared to 15% for the sample as a whole.

In summary, the explanation as to why there can be a decline in the proportion of households spending >3%W&S between 2021/22 and 2027/28 even under the 3.5% water charge scenario is that:

- Some households which were spending only slightly above 3% on water and sewerage in 2021/22 have high housing costs relative to income.
- And because housing costs are projected to grow relatively more slowly than BHC incomes (particularly for the social rented and owned outright tenures), these households for which housing costs are high relative to BHC income can actually see their AHC income rise by more than 3.5%.
- This is sufficient to take some households out of the 3% threshold, but of course it could be argued that these households circumstances haven't changed very materially (they have moved from spending fractionally more than 3% on the water charge to spending fractionally less).

Finally, it is worth noting that whilst 26,000 households move from spending >3%W&S in 2020/21 to 2027/28, around 1,000 households simultaneously move in the other direction, from spending less than 3% in 2021/22 to spending more than 3% in 2027/28.