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An experimental study of attitudes to changing water charges in Scotland

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Abstract: If an aim of a regulatory body is to act on behalf of the views of its citizenry, then it is important to understand what those views are. This paper, in collaboration with the OECD and the Scottish water industry, presents the results of an online (n= 500) and face-to-face laboratory (n= 100) study that utilised experimental behavioural science to explore how the provision and presentation of future price change information influences Scottish citizens' acceptance of water price changes. Participants were asked to rate different patterns of price rises for their water charges. The pattern, presentation, magnitude of price rises and the provision of additional cost information (designed to simplify the calculations of future costs) was manipulated across tasks and participants. Results from this study suggest that Scottish citizens are generally accepting of price rises in the short and medium terms. However, the patterns of price rises, and the way in which information is presented, can influence these attitudes, suggesting that consumers do not always accurately integrate sequential price rises over time. Findings from this study are designed to inform the regulatory process of the Scottish water industry and highlight the potential role of behavioural science in regulation more generally.

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Non-Technical Summary

This study set out to gauge the responses of Scottish citizens to different possible trajectories for water charges over the medium term. The study was a computerised experiment undertaken by 600 Scottish citizens. Of these, 500 completed the experiment online, 100 face-to-face.

The experimental approach exploits the logic that where we randomise participants into conditions and vary only one factor between conditions, we can be sure that any difference in responses is caused by that one factor. This permits the study to generate robust answers to research questions.

Stage 1 – Priors of Price Rises

RQ: *What are citizens' priors about what constitutes an acceptable price change?*

Participants were asked: *"Which of the following options do you believe to be the most acceptable price change for water charges over the next year?"* They could opt for a fall, no change, or a rise by various amounts. For half the participants, responses were described as *monetary* changes (e.g. "increase by £5.01- £10.00"); for the other half responses were relative to *inflation* (e.g. "increase at the rate of inflation").

Overall, 46.7% preferred no change, 41.2% selected a rise, and 12.2% a fall. There was clear evidence of "money illusion" (failing to account for inflation over time): 25.1% selected a price rise at or above inflation when changes were described relative to inflation, versus just 10.7% when described in monetary terms.

Answer: More households accept a rise in charges than a fall. The status quo is most acceptable. However, households do not take inflation into account unless prompted.

Stage 2 – Price Trajectories

RQ: *How does the size and presentation of price trajectories affect their acceptability? For a given rise in revenue over the period, do citizens prefer to put off the increase (back-load it), get it over with (front-load it), or spread the increase evenly over the period?*

Participants saw price trajectories for the next 6-year period (see examples in Figure 3). They rated each one on a scale of 1 – 7 (where 1 = "totally unacceptable" and 7 = "totally acceptable"). They differed in trajectory (front-load, back-load, constant), monetary versus percentage presentation, and scale (equivalent to revenue from 1.5% p.a. versus 2.5% p.a.).

Figure 1 shows summary results. Participants unsurprisingly preferred lower increases. They were more accepting of increases expressed in percentage terms. There was a strong distaste for putting off the increase and constant increases were higher than front-loaded ones.

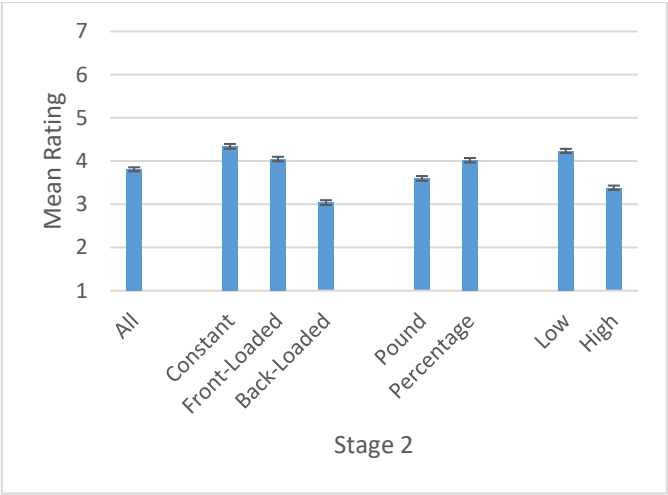

Figure 1. Mean acceptance rating (1-7) by price trajectory type (error bars report standard errors)

Answer: If increased revenue is required, households strongly dislike putting off the increase in charges.

<u>Stage 3</u> – Price Trajectories with Additional Information

RQ: *How does additional information about the changes in costs of price trajectories over time affect their acceptability?*

Participants again rated trajectories, but were shown additional information that tested the robustness of the preferences recorded in Stage 2. Half the participants were shown the rising water charges on a year-by-year basis (3a), the other half were also shown the total price rise and total additional charges over the full 6-year period (3b).

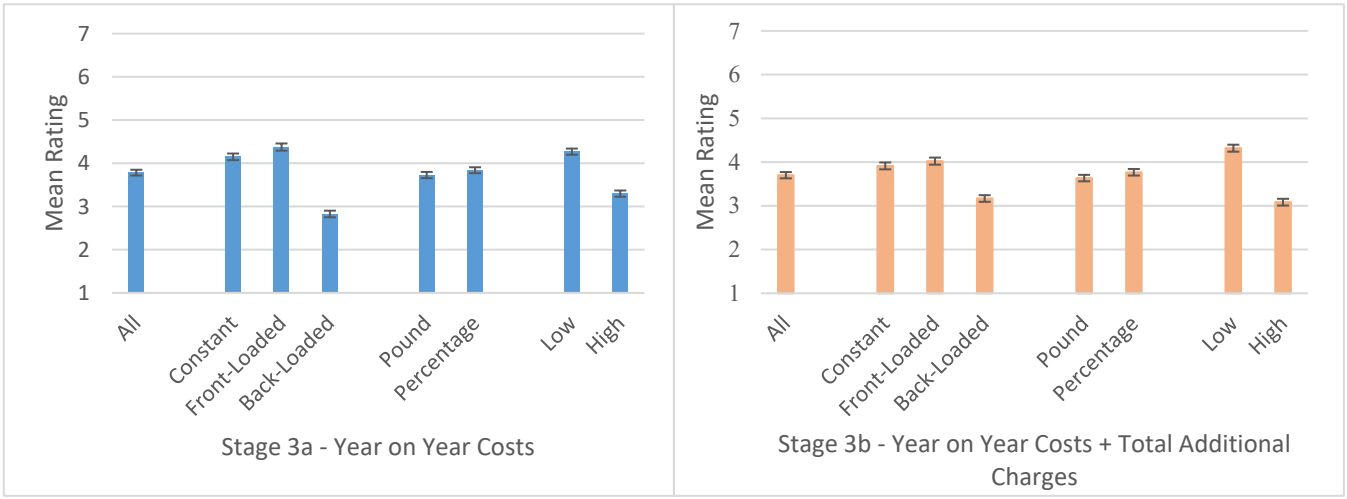

Figure 2. Mean acceptance rating (1-7) by price trajectory type for Stage 3a (*left*) and Stage 3b (*right*)

Results are shown in Figure 2. The preference for lower increases, greater acceptability of increases expressed as percentages, and dislike of putting off increases all persisted. However, the additional information overall made front-loaded increases more attractive.

Now	Now	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	
£363.00	**£ Increase**	£5.60	£5.60	£5.60	£5.60	£5.60	£5.60	**Price Rise (£)** £33.60
£363.00	**Annual Cost**	£368.60	£374.20	£379.80	£385.40	£391.00	£396.60	**Total Additional Charge (£)** £117.60

Figure 3. Example price trajectory. White denotes the basic information provided in Stage 2, 3a and 3b. Light grey denotes the Annual Cost information provided in Stage 3a and 3b. Dark grey denotes the Total Additional Charge information provided in Stage 3b only. The starting price was determined as the actual annual cost of water charges based on participants' council tax band.

Answer: The dislike of putting off increases in charges is strong and robust. Providing more information about year-by-year and total increases over a period suggests that households, *if facing an increase*, would rather get on with it.

Summary

The experimental method provided clear answers to the research questions asked. Overall, the findings can be summarised as four key results:

1. A substantial proportion of Scottish citizens is willing to accept some nominal increase in water charges, both in the immediate 12 months (Stage 1) or over the next 6 year period (Stages 2 and 3).
2. There is an aversion to putting off price increases.
3. How changes in prices are communicated matters, as price rises framed as percentages are more acceptable than when the same increases are shown in pounds.
4. Providing additional information about year-on-year bills and total additional charges makes people more inclined to get an increase over with.

1. Introduction

It is a widely acknowledged problem of social science that how an individual answers a question often depends on how that question is asked. Any organisation that seeks to represent the views of the citizenry in an objective and dispassionate fashion therefore has a problem: how can it ascertain, truthfully and accurately, what those views are? In recent years, behavioural science has deployed the experimental method to advance our understanding of the mechanisms behind people's judgements and decisions, and of the biases inherent in such mechanisms. Part of the aim of this work is to get beyond the observation that judgements, decisions and behaviour can be inconsistent or contradictory, and instead to help policymakers to make inferences about what people's underlying preferences and desires might be (Beshears *et al*., 2008).

The Scottish water industry faces a problem of exactly this sort. The regulatory architecture requires that multiple actors take account of and, in some cases, represent the preferences of Scottish households in respect of their water supply and the infrastructure and systems required to deliver it, together with any associated economic, environmental and social consequences. This is evidently a far from straightforward task, given the complexities involved, yet it is a vital part of the "Strategic Review of Charges" being undertaken by the Water Industry Commission for Scotland (WICS).

In this context, the present study offers some behavioural evidence to inform the regulatory process. It is the first in a series of experimental research studies (ESRI Study 1) designed to illuminate the views of Scottish households regarding water. Given the scale of the task, it addresses only one specific aspect of preferences, namely attitudes to prospective changes in charges over the short and medium term. By utilising ideas and methods from behavioural science, it aims to understand attitudes to alternative trajectories of price changes over time and how these are described. Further studies will examine how household's preferences are affected by the need to trade off charges against benefits, including the mitigation of multiple potential risks.

Previous research on Scottish attitudes to water charges has shown that citizens in Scotland are typically content with the standard of service that they receive and that they perceive this service as value for money (Walker, 2017). However, it is also acknowledged that the level of understanding of water charges is low; for example, 20% of respondents in a previous survey did not know that water charges were tied to council tax bands (Walker, 2017, p. 11).

If investment requirements within the water industry are such that price rises for water charges are necessary, it is important to understand how acceptable these would be to Scottish citizens. There is experimental evidence to suggest that perceptions of fairness can influence individuals' beliefs about how acceptable price rises are (Kahneman *et al*., 1986). This may be particularly important in the context of public policy decisions for water charges, where consumers are unable to "opt-out" of consuming the good.

To better understand Scottish attitudes to future changes to water charges, this study addressed three specific research questions:

1) What are citizens' priors about what constitutes an acceptable price change for water charges?
2) How does the size and presentation of price trajectories affect their acceptability?
3) How does additional information about the changes in costs of price trajectories over time affect their acceptability?

In order to answer these specific research questions, this study implemented three distinct experimental stages - each answering one of the above questions. As there were theoretical, methodological and practical differences between each of the stages, this document will report the motivation, design and results of each stage sequentially in the order that participants completed them. A general discussion of the main overall findings, and the potential policy implications of these, will then follow. First, we outline the general design of the overall study.

2. General Study Design

This study was a computerised experiment which presented participants with various stimuli and questions pertaining to their attitudes about different possible future water charges. Each participant saw multiple questions about various possible future water charges. What was meant by "future water charges", the magnitude of these charges, and the way in which these charges were presented, varied across the different types of questions that all participants saw (referred to as a within-subject design) and also differed across participants, so different participants saw different types of questions (referred to as a between-subject design).

A total of 600 Scottish citizens took part in this study. 500 participants completed the study online, and 100 completed it as a face-to-face laboratory study. In the online study, participants who were already signed up to an online market research company were invited to follow an

email link on their personal computers to begin the study. The study itself took approximately 15-20 minutes to complete, and participants received the industry standard participation fee determined by the market research company (approximately £2.00). In the face-to-face studies, participants were recruited by a market research company to attend a study in two locations in Scotland, Glasgow and Edinburgh. Participants attended for approximately 30 minutes and were paid £20 (approximately the standard fee for face-to-face studies).

The two studies were identical and took the same length of time to complete (although participants in the face-to-face study undertook an unrelated study after completing this one). In both study types the same experimental platform was used (Gorilla Experiment Builder, www.gorilla.sc), and all instructions were identical; the only difference being that an instructor read the instructions aloud in the face-to-face studies. Efforts were made to match the demographic characteristics of participants across both platform types, and details of this can be found in Appendix G. We observed differences in responses based on platform type, and these raise methodological questions about the use of different platform types in revealing consistent responses in studies such as this one. Differences between the results across the two platform types are discussed in detail in Appendix G.

3. Stage 1

Research Question: *What are citizens' priors about what constitutes an acceptable price change?*

3.1. Introduction

Before eliciting attitudes to longer term price trajectories, it was important first to get a general impression of consumers' attitudes to short term price changes. This stage was therefore centred on attitudes to price changes over the next twelve months.

Deciding what constitutes an acceptable price change for water charges over the next twelve months may be influenced by whether or not the effect of inflation is also accounted for. Evidence from the behavioural literature finds that individuals often fail to account for the impact of inflation when evaluating price changes over time, considering changes in nominal terms rather than real terms, an effect known as *money illusion* (e.g. Shafir *et al*., 1997). As such, directly priming individuals to consider the effect of inflation may influence responses.

Responses may also be influenced by an individual's perception of the rate of inflation. Evidence suggests that individuals routinely misperceive the rate of inflation (Duffy and Lunn, 2009, Arioli *et al*., 2017) and so participants' estimates of current inflation rates were also elicited at the end of all three stages to measure any effect of inflation perception on responses in this stage.

3.2. Task Description

Participants were presented with the following question:

"Which of the following options do you believe to be the most acceptable price change for water charges over the next year?"

Participants were shown a range of statements and asked to select the statement that best reflected their current beliefs about acceptable price changes over the next twelve months[1]. There was no mention about possible changes to the quality of their water service, or any other indication of the purpose of these potential price changes. This question was framed as neutrally as possible to best ascertain participants' existing beliefs about price changes. In this stage we also asked for participants' council tax bands, which were important in determining their real water charges for Stages 2 and 3 (details about this can be found in Appendix H).

3.3. Experimental Manipulation

Within this stage, the range of answers presented to participants differed according to the condition they were randomised into across a 2 x 2 between-subject design[2]. The two manipulations were:

Description: To test for the potential effect of *money illusion* in influencing decisions in this stage, the descriptions of possible responses were either framed as purely *monetary* changes (e.g. "increase by £5.01- £10.00") in the "Money" condition, or as relative to *inflation* (e.g. "increase at the rate of inflation") in the "Inflation" condition. The approximate cost of each option was kept the same (given the average cost of water, and the current rate of inflation), so the only difference between the options was the way in which they were framed.

[1] Table 1 shows the range of response options across the different experimental manipulations.
[2] A 2 x 2 between-subject design means that options differed across two dimensions, each with two alternatives. This means that there were four independent ranges of options (i.e. Money-Small End Points, Money-Large End Points, Inflation-Small End Points and Inflation-Large End Points) and each participant was randomly allocated into one of these.

End Points: The number of response options was varied between participants, with either five (Small End Points) or seven (Large End Points) statement options. This was a consistency measure to test whether participant's responses to this question were being influenced by the scale used. In "Small End Points", response options ranged from statements 2-6 in Table 1, in "Large End Points", all response options, from statements 1-7 in Table 1, were presented to participants. Note in both cases the middle option is unchanged (statement 4), and so this manipulation only concerns the effect of including additional options at the extremities of the range.

3.4. Results

The results for Stage 1 are presented in Table 1, and Figures 1.a and 1.b. Overall 46.7% of participants preferred no price change for water over the next 12 months. However, participants were also generally supportive of a potential price rise. Among those who selected any price change, 41.2% selected a price rise, and only 12.2% selected a fall in price over the next 12 months.

It is possible to place approximate values on the willingness-to-pay of citizens in this stage. In the "Money" condition, options ranged between financial values (e.g. increase by £0.01 - £5.00). On an assumption that participants' true values lie randomly between this minimum and maximum value, approximated value for each option would be the mid-point (e.g. increase by £2.50). It is also possible to take maximum and minimum estimates to provide a range (based on the highest and lowest value for each option (e.g. if every participant wished for an increase of £5.00, or every participant wished for an increase of £0.01). Since in the "Inflation" condition options were approximately equivalent to those in the "Money" condition, the same principal can be applied to responses across both.

On average, willingness-to-pay for a price change over the next 12 months was £1.65 (*min*: £0.32; *max*: £2.98). Removing participants who selected a price decrease, willingness-to-pay was £2.47 (*min*: £1.30; *max*: £3.64). When only considering participants who were willing to tolerate some price rise, willingness-to-pay was £5.27 (*min*: £2.78; *max*: £7.77).

A comparison of responses by experimental manipulation highlights whether the framing of response options can influence outcomes. We categorise two potential outcomes of interest. The first is whether participants would choose any price increase as acceptable (i.e. statements 4-7). Figure 2.a (χ^2= 1.430, p= 0.232) and Figure 2.b (χ^2= 2.072, p= 0.150) shows that

likelihood to select some price increase did not differ significantly between either experimental manipulations.

Money		Inflation	All	Money	Inflation	Small End Points	Large End Points
Decrease by £5.01-£10.00	**1**	Decrease by a lot	26	17	9	0	26
Decrease by £0.01-£5.00	**2**	Decrease by a little	47	20	27	28	19
No change	**3**	No change	280	152	128	141	139
Increase by £0.01-£5.00	**4**	Increase by less than inflation	141	87	54	80	61
Increase by £5.01-£10.00	**5**	Increase at inflation	81	20	61	42	39
Increase by £10.01-£15.00	**6**	Increase a little more than inflation	19	9	10	11	8
Increase by £15.01-£20.00	**7**	Increase a lot more than inflation	6	4	2	0	6
		N	**600**	**309**	**291**	**302**	**298**
		Median	3	3	3	3	3

Table 1. Number of participants selecting each statement by presentation type

The second outcome of interest is whether participants would choose a price increase at or above the rate of inflation (i.e. statements 5-7). Figure 2.c shows that participants in the Money condition were statistically significantly less likely to select a price increase at or above the level of inflation than participants in the Inflation condition ($\chi^2 = 21.383$, $p < 0.001$). From Table 1 and Figure 1.a., this appears to be driven by the salience of the "Increase at inflation" option in Inflation. These results lend tentative support to the notion of *money illusion* - that participants did not account for the presence of inflation in their decisions unless they were explicitly prompted to consider it. Figure 2.d shows this outcome was not affected by End Points ($\chi^2 = 0.006$, $p = 0.940$). Parametric statistical models report similar findings, and detailed descriptions of these can be found in Appendix A. These models also report that, on average, higher perceptions of inflation led to decreased likelihood to choose any price increase (or one at or above the rate of inflation), but overall these effects were not statistically significant.

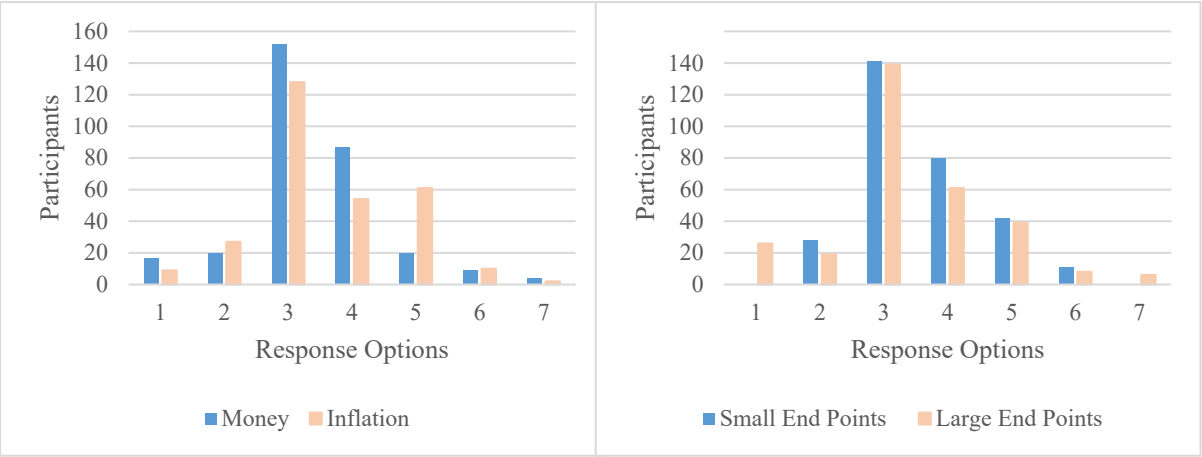

Figure 1.a. (*left*) Number of participants selecting statement 1-7 separating by Description (see Table 1 for a description of each statement)

Figure 1.b. (*right*) Number of participants selecting statement 1-7 separating by End Points (in Small End Points participants were only presented with statements 2-6)

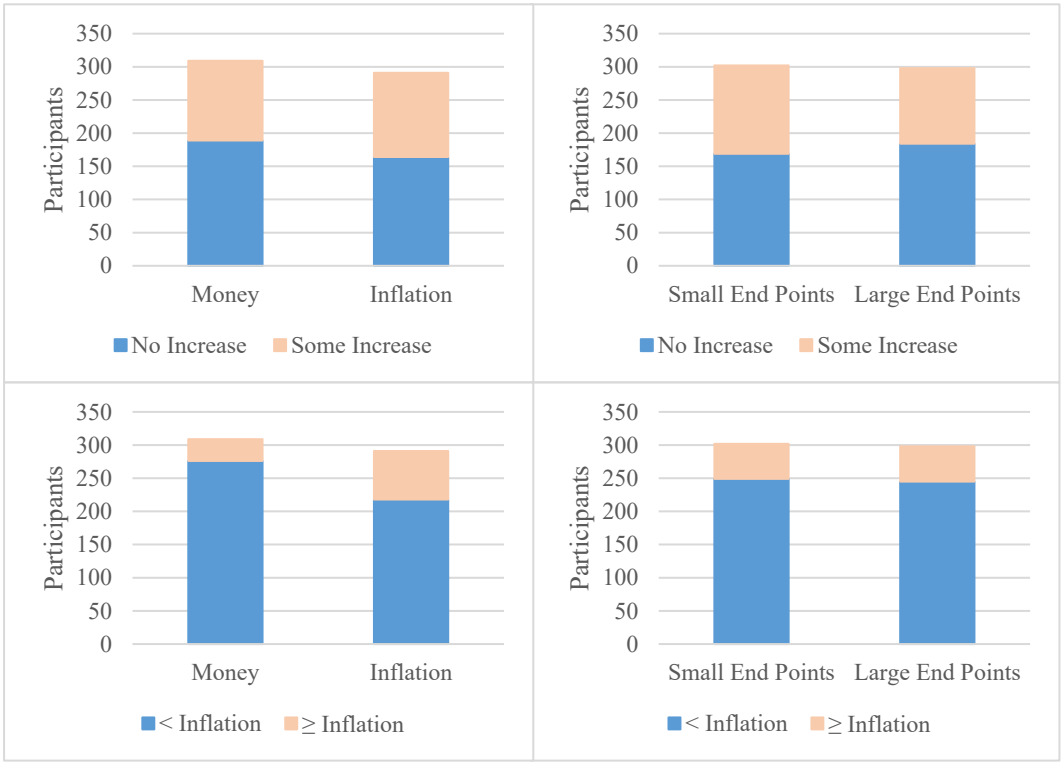

Figure 2.a. (*top left*) Number of participants selecting statement 1-3 vs. 4-7 by Description

Figure 2.b. (*top right*) Number of participants selecting statement 1-3 vs. 4-7 by End Points

Figure 2.c. (*bottom left*) Number of participants selecting statement 1-4 vs. 5-7 by Description

Figure 2.d. (*bottom right*) Number of participants selecting statement 1-4 vs. 5-7 by End Points

4. Stage 2

Research Question: *How does the size and presentation of price trajectories affect their acceptability?*

4.1. Introduction

The main aim of this study was to uncover Scottish citizens' attitudes to changes to water prices over multiple year periods. In order to observe attitudes towards a range of possible price changes, we manipulated the absolute magnitude of price rises, the pattern of price rises and the way in which these price rises were presented. There were a number of reasons why we would be interested in uncovering citizens' attitudes to price changes over multiple years.

First, there is evidence in the behavioural science literature that individuals' attitudes and preferences may be time-dependent. Research on time-discounting suggests that individuals give less weight to future events than immediate ones (Laibson, 1997). In the context of financial losses (e.g. price rises), research suggests that whether there is a desire to put it off or get it over with can depend on the overall size of the loss (Hardisty *et al*. 2013). This suggests that manipulating when and by how much price changes occur across multiple years may affect attitudes towards these.

Second, there is evidence to show that whether price changes are expressed as monetary or percentage changes can influence individual decision-making, even when objectively the different options amount to the same things (e.g. Krishna *et al*., 2002). Though overall the literature is not conclusive, evidence of a preference for monetary changes when prices are falling may be because these are easier to calculate than percentage changes (DelVecchio *et al*., 2007). Whether the same is true for price rises is not clear.

Third, the WICS "Strategic Review of Charges" outlines planned future price changes for water charges over multiple-year periods. Therefore there is a clear public policy interest in ascertaining Scottish attitudes to different formats of price changes over time periods of a similar duration.

4.2. Task Description

In this stage we asked participants to rate multiple price trajectories for proposed changes to water charges over a six year period. In this stage, price trajectories were presented as in Figure 3 below.

Now	Now	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
£363.00	**£ Increase**	£5.60	£5.60	£5.60	£5.60	£5.60	£5.60

Figure 3. Example of a price trajectory as presented to participants. The actual starting cost at 'Now' was dependent on the council tax band of the participant (elicited in Stage 1)

First, participants were informed that there was a possibility that prices for water charges in Scotland would be required to increase in the coming years, but that it was not certain the size or form that these price rises would take. Participants were then informed that they would be presented with a series of different price trajectories for water charges over the next six years. For each price trajectory, participants were asked to rate how acceptable they believed each trajectory to be, on a scale of 1 – 7 (where 1 = "totally unacceptable" and 7 = "totally acceptable"). Participants viewed all price trajectories as many times as they wished before commencing the rating tasks for each price trajectory. This was designed to reduce the possibility of an occurrence of order effects – where the order in which trajectories were presented could systematically influence their rating. Although we found evidence of a general order effect, there was no evidence to suggest that this influenced the main effects within this study (further details are provided in Appendix F). Each price trajectory (and its rating task) was presented on a separate page, to reduce comparison effects across different price trajectories.

4.3. Experimental Manipulation

In total, participants rated twelve different price trajectories. Informed by the existing behavioural literature, we tested whether different price trajectories affected individuals' perceptions of acceptability. The types of trajectories were manipulated in three ways in a 3 x 2 x 2 within-subject design, to generate a total of twelve unique price trajectories[3]:

1. **Trajectory Pattern**: How the price rises occur over the six year period, with equivalent revenue
   a. **Constant**: A consistent increase for each of the six years
   b. **Front-Loaded**: Increase for the first three years, no increase in the last three years

[3] Examples of the twelve unique price trajectories can be found in Appendix B.

c. **Back-Loaded**: No increase in the first three years, increase in the last three years

2. **Format**: How price changes were presented
   a. **Pound:** Price rises presented as pounds and pence increases
   b. **Percentage:** Price rises presented as percentage increases
3. **Price Level**: Absolute size of total price increase over full price trajectory period
   a. **Low Cost**: Low price increase (approximately equivalent to 1.50% per annum)
   b. **High Cost**: High price increase (approximately equivalent to 2.50% per annum)

4.4. Results

The summary results for Stage 2 are presented in Figure 4. Consistent with Stage 1, participants were reasonably accepting of proposed price increases overall (Median rating= 4; Mean= 3.81, *SD* = 1.14). There are a number of striking findings across different types of price trajectories.

The first is that there is a strong distaste for Back-Loaded trajectories, which were consistently rated less acceptable than equivalent Constant and Front-Loaded trajectories. Constant trajectories were consistently rated more acceptable than equivalent Front-Loaded trajectories. There was also a consistent increased acceptance of price trajectories framed as Percentage than the equivalent trajectories framed as Pound. Lastly, Low Cost price trajectories were rated more acceptable than High Cost trajectories. Results of non-parametric analyses (found in Appendix C) find that differences in ratings across all pairwise trajectory types are statistically significant. Parametric statistical models report similar findings, and detailed descriptions of these can be found in Appendix D.

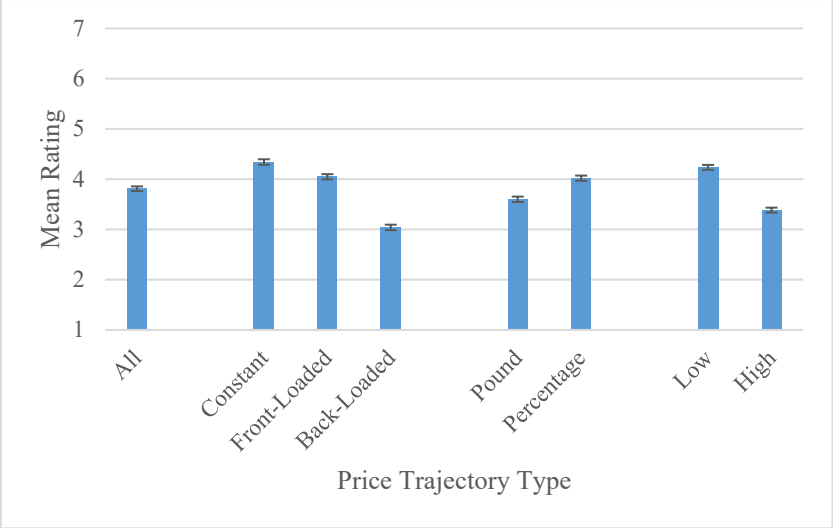

Figure 4. Mean acceptance rating (1-7) by price trajectory type (error bars report standard errors)

As each price trajectory was intended to be rated independently, participants were not asked to make explicit comparisons or choices between trajectory types. However, it is possible to estimate a monetary value of the difference in levels of acceptance across different types of price trajectories as a result of the responses in this task. Over the full six year period of an average annual water bill the difference in cost to a citizen between a Low Cost price trajectory and a High Cost price trajectory was £81.90 over the six year period. Using this as a benchmark, a one unit decrease in rating was calculated as being equivalent to an additional £96.26 over the six year price trajectory of an average annual water bill[4]. From this we were able to estimate an approximate difference in value of each price trajectory, differing by type and format.

Compared to Constant price trajectories, the reduced acceptance for Front-Loaded trajectories was equivalent to an additional £28.32 over the full six year period. Compared to Constant price trajectories, the reduced acceptance for Back-Loaded trajectories was equivalent to an additional £125.30 over the full six year period. Compared to Front-Loaded price trajectories, the reduced acceptance for Back-Loaded trajectories was equivalent to an additional £96.98 over the full six year period. For context, an additional £125.30 over a full six year period is approximately equivalent to the difference in cost of a 1.50% increase per annum for the six years and 3.00% increase per annum for the six years.

[4] This was calculated by dividing the difference in cost over the full six year period (£81.90) by the mean difference in rating between Low Cost and High Cost trajectories (0.850833).

Compared to price trajectories presented as Percentage, the reduced acceptance of trajectories presented as Pound was equivalent to an additional £40.46 over the full six year period, despite the fact that the actual cost to the citizen, and the pattern of price rise, was identical. An additional £40.46 over a full six year period is approximately equivalent to the difference between a 1.50% increase per annum for the six years and 2.00% increase per annum for the six years. This demonstrates the scale of influence that relatively small changes in the trajectory type and format of presentation can have on the perceptions of acceptability for equivalent price trajectories.

5. Stage 3

Research Question: *How does additional information about the changes in costs of price trajectories over time affect their acceptability?*

5.1. Introduction

The differences in levels of acceptance for different price trajectories in Stage 2 is substantial, even when the objective differences in revenue are the same. It is possible that, given all the information provided in these initial price trajectories, participants simply could not properly integrate all the information, and so were unable to recognise that different trajectories amounted to the same levels of revenue. Stage 3 aimed to make this information more readily available for participants, to see whether differences between price trajectories were altered with this additional provision of information.

5.2. Task Description

Stage 3 followed exactly the same format as Stage 2. Participants were informed that they would be asked to rate a further twelve price trajectories, but this time these price trajectories would contain more information than those in Stage 2. Though the price trajectories were identical in both stages, this was not made explicitly clear to participants.

5.3. Experimental Manipulation

The type of additional information provided differed across two conditions. These are described below and how this was presented in the price trajectories is outlined in Figure 5. The two additional pieces of information were:

Annual Cost: Participants were shown the total cost of water charges in each year, including any price increases.

Accumulated Cost: Participants were shown the total price rise across the full six year period. Participants were also shown the total additional charges from the price rises over the full six year period (i.e. the total additional cost of water compared to if prices had not changed from their current levels).

One half of participants saw Annual Cost only (henceforth Stage 3a), and the other half saw both Annual Cost and Accumulated Cost (henceforth Stage 3b). The reason for this splitting of information was the concern that different information may convey different messages to participants. For example, the behavioural literature suggests that individuals struggle to accumulate multiple charges accurately. This suggests that participants in Stage 2 were perhaps not accurately determining what the final cost of water would be at the end of each price trajectory. The information provided in Annual Cost made that explicitly clear. Similarly, given that additional costs each year are accumulated over every additional year, it is difficult to calculate that total accumulated cost accurately. In Accumulated Cost, as well as making clear the total price rise over the full six years, it was highlighted explicitly to participants that all Low Cost/ High Cost trajectories (irrespective of their trajectory pattern or format) yielded exactly the same total additional charges[5].

Now	Now	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	
£363.00	**£ Increase**	£5.60	£5.60	£5.60	£5.60	£5.60	£5.60	**Price Rise (£)** £33.60
£363.00	**Annual Cost**	£368.60	£374.20	£379.80	£385.40	£391.00	£396.60	**Total Additional Charge (£)** £117.60

Figure 5. Example of price trajectory presented in Stage 3. White colour denotes the basic Price Trajectory information provided in Stage 2, 3a and 3b. Light grey colour denotes the Annual Cost information provided in Stage 3a and 3b, the dark grey colour denotes the Accumulated Cost information provided in Stage 3b only.

5.4. Results

The summary results for Stage 3a and 3b are presented in Figures 6 and 7 below.

[5] Examples of the twelve unique price trajectories can be found in Appendix B.

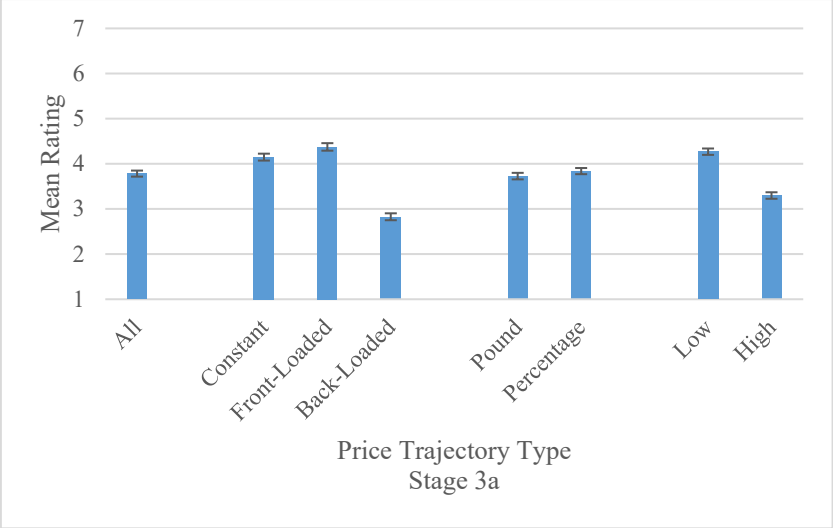

Figure 6. Mean acceptance rating (1-7) by price trajectory type for Stages 3a (error bars report standard errors)

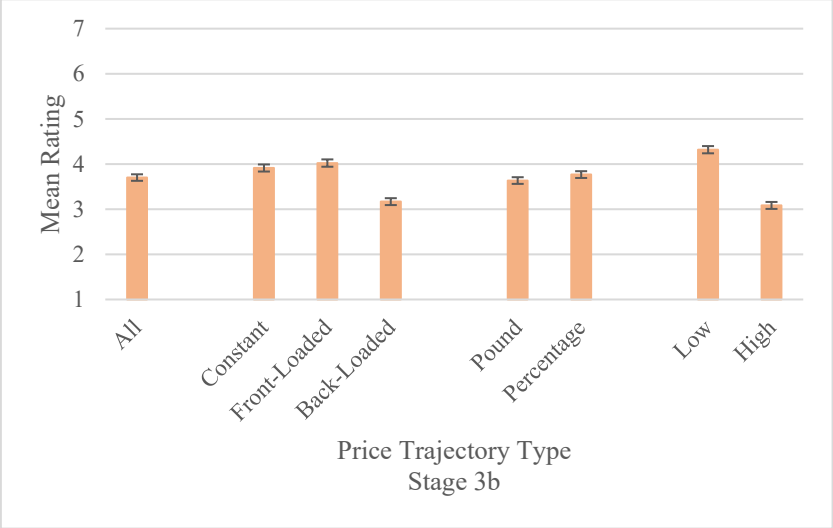

Figure 7. Mean acceptance rating (1-7) by price trajectory type for Stages 3b (error bars report standard errors)

In both Stages 3a and 3b, Front-Loaded trajectories on average had a higher rating than Constant, the opposite to Stage 2. This provides strong evidence to suggest that participants were not properly accumulating costs throughout the six year period in Stage 2, particularly in terms of final cost at the end of year six.

It is a necessary feature of the three trajectory patterns that, in order to generate equivalent revenue gained over the full six year period, the annual cost at year six is lowest in Front-

Loaded, next lowest in Constant and highest in Back-Loaded. This suggests that whatever is driving a preference for constant increases with the price trajectories in Stage 2 is being offset by the annual cost information provided in Stage 3a. It is also of interest to note that this effect is somewhat mediated by the introduction of total accumulated costs (which were identical in in all trajectories) in 3b, where a preference for Front-Loaded is significantly reduced (as seen in parametric analysis in Appendix E). The simultaneous introduction of total price rise (which would have been lowest for Front-Loaded) may have reduced the mediating effect of revealing equivalent total accumulated costs.

Results of non-parametric analyses (found in Appendix C) find that differences in ratings across all pairwise differences are statistically significant in Stages 3a and 3b. Responses to Back-Loaded trajectories also lend support to the hypothesis that participants do focus on the final cost at year six in Stage 3a. Since the annual cost at year six was considerably higher in Back-Loaded than the other two trajectory patterns, this may explain the reduced relative acceptance of Back-Loaded in Stage 3a. Whilst a distaste for Back-Loaded trajectories persists in Stage 3b, the relative disparity in acceptance between Back-Loaded and the other two trajectory patterns is smaller (as seen in parametric analysis in Appendix E).

It is also particularly surprising that, although reduced, the disparity between trajectory presentation formats persists in both Stages 3a and 3b. That is, even though it is made explicitly clear that the price trajectories presented as pounds are equivalent to those presented in percentages, there remains a statistically significant greater acceptance when trajectories are framed as percentages.

Throughout all stages, there was a consistent preference for Low Cost trajectories, relative to High Cost, as would be expected. Parametric statistical models report similar findings to these above, and detailed descriptions of these can be found in Appendix E.

6. Summary of Findings

This experimental study aimed to improve understanding of Scottish citizens' attitudes towards different prospective price trajectories for future water charges. We manipulated the shape of the price trajectory, the way that the price changes were presented, the absolute costs of the trajectories, and the annual bill for each year throughout the period and the accumulated additional revenue associated with these trajectories were made explicit for participants. We

found evidence that these manipulations influence attitudes to price changes. In this section we summarise the results and what they indicate about the psychological mechanisms underlying responses. The final section then cautiously draws some possible policy implications.

The findings of this study can be summarised as five key results:

1. **A substantial proportion of Scottish citizens is willing to accept some nominal increase in water charges**, both in the immediate 12 months (Stage 1) or over the next 6 year period (Stages 2 and 3). The proportion who believe that water charges should be reducing is small. Given that responses were collected in this study without any reference to household or environmental benefits, or to any need for investment in maintenance or infrastructure, this acceptance of the need to pay for water services might be considered somewhat surprising.
2. **There is an aversion to putting off price increases.** Responses to the Back-Loaded trajectories were always significantly more negative. Although somewhat diminished, this negative response persisted even when participants were shown that the revenue earned was equivalent over the six year period for Constant, Front-Loaded and Back-Loaded trajectories. For example, across Stages 2 and 3, Back-Loaded price trajectories were rated worse than equivalent Constant trajectories 59.1% of the time (the reverse was true only 9.5% of the time) and were rated worse than equivalent Front-Loaded trajectories 58.0% of the time (the reverse was true only 10.1% of the time). Overall, then, this effect was strong. In principle, it could result from more than one psychological mechanism, with the combined effect being sufficient to override the fact that people generally care more about outcomes in the present than in the future. One possibility is that people dislike the feeling of having something negative "hanging over them". Putting off raising the additional revenue necessarily entails large and unpleasant year-on-year increases in the future. Another possibility is that people dislike the fact that, for a given revenue increase over a given period of time, putting off the increase results in a higher final bill at the end of the period, with potential implications for the size of bills further into the future. Lastly, an enlightened respondent might reason that if they are going to have to pay for additional investment in any case, the sooner they do it the sooner any benefits arising from it may arrive. A closer examination of the patterns in our data right across the three types of trajectory offers some insights into which of these mechanisms might be stronger. For instance, the lack of a similarly strong preference for the Front-Loaded trajectory over the

Constant one suggests that the speed of receiving benefits is perhaps not a decisive factor. Similarly, if the absolute size of the bill in the final year were the key issue, the Front-Loaded trajectory might be expected to be equivalently preferred to the Constant trajectory in both Stages 3a and 3b. The implication of these arguments is that the primary mechanism behind the dislike of leaving increases to later is the first one mentioned above. Put simply, if people know that there is going to be an increase in charges, they would rather get on with it.

3. **How changes in prices are communicated matters.** The study finds evidence of money illusion in Stage 1 – a failure to account for inflation. This is not surprising, as money illusion is a frequently observed phenomenon, but it is important. There is also evidence for a large and consistent difference in response when prices are presented as percentages versus when they are presented as pounds and pence (Stages 2 and 3). What is perhaps more surprising is that this preference for trajectories expressed as percentages persisted even once the annual and accumulated costs were made explicit in Stage 3 (which highlighted that the costs of the trajectories were identical irrespective of the framing of price change). The effect size measured here is quite substantial. Price trajectories presented in percentages were preferred to the same price trajectories presented in pounds 34.9% of the time in Stages 2 and 3 (the reverse was true only 21.3% of the time). The implication is straightforwardly that increases in pounds are consistently given more psychological weight than equivalent increases in percentages.
4. **Providing additional information about future bills and accumulated revenue alters attitudes.** There was a preference for Constant over Front-Loaded in Stage 2, a preference for Front-Loaded over Constant in Stage 3a, and a reduced preference for Front-Loaded in Stage 3b. This pattern is consistent with two competing mechanisms. First, participants failed to account fully for the accumulation of smaller price increases inherent in the Constant trajectories, until it was made explicit. Second, for the Front-Loaded trajectories they failed to understand the impact on the total amount extra that they would hand over as a result of price increases occurring earlier in the period. The pattern of responses of these two trajectories relative to the Back-Loaded ones is also consistent with these mechanisms.
5. **The experimental platform used can influence responses.** A more general finding of this study was the differences observed between participants who completed the online study and those who completed it face-to-face. In general, price trajectory ratings were more positive in the face-to-face study, and these participants were also more

likely to utilise the full rating scale. One potential interpretation of this is that face-to-face participants were more engaged with the study, but this is conjecture. Nevertheless, we observed similar relative effects of our main experimental manipulations across both platforms. Thus, whilst these findings raise questions of methodological interest that warrant future investigation, they do not substantively influence the main findings from this present study.

7. Policy Implications

As described at the outset, it is not a straightforward matter to generate an objective, dispassionate and representative measure of household preferences. Yet it is possible to make empirical progress and, therefore, to generate useful evidence that supports a more behaviourally informed approach. This final section draws some cautious policy implications from the findings of this first study in the research programme. The fact that this is the first study should be borne in mind at all times. It is logically possible that any or all of the results obtained here might be altered were respondents to have access to additional information about the likely scale of benefits associated with increases in water charges, especially if this turned out to be substantially greater than or less than they anticipated. Nevertheless, there are implications that might reasonably be drawn. In any case, when a specific change in charges or a likely trajectory for charges is communicated to the public, it may not be possible to simultaneously communicate information about the associated benefits, so the findings here perhaps offer some guidance as to how such communications might initially be received.

The findings suggest that Scottish citizens respond reasonably positively to the prospect of moderate increases in charges, perhaps surprisingly so. This is more likely to be the case when an increase is explicitly placed in the context of inflation and expressed as a percentage. Of course, one might debate whether this evidence ought to guide communications of price changes, since the aim is to act in the interests of Scottish citizens rather than to get things past them. Yet the current study points the finger at money illusion as the underlying issue. If so, then it might reasonably be argued that expressing increases in percentage terms serves to remind people to factor in inflation when they judge the impact and, therefore, to respond according to a more informed preference.

A similar argument can be made that it is important to try to place price increases in the context of the revenue that they raise and the longer term pattern of resulting bills. There are, naturally, limits to the amount of information that can be imparted to the public. However, the current results suggest that people are inclined not to take into account the cumulative effect of consistent small rises. They also indicate that people fail to appreciate the total costs associated with increases that occur sooner rather than later. Thus, where possible, more than just the annual price change should be provided in any announcements of future price changes. Making explicit the effect on bills and on total costs over a period would appear to lead to a less biased and more informed response to changes in charges.

In the context of an industry with a recognised need for additional investment, the finding that people dislike putting off likely increases in charges is potentially important. Note that while it is possible that other mechanisms were involved, the evidence provided in this study suggests that rather than taking the short-sighted approach of delaying the inevitable, people are more inclined to want to get on with it. If this is indeed the main psychological mechanism behind people's responses, then one might reasonably ask over what time frame this effect might apply and, in particular, whether it might apply to longer time frames than the six years tested in the present experiments. This would amount to an extrapolation beyond the present data but is a reasonable conjecture – one that could potentially be addressed in further research.

At the risk of repetition, recall that this study deliberately elicited attitudes without making clear why prospective increases in charges might be necessary, where the money would be spent and what the potential outcomes might be. Furthermore, this study did not measure citizens' expectations of what might be improved by higher charges. These may all be fundamental issues in determining citizens' overall attitudes to their short and long-term expectations and acceptance of changing water charges and, therefore, important to consider in future studies.

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Appendices

Appendix A – Parametric Analysis of Stage 1

Here we report the results of statistical analyses which aim to isolate individual effects of the manipulations in Stage 1 on participant's choice of acceptable price change over the next 12 month period. We ran two separate logistic regressions; the dependent variable for the first was the binary decision of whether a participant selected any price increase as acceptable, the second was the binary decision of whether a participant selected any price increase at or above the rate of inflation as acceptable. For both of these the independent variables were the experimental manipulations and demographic information. Any meaningful effects of platform or demographics in this stage are reported in Appendices G-J.

The results, presented in Table A.1 below largely confirm the findings of the summary statistics. In Model 1 we observe that neither End Points nor Description significantly influences likelihood to choose some price increase. In Model 2 we observe that framing response options in terms of Inflation significantly increases the likelihood to choose an increase at or above the rate of inflation ($p< 0.001$). Estimations of average marginal effects suggest that participants who saw response options in terms of Inflation were 15.2 percentage points more likely to choose an increase at or above the rate of inflation than those who saw response options in terms of Money. In Models 3 and 4 we observe no evidence of an interaction effect between End Points and Description but the effect of framing response options in terms of Inflation on likelihood to choose some price increase at or above the rate of inflation persists ($p= 0.004$). When including demographic information in Models 5 and 6 we see no change in effect sizes of the main manipulations.

Acceptable Price Change	**Model 1** Some Increase	**Model 2** Increase at or Above Inflation	**Model 3** Some Increase	**Model 4** Increase at or Above Inflation	**Model 5** Some Increase	**Model 6** Increase at or Above Inflation
Description (*Ref: Money*)						
Inflation	0.2270	1.0892***	0.1710	0.9513***	0.2776	1.0628***
	(0.171)	*(0.237)*	*(0.238)*	*(0.329)*	*(0.249)*	*(0.345)*
End Points (*Ref: Small*)						
Large	-0.2812	0.0318	-0.3392	-0.1545	-0.3190	-0.1810
	(0.171)	*(0.223)*	*(0.243)*	*(0.387)*	*(0.254)*	*(0.400)*
Inflation * Large						
	-------	-------	0.1152	0.2797	-0.0232	0.2226
	-------	-------	*(0.342)*	*(0.474)*	*(0.357)*	*(0.494)*
Online (*Ref: No)*						
Yes	0.1916	0.0557	0.1910	0.0535	0.1989	0.1217
	(0.233)	*(0.306)*	*(0.233)*	*(0.306)*	*(0.249)*	*(0.330)*
Log(Inflation Estimate)						
	-0.1062	-0.2215	-0.1058	-0.2203	-0.0836	-0.2062
	(0.128)	*(0.173)*	*(0.128)*	*(0.172)*	*(0.140)*	*(0.189)*
CT Band (*Ref: A / B / C*)						
D / E	-------	-------	-------	-------	0.0972	0.3660
	-------	-------	-------	-------	*(0.214)*	*(0.285)*
F / G / H	-------	-------	-------	-------	-0.0136	0.7895**
	-------	-------	-------	-------	*(0.275)*	*(0.343)*
Age (*Ref: 18 – 40*)						
41 - 60	-------	-------	-------	-------	-0.1473	-0.3047
	-------	-------	-------	-------	*(0.230)*	*(0.305)*
61 +	-------	-------	-------	-------	0.8312**	0.2815
	-------	-------	-------	-------	*(0.355)*	*(0.439)*
Gender (*Ref: Female*)						
Male	-------	-------	-------	-------	-0.0052	0.2394
	-------	-------	-------	-------	*(0.184)*	*(0.247)*
Employment (*Ref: Employed*)						
Unemployed	-------	-------	-------	-------	-0.7524**	-0.2665
	-------	-------	-------	-------	*(0.359)*	*(0.473)*
Retired	-------	-------	-------	-------	-0.9179***	-0.6104
	-------	-------	-------	-------	*(0.336)*	*(0.428)*
Degree (*Ref: No*)						
Yes	-------	-------	-------	-------	0.0936	0.5665**
	-------	-------	-------	-------	*(0.189)*	*(0.249)*
Location (*Ref: Urban*)						
Rural	-------	-------	-------	-------	-0.1329	0.0888
	-------	-------	-------	-------	*(0.233)*	*(0.303)*
Bill Payer (*Ref: No*)						
Yes	-------	-------	-------	-------	-0.2273	-0.1355
	-------	-------	-------	-------	*(0.275)*	*(0.353)*
Bill Discount (*Ref: No*)						
Yes	-------	-------	-------	-------	-0.2277	0.1374
	-------	-------	-------	-------	*(0.204)*	*(0.267)*
Constant	-0.3514	-2.0004***	-0.3231	-1.9086***	0.0247	-2.4427***
	(0.280)	*(0.381)*	*(0.292)*	*(0.408)*	*(0.432)*	*(0.585)*
Participants	569	569	569	569	564	564

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table A.1. Results of logistic models for Stage 1 with log odds reported. Dependent variable: likelihood to choose some price increase (Models 1, 3, 5) or likelihood to choose some price increase at or above the rate of inflation (Models 2, 4, 6)

Appendix B – Examples of Price Trajectories in Stages 2 and 3

Below is an example of all twelve price trajectories presented in Stages 2, 3a and 3b. Here, current price at "Now" is the national average water charge at 2018/19 prices (£363.00). White colour denotes the Price Trajectory information provided in Stages 2, 3a and 3b. Light grey colour denotes the Annual Cost information provided in Stages 3a and 3b. Dark grey colour denotes the Accumulated Cost information provided in Stage 3b only.

Now	Now	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	
£363.00	**£ Increase**	£5.60	£5.60	£5.60	£5.60	£5.60	£5.60	**Price Rise (£)** £33.60
£363.00	**Annual Cost**	£368.60	£374.20	£379.80	£385.40	£391.00	£396.60	**Total Additional Charge (£)** £117.60

Table B.1. Constant, Pound, Low

Now	Now	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	
£363.00	**£ Increase**	£7.84	£7.84	£7.84	£0.00	£0.00	£0.00	**Price Rise (£)** £23.52
£363.00	**Annual Cost**	£370.84	£378.68	£386.52	£386.52	£386.52	£386.52	**Total Additional Charge (£)** £117.60

Table B.2. Front-Loaded, Pound, Low

Now	Now	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	
£363.00	**£ Increase**	£0.00	£0.00	£0.00	£19.60	£19.60	£19.60	**Price Rise (£)** £58.80
£363.00	**Annual Cost**	£363.00	£363.00	£363.00	£382.60	£402.20	£421.80	**Total Additional Charge (£)** £117.60

Table B.3. Back-Loaded, Pound, Low

Now	Now	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	
£363.00	**£ Increase**	£9.50	£9.50	£9.50	£9.50	£9.50	£9.50	**Price Rise (£)** £57.00
£363.00	**Annual Cost**	£372.50	£382.00	£391.50	£401.00	£410.50	£420.00	**Total Additional Charge (£)** £199.50

Table B.4. Constant, Pound, High

Now	Now	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	
£363.00	**£ Increase**	£13.30	£13.30	£13.30	£0.00	£0.00	£0.00	**Price Rise (£)** £39.90
£363.00	**Annual Cost**	£376.30	£389.60	£402.90	£402.90	£402.90	£402.90	**Total Additional Charge (£)** £199.50

Table B.5. Front-Loaded, Pound, High

Now	Now	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
£363.00	**£ Increase**	£0.00	£0.00	£0.00	£33.25	£33.25	£33.25	**Price Rise (£)** £99.75
£363.00	**Annual Cost**	£363.00	£363.00	£363.00	£396.25	£429.50	£462.75	**Total Additional Charge (£)** £199.50

Table B.6. Back-Loaded, Pound, High

Now	Now	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
£363.00	**% Increase**	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	**Price Rise (£)** £33.60
£363.00	**Annual Cost**	£368.60	£374.20	£379.80	£385.40	£391.00	£396.60	**Total Additional Charge (£)** £117.60

Table B.7. Constant, Percentage, Low

Now	Now	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
£363.00	**% Increase**	2.10%	2.10%	2.10%	0.00%	0.00%	0.00%	**Price Rise (£)** £23.52
£363.00	**Annual Cost**	£370.84	£378.68	£386.52	£386.52	£386.52	£386.52	**Total Additional Charge (£)** £117.60

Table B.8. Front-Loaded, Percentage, Low

Now	Now	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
£363.00	**% Increase**	0.00%	0.00%	0.00%	5.20%	5.20%	5.20%	**Price Rise (£)** £58.80
£363.00	**Annual Cost**	£363.00	£363.00	£363.00	£382.60	£402.20	£421.80	**Total Additional Charge (£)** £117.60

Table B.9. Back-Loaded, Percentage, Low

Now	Now	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
£363.00	**% Increase**	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	**Price Rise (£)** £57.00
£363.00	**Annual Cost**	£372.50	£382.00	£391.50	£401.00	£410.50	£420.00	**Total Additional Charge (£)** £199.50

Table B.10. Constant, Percentage, High

Now	Now	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
£363.00	**% Increase**	3.55%	3.55%	3.55%	0.00%	0.00%	0.00%	**Price Rise (£)** £39.90
£363.00	**Annual Cost**	£376.30	£389.60	£402.90	£402.90	£402.90	£402.90	**Total Additional Charge (£)** £199.50

Table B.11. Front-Loaded, Percentage, High

Now	Now	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
£363.00	**% Increase**	0.00%	0.00%	0.00%	8.60%	8.60%	8.60%	**Price Rise (£)** £99.75
£363.00	**Annual Cost**	£363.00	£363.00	£363.00	£396.25	£429.50	£462.75	**Total Additional Charge (£)** £199.50

Table B.12. Back-Loaded, Percentage, High

Appendix C – Non-Parametric Analysis of Stages 2 and 3

In this section we report the results of non-parametric analyses which aim to test for differences in ratings across price trajectory type in Stages 2, 3a and 3b. Below are results of tests for both differences in medians (Wilcoxon sign-rank tests) and means (paired t-tests). As indicated in the summary statistics, in Stages 2, 3a and 3b there are statistically significant differences between all pairwise comparisons of median and mean ratings.

Price Trajectory Type	**Median**	**Mean (*se*)**	**Price Trajectory Type**	**Median**	**Mean (*se*)**	**Wilcoxon sign-rank Test**		**t-Test**	
						***z*-stat**	***p*-value**	***t*-stat**	***p*-value**
Constant	4	4.341 (*0.054*)	**Front Loaded**	4	4.047 (*0.053*)	7.158	**< 0.001**	7.674	**< 0.001**
Constant	4	4.341 (*0.054*)	**Back Loaded**	3	3.040 (*0.055*)	18.128	**< 0.001**	24.132	**< 0.001**
Front Loaded	4	4.047 (*0.053*)	**Back Loaded**	3	3.040 (*0.055*)	16.590	**< 0.001**	20.713	**< 0.001**
Pound	4	3.599 (*0.054*)	**Percentage**	4	4.019 (*0.051*)	-8.486	**< 0.001**	-8.394	**< 0.001**
Low Cost	4	4.235 (*0.049*)	**High Cost**	3	3.384 (*0.049*)	19.432	**< 0.001**	29.009	**< 0.001**

Table C.1. Summary statistics and results of non-parametric tests for pairwise comparisons of price trajectory types in Stage 2

Price Trajectory Type	**Median**	**Mean (*se*)**	**Price Trajectory Type**	**Median**	**Mean (*se*)**	**Wilcoxon sign-rank Test**		**t-Test**	
						***z*-stat**	***p*-value**	***t*-stat**	***p*-value**
Constant	4	4.148 (*0.077*)	**Front Loaded**	4	4.375 (*0.083*)	-4.812	**< 0.001**	-3.877	**< 0.001**
Constant	4	4.148 (*0.077*)	**Back Loaded**	3	2.827 (*0.077*)	13.385	**< 0.001**	18.493	**< 0.001**
Front Loaded	4	4.375 (*0.083*)	**Back Loaded**	3	2.827 (*0.077*)	12.862	**< 0.001**	17.974	**< 0.001**
Pound	4	3.728 (*0.072*)	**Percentage**	4	3.839 (*0.068*)	-2.060	**0.039**	-2.530	**0.012**
Low Cost	4	4.269 (*0.071*)	**High Cost**	3	3.297 (*0.072*)	13.175	**< 0.001**	19.098	**< 0.001**

Table C.2. Summary statistics and results of non-parametric tests for pairwise comparisons of price trajectory types in Stage 3a

Price Trajectory Type	Median	Mean (*se*)	Price Trajectory Type	Median	Mean (*se*)	Wilcoxon sign-rank Test		t-Test	
						z-stat	*p*-value	*t*-stat	*p*-value
Constant	4	3.913 (*0.079*)	**Front Loaded**	4	4.022 (*0.081*)	-3.222	**0.001**	-2.425	**0.016**
Constant	4	3.913 (*0.079*)	**Back Loaded**	3	3.168 (*0.076*)	11.536	**< 0.001**	13.305	**< 0.001**
Front Loaded	4	4.022 (*0.081*)	**Back Loaded**	3	3.168 (*0.076*)	12.438	**< 0.001**	14.060	**< 0.001**
Pound	4	3.635 (*0.074*)	**Percentage**	4	3.767 (*0.075*)	-2.895	**0.004**	-3.581	**< 0.001**
Low Cost	4	4.318 (*0.080*)	**High Cost**	3	3.084 (*0.077*)	13.967	**< 0.001**	19.756	**< 0.001**

Table C.3. Summary statistics and results of non-parametric tests for pairwise comparisons of price trajectory types in Stage 3b

Appendix D – Parametric Analysis of Stage 2

In this section we report the results of statistical analyses which aim to isolate individual effects of the price trajectory manipulations in Stage 2 on participant's acceptance rating for price trajectories. We treat the range of ratings (from 1 - 7) that participants could have given to each price trajectory as ordinal. We ran an ordered logistic regression with rating as the dependent variable and the manipulations across price trajectories as independent variables. Any meaningful effects of order, platform or demographics in this stage are reported in Appendices F-J.

In Model 1, we initially included the variable "*Online*" which distinguished between the online and face-to-face studies since the distributions of the responses in each study type differed substantially (see Appendix G). Whilst there is evidence of a significant difference in responses by study type (manifested by a reduced likelihood for higher ratings in online studies), including this variable led to the model failing standard assumption checks for ordered logistic regression models. Additional analyses revealed that this failure was likely to be driven by differences in responses across platform type[6]. More details of this may be found in Appendix G. As such, Models 2 and 3 report the results of ordered logistic regressions separately for online and face-to-face studies respectively[7], and Models 4 and 5 repeat these to include demographic information (although these models fail standard assumption checks for ordered logistic regression models). We controlled for participants who reported "Prefer not to say" for the demographic questions, but these are not reported in the models.

The results of these models in Table D.1 confirm the results of earlier summary statistics. Overall there is strong evidence that both Front-Loaded and Back-Loaded trajectories are less likely to be given a higher rating than Constant trajectories ($p< 0.001$, for both), signified by a negative coefficient. Likewise there is strong evidence that the same Percentage trajectories are preferred to Pound ($p< 0.001$) and that High Cost trajectories are less preferred than Low Cost trajectories ($p< 0.001$). Overall, these finding are supportive of the summary statistics, and do not substantively differ by platform type or when incorporating demographic effects.

[6] A Brant test indicated that the ordered logistic regression including "*Online*" failed the proportional odds assumption. Running a generalised ordered logistic regression relaxed the assumptions of proportional odds for "*Online*" revealing substantial differences in the effect of study type across different rating values.

[7] Whilst all included variables in each of these models do not pass the proportional odds assumption, the sample size is sufficiently large and the difference in changes between rating values does not influence interpretation of the results, and so ordered logistic regression is a preferred model to a generalised ordered logistic regression (Williams, 2016).

Price Trajectory Rating	**Model 1** All	**Model 2** Online	**Model 3** Face-to-Face	**Model 4** Online + Demographics	**Model 5** Face-to-Face + Demographics
Pattern (*Ref: Constant*)					
Front-Loaded	-0.3299***	-0.3105***	-0.4476***	-0.3296***	-0.4895***
	(0.042)	*(0.045)*	*(0.121)*	*(0.047)*	*(0.132)*
Back-Loaded	-1.4273***	-1.3783***	-1.6910***	-1.4639***	-1.8297***
	(0.067)	*(0.071)*	*(0.187)*	*(0.074)*	*(0.195)*
Format (*Ref: Pound*)					
Percentage	0.4731***	0.4962***	0.3761**	0.5303***	0.4553***
	(0.055)	*(0.059)*	*(0.147)*	*(0.063)*	*(0.165)*
Price Level (*Ref: Low Cost*)					
High Cost	-0.9153***	-0.8828***	-1.0826***	-0.9311***	-1.1716***
	(0.036)	*(0.039)*	*(0.091)*	*(0.042)*	*(0.098)*
Online (*Ref: No)*					
Yes	-0.2356*	-------	-------	-------	-------
	(0.130)	-------	-------	-------	-------
Primacy (*Ref: Order = 2 - 12)*					
Order = 1	0.1508**	0.1446**	0.2090	0.1573**	0.1662
	(0.061)	*(0.066)*	*(0.166)*	*(0.070)*	*(0.185)*
Order (*Ref: Order = 1*)					
	-0.0212***	-0.0207**	-0.0243	-0.0221**	-0.0243
	(0.008)	*(0.008)*	*(0.020)*	*(0.009)*	*(0.023)*
Log(Inflation Estimate)					
	-------	-------	-------	0.1633*	-0.1044
	-------	-------	-------	*(0.088)*	*(0.184)*
CT Band (*Ref: A / B / C*)					
D / E	-------	-------	-------	0.2105	-0.0713
	-------	-------	-------	*(0.141)*	*(0.260)*
F / G / H	-------	-------	-------	0.1107	-0.1904
	-------	-------	-------	*(0.188)*	*(0.358)*
Age (*Ref: 18 – 40*)					
41 - 60	-------	-------	-------	-0.4262***	0.3511
	-------	-------	-------	*(0.139)*	*(0.334)*
61 +	-------	-------	-------	-0.3914**	1.1033**
	-------	-------	-------	*(0.190)*	*(0.459)*
Gender (*Ref: Female*)					
Male	-------	-------	-------	-0.1718	-0.2910
	-------	-------	-------	*(0.116)*	*(0.235)*
Employment (*Ref: Employed*)					
Unemployed	-------	-------	-------	-0.3538*	-0.3946
	-------	-------	-------	*(0.181)*	*(0.539)*
Retired	-------	-------	-------	-0.0686	-0.4939
	-------	-------	-------	*(0.183)*	*(0.377)*
Degree (*Ref: No*)					
Yes	-------	-------	-------	0.0760	-0.2589
	-------	-------	-------	*(0.118)*	*(0.268)*
Location (*Ref: Urban*)					
Rural	-------	-------	-------	-0.2404	-0.3603
	-------	-------	-------	*(0.154)*	*(0.421)*
Bill Payer (*Ref: No*)					
Yes	-------	-------	-------	0.1524	-0.4546
	-------	-------	-------	*(0.181)*	*(0.319)*
Bill Discount (*Ref: No*)					
Yes	-------	-------	-------	0.3006**	-0.0290
	-------	-------	-------	*(0.128)*	*(0.305)*
Observations	7,200	6,000	1,200	5,688	1,140
Participants	600	500	100	474	95

Table D.1 Results of ordered logistic models for Stage 2 with log odds reported

Appendix E – Parametric Analysis of Stage 3

In this section we report the results of statistical analyses which aim to isolate individual effects of the price trajectory manipulations in Stage 3 on participant's acceptance rating for price trajectories, including interaction effects between Stages 3a and 3b. We treat the range of ratings (from 1 - 7) that participants could have given to each price trajectory as ordinal. We ran an ordered logistic regression with rating as the dependent variable and the manipulations across price trajectories as independent variables. Any meaningful effects of order, platform or demographics in this stage are reported in Appendices F-J.

In Models 1 and 2 we report the main effects of Stages 3a and 3b separately. In Model 3, we incorporate both stages into one model. In Models 1, 2 and 3 we initially included the variable "*Online*" which distinguished between the online and face-to-face studies. Including this variable led to the model failing standard assumption checks for ordered logistic regression models, as in the models for Study 2. As such Models 4 and 5 report the results of ordered logistic regressions separately for online and face-to-face studies respectively and Models 6 and 7 repeat these to include demographic information (although these models fails standard assumption checks for ordered logistic regression models).

Again, the models in Table E.1 below broadly support the summary statistics. Models 1 and 2 show that preferences for price trajectories follow the same directions in Stages 3a and 3b, but the magnitude of effect size differs. The particular finding of interest in Stage 3 is reiterated in parametric analysis: Front-Loaded trajectories were preferred to Constant in Stage 3a and 3b ($p< 0.001$, $p= 0.029$, respectively), the opposite to Stage 2.

Models 3-7 compared the magnitude of effect sizes across Stages 3a and 3b. These effects are observed in the "*Stage 3b **" interaction effects for each price trajectory type. Model 3 highlights that the preference for Front-Loaded over Constant is reduced for Stage 3b ($p= 0.069$). The magnitude of reduced preference for Back-Loaded trajectories over Constant is also reduced in Stage 3b ($p<0.001$). There appears no difference in the magnitude of disparity between preferences for Percentage over Pound across Stage 3 type ($p= 0.946$). The magnitude of reduced preference of High Cost relative to Low Cost is greater in Stage 3b ($p= 0.015$). A preference for Front-Loaded over Constant trajectories is only significant for online participants in Model 4 ($p< 0.001$), but not face-to-face participants in Model 5 ($p= 0.390$). Overall, these finding are supportive of the summary statistics, and are not substantially changed incorporating demographic effects.

Price Trajectory Rating	**Model 1** Stage 3a	**Model 2** Stage 3b	**Model 3** Stage 3 All	**Model 4** Stage 3 All	**Model 5** Stage 3 All	**Model 6** Stage 3 All + Demographics	**Model 7** Stage 3 All + Demographics
	All	All	All	Online	Face-to-Face	Online	Face-to-Face
Pattern (*Ref: Constant*)							
Front-Loaded	0.2576***	0.1091**	0.2554***	0.2812***	0.1683	0.2990***	0.2330
	(0.065)	*(0.050)*	*(0.064)*	*(0.067)*	*(0.196)*	*(0.072)*	*(0.213)*
Back-Loaded	-1.4966***	-0.8517***	-1.5056***	-1.4344***	-1.8693***	-1.5295***	-1.9296***
	(0.089)	*(0.069)*	*(0.087)*	*(0.093)*	*(0.223)*	*(0.099)*	*(0.242)*
Format (*Ref: Pound*)							
Percentage	0.1421***	0.1462***	0.1421***	0.1311**	0.2645**	0.1552***	0.2868**
	(0.048)	*(0.041)*	*(0.048)*	*(0.052)*	*(0.124)*	*(0.056)*	*(0.134)*
Price Level (*Ref: Low Cost*)							
High Cost	-1.1171***	-1.3497***	-1.1176***	-1.1092***	-1.2395***	-1.1928***	-1.2735***
	(0.067)	*(0.080)*	*(0.064)*	*(0.072)*	*(0.155)*	*(0.076)*	*(0.170)*
Stage (*Ref: Stage 3a*)							
Stage 3b	-------	-------	-0.1388	-0.1892	0.1047	-0.1552	0.2727
	-------	-------	*(0.129)*	*(0.142)*	*(0.311)*	*(0.157)*	*(0.378)*
Pattern (*Ref: Constant*)							
Stage 3b * Front-Loaded	-------	-------	-0.1467*	-0.1345	-0.2161	-0.1865**	-0.2877
	-------	-------	*(0.081)*	*(0.084)*	*(0.244)*	*(0.090)*	*(0.265)*
Stage 3b * Back-Loaded	-------	-------	0.6581***	0.6378***	0.7901***	0.6871***	0.7048***
	-------	-------	*(0.104)*	*(0.111)*	*(0.244)*	*(0.118)*	*(0.274)*
Format (*Ref: Pound*)							
Stage 3b * Percentage	-------	-------	0.0042	0.0151	-0.1463	-0.0069	-0.1517
	-------	-------	*(0.063)*	*(0.068)*	*(0.159)*	*(0.072)*	*(0.182)*
Price Level (*Ref: Low Cost*)							
Stage 3b * High Cost	-------	-------	-0.2254**	-0.2335**	-0.1404	-0.2184**	-0.2238
	-------	-------	*(0.092)*	*(0.104)*	*(0.193)*	*(0.111)*	*(0.211)*
Online (*Ref: No)*							
Yes	-0.1345	-0.4065*	-0.2740*	-------	-------	-------	-------
	(0.221)	*(0.234)*	*(0.162)*	-------	-------	-------	-------
Primacy (*Ref: Order = 2 - 12)*							
Order = 1	0.0237	-0.0839	-0.0304	-0.0401	0.0331	-0.0440	0.0342
	(0.086)	*(0.083)*	*(0.060)*	*(0.067)*	*(0.129)*	*(0.071)*	*(0.155)*
Order (*Ref: Order = 1*)							
	-0.0154*	-0.0169**	-0.0162***	-0.0080	-0.0522***	-0.0081	-0.0518***
	(0.008)	*(0.007)*	*(0.005)*	*(0.006)*	*(0.014)*	*(0.006)*	*(0.015)*
Log(Inflation Estimate)							
	-------	-------	-------	-------	-------	0.2208**	-0.0143
	-------	-------	-------	-------	-------	*(0.101)*	*(0.219)*
CT Band (*Ref: A / B / C*)							
D / E	-------	-------	-------	-------	-------	0.2381	-0.0056
	-------	-------	-------	-------	-------	*(0.147)*	*(0.306)*
F / G / H	-------	-------	-------	-------	-------	-0.0565	-0.0098
	-------	-------	-------	-------	-------	*(0.189)*	*(0.388)*
Age (*Ref: 18 – 40*)							
41 - 60	-------	-------	-------	-------	-------	-0.4818***	0.6004
	-------	-------	-------	-------	-------	*(0.151)*	*(0.411)*
61 +	-------	-------	-------	-------	-------	-0.2604	0.8307
	-------	-------	-------	-------	-------	*(0.230)*	*(0.509)*
Gender (*Ref: Female*)							
Male	-------	-------	-------	-------	-------	0.0503	-0.2520
	-------	-------	-------	-------	-------	*(0.124)*	*(0.302)*
Employment (*Ref: Employed*)							
Unemployed	-------	-------	-------	-------	-------	-0.3077	-0.2330
	-------	-------	-------	-------	-------	*(0.236)*	*(0.742)*
Retired	-------	-------	-------	-------	-------	-0.2350	-0.3277
	-------	-------	-------	-------	-------	*(0.215)*	*(0.444)*
Degree (*Ref: No*)							
Yes	-------	-------	-------	-------	-------	0.0413	-0.2338
	-------	-------	-------	-------	-------	*(0.125)*	*(0.322)*
Location (*Ref: Urban*)							
Rural	-------	-------	-------	-------	-------	-0.1541	-0.2095
	-------	-------	-------	-------	-------	*(0.166)*	*(0.480)*
Bill Payer (*Ref: No*)							
Yes	-------	-------	-------	-------	-------	0.2344	-0.8013**
	-------	-------	-------	-------	-------	*(0.209)*	*(0.391)*
Bill Discount (*Ref: No*)							
Yes	-------	-------	-------	-------	-------	0.0810	0.3976
	-------	-------	-------	-------	-------	*(0.136)*	*(0.392)*
Observations	3,516	3,684	7,200	6,000	1,200	5,688	1,140
Participants	293	307	600	500	100	474	95

Table E.1. Results of ordered logistic models for Stage 3 with log odds reported

Appendix F - Order Effects

In Stages 2 and 3 the order in which price trajectories were presented to participants was randomised. The presence of order effects (where systematic differences in responses based on the order in which price trajectories were presented) is important to test for. Whilst a general finding of order effects should not hinder the main findings of this study, it would be an interesting finding from a methodological perspective. Order effects could potentially present an issue if the order in which different types of trajectories were presented systematically influenced the relative preferences for different trajectory types, however.

In an additional attempt to reduce the likelihood of order effects, participants saw all twelve price trajectories that they were to rate in each stage prior to the rating tasks. The purpose of this was to make participants familiar with the entire range of different price trajectories prior to the rating task.

A first test of order effects is whether the type of price trajectory seen first influenced consequent rating throughout the remaining tasks. Table F.1 below tests for differences in the mean ratings across all twelve tasks of Stage 2, by the type of trajectory that was rated first. As can be seen, there were no significant differences in overall mean ratings by pattern, format or size of the first rated trajectory.

First Price Trajectory Type	Mean (*se*)	First Price Trajectory Type	Mean (*se*)	t-Test *t*-stat	t-Test *p*-value
Constant (*n*= 207)	3.845 (*0.080*)	**Front Loaded (*n*= 195)**	3.805 (*0.083*)	0.347	0.729
Constant (*n*= 207)	3.845 (*0.080*)	**Back Loaded (*n*= 198)**	3.776 (*0.080*)	0.611	0.541
Front Loaded (*n*= 195)	3.805 (*0.083*)	**Back Loaded (*n*= 198)**	3.776 (*0.080*)	0.253	0.801
Pound (*n*= 295)	3.820 (*0.067*)	**Percentage (*n*= 305)**	3.799 (*0.065*)	0.227	0.820
Low Cost (*n*= 302)	3.767 (*0.061*)	**High Cost (*n*= 298)**	3.852 (*0.071*)	-0.913	0.362

Table F.1. Mean ratings of all price trajectories by first viewed trajectory type in Stage 2

A second test measures the differences in average ratings of the first viewed price trajectory by different trajectory types. In the absence of order effects, it would be expected that the overall differences between trajectory types should be true across the first viewed trajectories too. If these differences were not present in the first rated trajectories, this might suggest that participants are adapting their preferences as they move through the rating tasks – suggesting

that the order in which these were presented might matter. Table F.2 below tests for differences in ratings of the first rated trajectory by trajectory type. As can be seen, differences for first viewed trajectories were broadly in line with overall differences by price trajectory type, and differences were statistically significant (with the exception of no evidence of a difference between Constant and Front-Loaded trajectories). The finding of similar responses is encouraging – it suggests that objective differences between price trajectories were perceived during the first rating task, in a consistent pattern across participants.

First Price Trajectory Type	**Mean (*se*)**	**First Price Trajectory Type**	**Mean (*se*)**	**t-Test**	
				***t*-stat**	***p*-value**
Constant (*n= 207*)	4.319 (*0.116*)	**Front Loaded (*n= 195*)**	4.323 (*0.119*)	-0.026	0.980
Constant (*n= 207*)	4.319 (*0.116*)	**Back Loaded (*n= 198*)**	3.596 (*0.117*)	4.400	**< 0.001**
Front Loaded (*n= 195*)	4.323 (*0.119*)	**Back Loaded (*n= 198*)**	3.596 (*0.117*)	4.360	**< 0.001**
Pound (*n= 295*)	3.902 (*0.099*)	**Percentage (*n= 305*)**	4.256 (*0.096*)	-2.579	**0.010**
Low Cost (*n= 302*)	4.361 (*0.094*)	**High Cost (*n= 298*)**	3.799 (*0.098*)	4.131	**< 0.001**

Table F.2. Mean ratings of first viewed price trajectory by first viewed trajectory type in Stage 2

From the above findings, it is clear that order effects did not substantively affect the main findings of the study. However, it is still of interest to test whether order effects occurred more generally. This would be the case if ratings were higher for earlier tasks than later ones. Figure F.1 reports the mean rating for price trajectories in Stage 2 by the order in which they were presented to participants. There is evidence of general order effects, with a general downward decline in ratings as order increases. For example, the price trajectory rated first was rated significantly higher (4.082) than the average of all other price trajectories (3.785) (t= 4.859, p< 0.001).

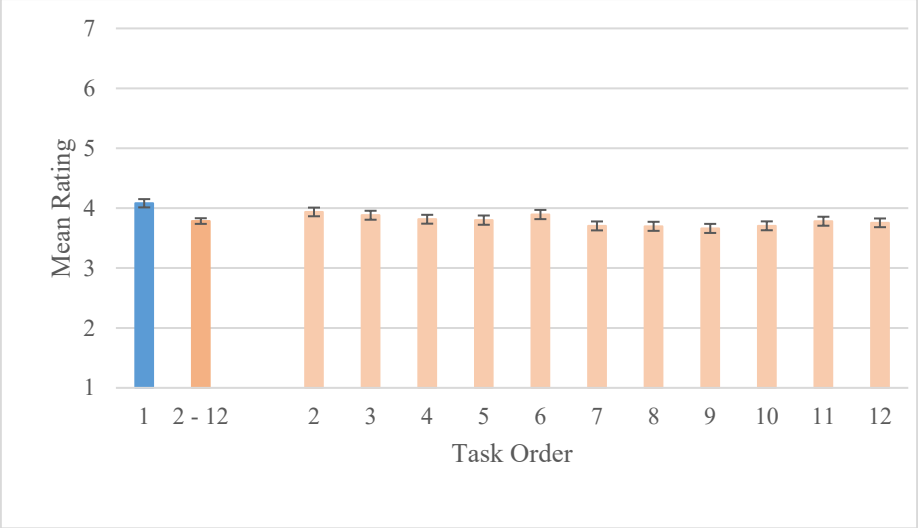

Figure F.1. Mean rating of price trajectories by task order

Incorporating the effect of order into the parametric models of Stages 2 and 3 in Appendices D and E report the degree to which order effects influenced ratings. In these, we report both order effects (measuring a general change in ratings as order progresses) and primacy effects (measuring an additional effect for the very first rated trajectory). The order in which trajectories were presented was kept the same for each participant in both Stages 2 and 3. In general, for Stage 2 as seen in Model 1 in Table D.1, there is evidence of a general order effect (0.006), where trajectories rated later were rated as less acceptable. In addition there was evidence of a primacy effect, where the positive effect of order was stronger still for the first rated price trajectory (p= 0.014). Whilst these effects are only significant for online participants and not face-to-face participants, the effect sizes are similar across study types, suggesting this lack of statistical significance may be due to a smaller sample size for face-to-face participants. In Stage 3, evidence of primacy effects disappeared but general order effects persisted, as seen in Table E.1. However, it is interesting to note that these order effects persisted only for face-to-face participants (p< 0.001) and not online participants (p= 0.171). Importantly, the presence of order effects does not diminish the main findings of the study in the models.

Appendix G - Online vs. Face-to-Face

Since this study was conducted both online and face-to-face, it was important to test whether responses were systematically different across platform type. In general, the demographic characteristics between the two platform types were similar. Given our categorisation of demographic information, online and face-to-face participants did not differ by council tax group (χ^2= 0.497, p= 0.780), gender (χ^2= 0.028, p= 0.867), employment type (χ^2= 0.478, p= 0.787), educational attainment (χ^2= 0.335, p= 0.563), rural/ urban location (χ^2= 2.210, p= 0.137) or whether the main bill payer (χ^2= 2.145, p= 0.143). A greater proportion of online participants were older (χ^2= 5.935, p= 0.051) and were in receipt of council tax discount (χ^2= 2.985, p= 0.084), relative to face-to-face participants.

Stage 1

In Stage 1, as can be seen in Table G.1 below, choice responses were no different across platform types (z= 1.368, p= 0.171). Similarly including a variable for platform type ("*Online*") in parametric analysis in Appendix A shows no difference in either price change measure.

Money		**Inflation**	**All**	**Online**	**Face-to-Face**
Decrease by £5.01-£10.00	1	Decrease by a lot	26	20	6
Decrease by £0.01-£5.00	2	Decrease by a little	47	36	11
No change	3	No change	280	234	46
Increase by £0.01-£5.00	4	Increase by less than inflation	141	120	21
Increase by £5.01-£10.00	5	Increase at inflation	81	67	14
Increase by £10.01-£15.00	6	Increase a little more than inflation	19	17	2
Increase by £15.01-£20.00	7	Increase a lot more than inflation	6	6	0
N			600	500	100
Median			3	3	3
Mann-Whitney Test				z= 1.368	p= 0.171

Table G.1. Comparison of responses by platform type in Stage 1

Stages 2 and 3

In Stages 2 and 3 there is evidence of significant differences in responses by platform type. Overall, average ratings were significantly higher for participants in face-to-face than online in both Stage 2 (t= 1.748, p= 0.081) and Stage 3 (t= 2.023, p= 0.044). Within the stages, the relative difference across price trajectory types follow the same pattern, but the overall absolute

rating is greater in face-to-face studies than online. This suggests that the effect is related to the platform type itself more generally and not specific to certain manipulations within the study. This evidence of an effect of platform type is echoed in the parametric analyses for Stages 2 and 3 in Appendices D and E respectively.

It is also of interest to compare the distributions of responses of different platform types. Figures G.1 – G.4 report histograms of rating for Stages 2 and 3 by platform type.

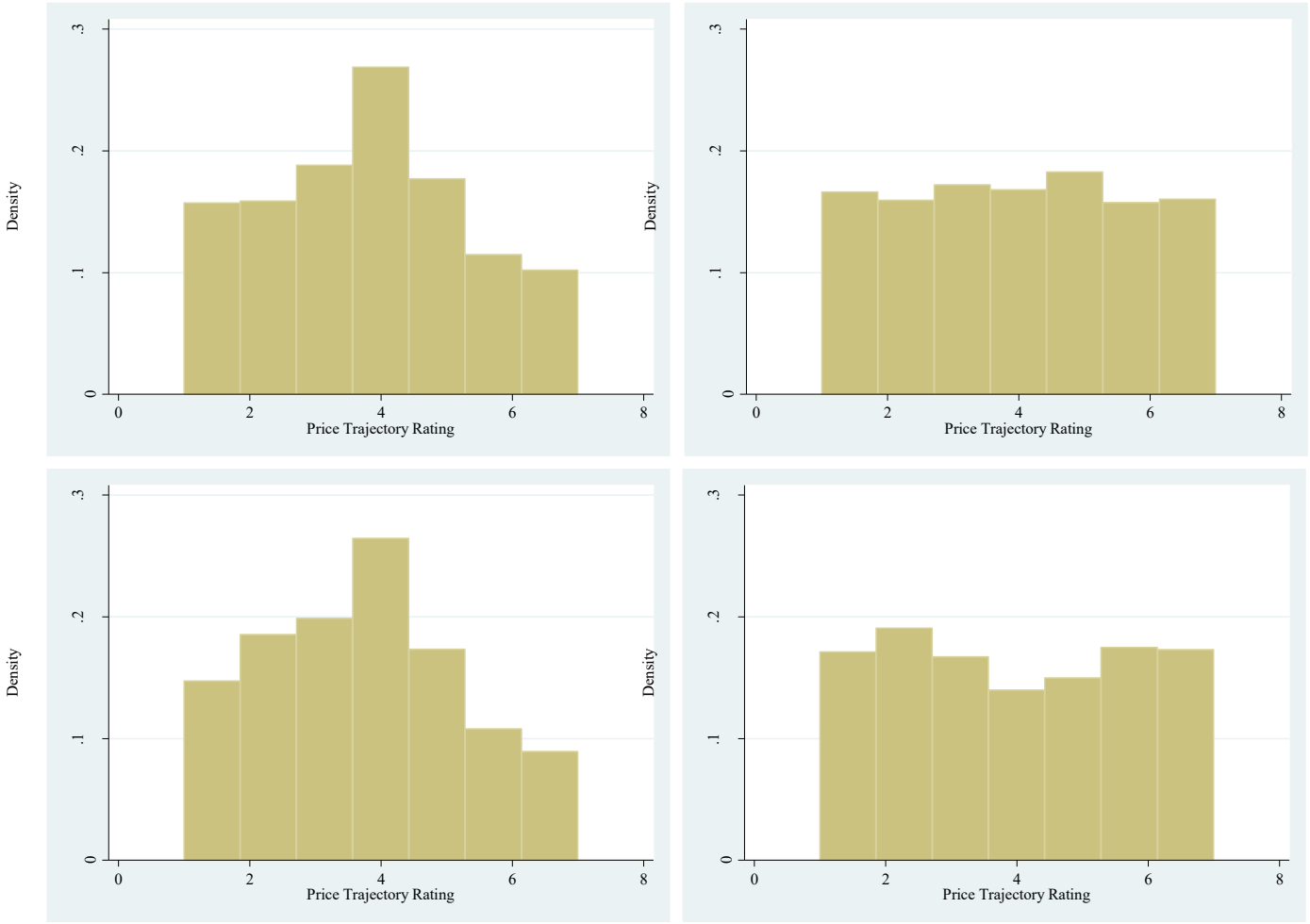

Figure G.1. (*top left*) Histogram of the ratings of online participants in Stage 2
Figure G.2. (*top right*) Histogram of the ratings of face-to-face participants in Stage 2
Figure G.3. (*bottom left*) Histogram of the ratings of online participants in Stage 3
Figure G.4. (*bottom right*) Histogram of the ratings of face-to-face participants in Stage 3

As can be seen from the histograms above, there is a much greater tendency to select the mid-point (i.e. a rating of 4) for online participants than face-to-face participants in both Stages 2 and 3. For a more detailed analysis, Table G.2 below reports the percentage of rating selection

by platform type. When categorised into three options: a rating between 1-3, a rating of 4 and a rating of 5-7, it is clear that there is very little difference in the proportion of price trajectories rated between 1-3 across online and face-to-face for both Stage 2 (43.2%, 42.7%, respectively) and Stage 3 (45.5%, 45.3%, respectively). As seen in the histograms above, there is a much larger occurrence of a rating of 4 for online participants across both stages. Additionally, there was a reduced tendency for online participants to rate price trajectories between 5-7 than face-to-face participants for both Stage 2 (33.8%, 42.9%, respectively) and Stage 3 (31.8%, 42.7%).

	Stage 2				**Stage 3**			
	Online		**Face-to-Face**		**Online**		**Face-to-Face**	
Rating	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**
1	809	13.5	171	14.2	758	12.6	176	14.7
2	816	13.6	164	13.7	953	15.9	196	16.3
3	968	16.1	177	14.8	1022	17.0	172	14.3
4	1382	23.0	173	14.4	1360	22.7	144	12.0
5	910	15.2	188	15.7	892	14.9	154	12.8
6	590	9.8	162	13.5	555	9.3	180	15.0
7	525	8.8	165	13.8	460	7.7	178	14.8
1 – 3	2593	43.2	512	42.7	2733	45.5	544	45.3
4	1382	23.0	173	14.4	1360	22.7	144	12.0
5 – 7	2025	33.8	515	42.9	1907	31.8	512	42.7

Table G.2. Summary statistics of price trajectory ratings by platform type across Stage 2 and Stage 3

Additional analysis reveals that, in Stage 2, 33.0% of face-to-face participants used the full scale (i.e. rated at least one price trajectory as the minimum 1 and at least one as the maximum 7), whereas only 17.6% of online participants did the same, a statistically significant difference (χ^2= 12.276, p< 0.001). This is finding appears driven by both upper and lower ratings, with face-to-face participants significantly more likely to give the minimum rating of 1 to at least one price trajectory (58.0%) than online participants (46.8%) (χ^2= 4.184, p= 0.041) and significantly more likely to give the maximum rating of 7 to at least one price trajectory (58.0%) than online participants (37.8%) (χ^2= 14.040, p< 0.001).

Overall, this suggests two things. The first is that face-to-face participants were more likely to give price trajectories a higher rating than online participants, and the second is that face-to-

face participants were more likely to make use of the full rating scale. This second finding implies that face-to-face participants were distinguishing more between individual price trajectories. This is possibly a result of participants in the face-to-face study engaging more with the rating tasks, and consequently discerning greater differences between each trajectory.

Appendix H – Council Tax Bands

As water charges in Scotland are fixed according to a property's council tax band, participants were asked to provide their council tax band to provide personalised prices for each participant in Stages 2 and 3. Table H.1 below outlines the cost of water at time "Now" for each council tax band, which is the 2018/19 annual cost of water in Scotland[8].

As there were concerns that participants would not know their council band, a link to the Scottish Assessors Association website (www.saa.gov.uk) was provided, where participants could enter their address to find their own council tax band. More than one-quarter of participants (25.7%) availed of this service, suggesting that a substantial number of citizens in Scotland are unaware of their current council tax band. For those who were still unsure of their council tax band, an "I don't know" option was provided, and 11.7% of participants selected this option (it should be noted that, of the 70 participants who selected "I don't know", only 2 attempted to use the Scottish Assessors Association website). For the purpose of setting personalised water charges in Stages 2 and 3, participants who selected "I don't know" were randomly assigned into either council tax band C or F.

Table H.1 below outlines the distribution of participants by selected council tax bands. Also included is the distribution of council tax bands across all registered properties in Scotland for comparison[9]. As can be seen, compared to the national distribution, there was relatively fewer participants with properties at lower council tax bands.

	Council Tax Band								
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**"I don't know"**
Annual Cost	£291.60	£340.20	£388.80	£437.40	£534.60	£631.80	£729.00	£874.80	N/A
Study (n)	45	93	100	126	71	56	34	5	70
Study (%)	8.5	17.5	18.9	23.8	13.4	10.6	6.4	0.9	N/A
National (%)	20.9	22.9	16.1	13.4	13.4	7.7	4.9	0.5	N/A

Table H.1. Distribution of council tax bands by study and national level

[8] Taken from: Scottish Water, 2018, *Unmetered Charges 2018-2019*, [online] Scottish Water, Available at: <https://www.scottishwater.co.uk/you-and-your-home/your-charges/2018-19-charges/2018-19-umc> [Accessed 05/11/2018]

[9] Taken from: Scottish Assessors Association, 2018, *Report 3 – Council Tax by Assessor/ Local Authority/ Council Tax Band*, [online] Scottish Assessors Association, Available at: <https:// https://www.saa.gov.uk/general-statistics/?REPORT_NAME=ct_band#report_list > [Accessed 05/11/2018]

It is possible that the general acceptance of price rises in this study is an overestimation of the true population since the average council tax band is higher in the study than the national average. However, it is possible to measure whether differences exist between responses based on council tax band within this sample population. In terms of effect of council tax band on responses in this study, there was little consistent evidence that preferences differed by council tax band.

Due to the large number of possible council tax bands, these have been condensed into three roughly equivalent groups – CTQ 1 (bands A/B/C), CTQ 2 (bands D/E), CTQ 3 (bands F/G/H) as well as a fourth group – CTQ 4 ("I don't know"). Overall, as can be seen in Appendices A, D and E, there is little consistent evidence of council tax band influencing rating decisions in Stages 1, 2 and 3.

Appendix I – Inflation Estimation

In the demographic questionnaire at the end of the study we asked participants to provide their best guess for the current rate of inflation in the United Kingdom at the present time. We were interested in whether perceptions of inflation could influence decision making across the study. The manipulation of the description of response options in Stage 1 specifically tested for an effect of *money illusion* in decision making, and it was envisaged that inflation rate perceptions could directly influence responses here. It is also plausible that perceptions of inflation might influence ratings of acceptance of price changes over time in Stages 2 and 3 also.

Overall, 95.7% of all participants answered this question with a numerical value, and responses were heavily right-skewed (as is common with responses to inflation rates, e.g. Duffy and Lunn, 2009) ranging from 0% - 1000%. Particularly at the upper end of responses, some responses were clearly not plausible answers and so the five responses which reported annual inflation at greater than 50% were removed. Of the remaining data the five-percent Winsorized-mean[10] was 3.55%. The median response was 2.50%. Participants in this study were considerably more accurate in their estimation of current inflation levels than other studies (e.g. Duffy and Lunn, 2009). Since the study duration overlapped between the monthly announcements of two inflation figures, the rate of inflation in the UK during the study varied between 2.50% - 2.70%[11]. 16.8% of participants responded with an answer that lay between these figures. Responses did not differ significantly by study type (z= 1.251, p= 0.211), so it is unlikely that this finding is being driven by online participants consulting external sources, such as the internet, prior to responding.

There was no significant evidence of inflation estimation affecting overall responses in Stage 1 in Appendix A. There is some evidence of perception of inflation systematically influencing responses in Stage 2 and 3 for online respondents in Appendices D and E (the logarithmic transformation of inflation was used to address persisting right-skew of responses). Those who had a higher inflation estimation on average rated price trajectories as higher (p= 0.064, p=

[10] Winsorizing addresses outliers in a distribution by adjusting those that fall beyond a certain parameter to equal to the value of a pre-determined percentile. In this case, a 5% Winsorized-mean adjusted the lowest five percent of responses to equal the value at the fifth-percentile (0.75%) and the highest five percent of responses to equal the value at the ninety-fifth percentile (15%). An alternative method would be the trimmed-mean (which omits the lowest and highest five percent of responses). The trimmed mean of responses here was 3.06%. In this case we use a Winsorized-mean as it reduces the number of omitted responses for statistical analysis.

[11] Taken from: Office for National Statistics, 2018, *CPI Annual Rate 00: All Items 2015=100*, [online] Office for National Statistics, Available at: < https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/d7g7/mm23 > [Accessed 06/11/2018]

0.029). However, this was not the case for face-to-face respondents, and in fact for these the effect on average occurred in the opposing direction.

Appendix J - Demographic Effects

In general, the parametric models presented in Appendices A, D and E show few systematic effects of general demographic information across Stages 1, 2 and 3. Below we report any consistent and statistically significant differences in responses throughout the study, which may be of potential importance for policy makers.

Age: There was conflicting evidence of age on responses, dependent on platform type. On average, younger participants (aged 18-40) rated the price trajectories as less acceptable in Stages 2 and 3 than those aged 41-60 or 61+ in face-to-face studies, although this was only statistically significant for those aged 61+ in Stage 2 (p= 0.016). Conversely, younger participants rated the price trajectories as more acceptable, and statistically significantly, in online studies in Stages 2 and 3 than those aged 41-60 (p= 0.002, p= 0.001, respectively) or 61+ (p= 0.040, p= 0.258, respectively).

Gender: Overall there was little evidence of systematic differences in responses across the study by gender.

Employment: Unemployed participants (including those reporting as being in full time education) were less likely to choose any price rise in Stage 1 as seen in Appendix A (p= 0.036), as were retired participants (p= 0.006). There was little significant evidence of employment effects in Stages 2 and 3.

Educational Attainment: In Stage 1, those educated to degree level were significantly more likely to choose a price increase at or above the rate of inflation than those without a degree (p= 0.023), although this was not true for any price increase (p= 0.621). Tentatively, this suggests that those educated to a degree level are more likely to perceive prices in real, rather than nominal terms. There was no effect of education in Stages 2 and 3.

Location: On average, those who lived in rural areas rated price trajectories as less acceptable, but these effects were not statistically significant for individual stages or platform types.

Bill Payer/ Bill Discount: There was some evidence that face-to-face bill payers rated price trajectories as less acceptable, but this was only statistically significant in Stage 3 (p= 0.040). Overall, on average participants in receipt of a council tax discount rated price trajectories as more acceptable, but this was only statistically significant for online participants in Stage 2 (p= 0.019).

References

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Williams, R. (2016), Understanding and interpreting generalized ordered logit models, *Journal of Mathematical Sociology*, *40*(1), 7-20