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# Estimating Customers' Willingness to Pay for Sustainable Abstraction at PR24

Prepared for Wessex Water

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# Executive Summary

NERA Economic Consulting (NERA) and Qa Research (Qa) were commissioned by Wessex Water (WW) to design, implement, and analyse a survey to estimate customers' preferences regarding six different methods that WW could adopt to improve the sustainability of its abstraction activities, as well as customers' preferences towards Sustainable Abstraction (SA) in general. This SA survey is Phase II of WW's PR24 customer valuation research and follows directly from Phase I, which examined customer preferences for improvement over a broader set of service attributes.

## Design of Stated Preferences Survey

Before implementing the survey, WW identified six different methods of intervention that could reduce the amount of water it needs to abstract from the environment (see Table 1 below). We carried our additional research with WW to identify the different service levels that WW could achieve for each method and the cost of each service level, as well as to design showcards with additional information about each method.

**Table 1: We Examined Customer Preferences Over Six Methods to Improve the Sustainability of WW's Abstraction**

| Method | | Abbreviation |
|---|---|---|
| 1 | Reducing leakage from water supply pipes | Leakage |
| 2 | Supporting household customers to reduce the amount of water they use at home | HH Support |
| 3 | Supporting businesses and other organisations to reduce the amount of water they use | NHH Support |
| 4 | Switching customers to smart water meters | Smart Meters |
| 5 | Seeking changes to laws and legislation to introduce water efficiency labelling for domestic appliances and make all new homes more water efficient | Regulation |
| 6 | Creating a new reservoir from a former quarry as a new source of water | Reservoir |

*Source: Qa.*[1]

In order to address the research questions of this study, we developed a multi-part survey with five distinct stated preference exercise, which appear in a logical sequence and present customers with varying features of the decision problem, specifically:

- Whether customers were constrained to meet a target set by WW of improving SA by 10 megalitres per day (ML/d) (Exercises 1, 3 and 5) or could freely choose the total amount of improvement between 0 and 50 ML/d (Exercises 2 and 4);
- How much information customers were given about the six methods (with the showcards presented to customers after Exercises 1 and 2); and
- Whether customers faced a simplified and stylised decision problem with fixed unit bill impacts for each method (i.e., £ per ML/d) where they could choose any amount of each method (Exercises 1-4), or a faced a decision problem that more realistically reflected

[1] Qa, Wessex Water Sustainable Abstraction Survey 2023 – Main Version.

WW's actual planning problems accounting for methods' variable unit bill impacts and physical constraints (Exercise 5).

Over a period of approximately one month (from 23 March to 17 April), we collected stated preference data from 2827 of WW's household customers, and performed the analysis on 2,745 responses due to data quality issues.

## Main Results and Conclusions

Below we set out in detail the six research questions agreed with WW, and discuss in turn the answers obtained in this study, based on our econometric analysis of the survey data we gathered.

1. **How much are customers willing to pay per unit of each method when they are required to meet a SA target?**
2. **How much are customers willing to pay per unit of each method when they are not required to meet a SA target?**

We find that for five of the six methods of SA, customers' selected volumes of SA improvement is not sensitive to the bill impacts they face within the survey to select higher or lower levels of it. Hence, we conclude that customers are willing to pay a price per ML/d up to the maximum bill impact per ML/d shown in the survey, up to their preferred total level of ML/d (see Table 2), with no evidence that their willingness to pay diminishes over this range. For instance, this means that when customers are presented with WW's target of 10 ML/d, they are willing to pay at least £2.22 per ML/d to improve SA by 3 ML/d (£6.66 in total) through leakage reduction.

**Table 2: Customers have a Constant WTP per ML/d for Five of Six Methods, up to their Preferred Level of ML/d**

| | | Preferred level (ML/d) | |
|---|---|---|---|
| **Method** | **WTP (£ per ML/d)** | **To achieve target 10 ML/d** | **Without target** |
| Leakage Reduction | 2.22 | 3 | 12 |
| HH Support | 0.34 | 1 | 4 |
| NHH Support | 0.09 | 1.5 | 5 |
| Smart Meters | 1.35 | 1 | 3.5 |
| Regulation | 0.16 | 1 | 3.5 |

*Source: NERA analysis of survey responses (Exercises 3 and 4).*

For the sixth method of SA (building a new water reservoir), we find that customers' likelihood of selecting this option does depend on its impact on the bill they would face as a result. This suggests that customers see a trade-off between price and ML/d of water saved through building a reservoir: the higher the price of each ML/d the fewer ML/d they want, and similarly, the higher the total amount of ML/d saved through building a reservoir, the lower their WTP for one additional ML/d to be saved.

Table 3 reports customers' WTP for one additional ML/d to be saved through building a reservoir. For example, looking at the second column, the table suggests that, to achieve the target, customers are willing to pay £1.96 per ML/d for the first ML/d saved and a further £0.46 per ML/d for the second unit. Therefore, if WW were to build a reservoir to reduce abstraction by 2 ML/d in total, then the average customer would be WTP in total an additional £2.42 per year on their bill to fund this.

**Table 3: Customers' WTP per ML/d of a Reservoir Changes with the Total Amount of ML/d Saved**

| | WTP (£ per ML/d) | |
|---|---|---|
| **Water saved (ML/d)** | **To achieve target 10 ML/d** | **Without target** |
| 1 | 1.96 | 2.68 |
| 2 | 0.46 | 2.35 |
| 3 | 0 | 2.02 |
| 4 | 0 | 1.69 |
| 5 | 0 | 1.37 |
| 6 | 0 | 1.04 |
| 7 | 0 | 0.71 |
| 8 | 0 | 0.38 |
| 9 | 0 | 0.05 |
| 10 | 0 | 0 |

*Source: NERA analysis of survey responses (Exercises 3 and 4).*

Regarding the relative preferences expressed by customers between these alternative options, the evidence suggests that customers tend to place most value on leakage reduction and reservoir construction, with less value in £ per ML/day of SA improvement placed on the alternatives.

**3. How much are customers willing to pay per unit of SA?**

**4. Is there evidence that customers do not have strong preferences between methods, but rather want WW to meet the SA target in the least expensive way possible?**

We find evidence that customers are willing to pay for WW to invest to improve the sustainability of its abstraction activities by more than its 10 ML/d target. When customers were not restricted to select 10 ML/d, they typically chose a materially higher amount of SA. On average, customers selected 35.1 ML/d and 36.3 ML/d in Exercises 2 and 4, respectively, increasing the total annual bill by £23 in both. Further, approximately 50 per cent of customers chose the maximum allowable amount of water saved of 50 ML/d.

The evidence does not suggest that customers prefer WW to meet the SA target in the least expensive way possible. In general, customers would like WW to achieve SA primarily through leakage reduction, which is typically the most expensive method offered.

Since customers do not see the methods as substitutable, we conclude that it would not be accurate to aggregate customers' preferences for different methods to derive a single, common WTP estimate for SA improvement, per se. This is because, for example, customers' WTP for leakage reduction also reflects other characteristics of that method (e.g., that it requires action from WW rather than consumers, or that the impact seems more certain) which value we cannot disentangle from the value customers place on leakage reduction purely based on how much SA it can deliver.

Therefore, we do not estimate a single, common WTP for SA. Instead, we recommend that WW rely on the estimated WTP for each method, alongside the descriptive evidence that customers do want a higher level of SA than the target 10 ML/d.

**5. How do the answers to the above questions change once customers learn more about SA and about each method?**

We tested whether customers' preferences changed after we presented them with additional information about each of the six methods of SA. We find that the information resulted in a small but statistically significant change in customers' preferences:

- When constrained to meet the 10 ML/d target, customers moved approximately 0.2 ML/d from leakage reduction and the reservoir to HH and NHH support.
- When customers could freely choose their preferred amount of SA, they again chose less leakage reduction (by 0.2 ML/d) and more HH and NHH support (by 0.4 and 0.7 ML/d, respectively), but also more reservoir construction and "regulation" (by 0.1 and 0.2 ML/d, respectively), overall increasing the total amount of SA selected by approximately 1.2 ML/d. However, since customers tended to reduce the amount to be delivered by the most expensive option (i.e., leakage reduction), the total bill impact did not increase.

Overall, this suggests that once customers become more informed about the methods, they are slightly more willing to select less expensive methods to achieve more improvement in SA for the same overall bill impact.

**6. How would customers solve WW's planning problem?**

Finally, we tested whether customers' preferences changed when faced with a choice exercise that more realistically reflected the costs and feasibility constraints of WW's actual planning problem to achieve its 10 ML/d target. Overall, we find similar results to those expressed in the preceding exercises. Customers still want WW to achieve the target improvement in SA through a mix of methods which prioritises leakage reduction, with an average impact on their annual bill of £6.

# 1. Introduction

NERA Economic Consulting (NERA) and Qa Research (Qa) were commissioned by Wessex Water (WW) to design, implement, and analyse a survey to estimate customers' preferences regarding six different methods that WW could adopt to improve the sustainability of its abstraction activities.[2] This Sustainable Abstraction (SA) survey is part of "Phase II" of WW's PR24 customer valuation research and follows directly from Phase I, which examined customer preferences for improvement over a broader set of service attributes.

In Phase I, we found that WW customers were willing to pay for improvements in environmental attributes including sustainable abstraction.[3] WW has therefore commissioned Phase II to gain a more detailed understanding of customers' willingness to pay for improvement in sustainable abstraction. We understand that WW intends to use the findings from this study to inform development of its PR24 business plan.

This report studies a number of research questions. First, WW has identified different methods by which it could improve its sustainable abstraction, and would like to understand what customers' preferences towards these methods are and whether these would change if customers were provided with additional information on them. Then, WW would like to understand what level of improvement customers want to see, and whether this exceeds the currently envisaged target level.

The project consisted of four main parts:

1. Set up and design of the study, identifying and defining methods to improve the level of sustainable abstraction, testing customer comprehension of the methods and then refining them, designing and building the survey, and selecting the estimation technique;
2. Survey testing through pilot fieldwork and analysis of pilot results;
3. Fieldwork, consisting of online and face-to-face surveys; and
4. Quantitative analysis of the fieldwork data.

This report is set out as follows:

- Section 2 explains the set-up and design of the main study. This section includes a description of our analysis of data from the pilot study.
- Section 3 describes the data collected as a result of our main-stage fieldwork.
- Section 4 sets out the findings of our research around customers' preferences between the methods which WW could implement to improve sustainable abstraction, what customers are willing to pay for each method, and whether customers see the methods as interchangeable such that customers can be described as having a single, overall willingness to pay for SA (irrespective of method).
- Section 5 summarises our findings on how customers would solve WW's planning problem, that is, when faced with WW's actual costs and feasibility constraints for each

[2] Abstraction is the process of taking water from rivers, streams, and other natural sources to meet demand for clean water on WW's network.

[3] NERA (9 September 2022), Estimating Customers' Willingness to Pay for Changes in Service at PR24 – Prepared for Wessex Water. Sustainable abstraction is captured in attribute F (Taking water out of rivers & streams).

method, how customers would combine methods to meet WW's target level of improvement in the sustainability of its abstraction activities.

- Section 6 concludes.

# 2. Study Design

Stated preference studies give a sample of individuals the opportunity to state their preferences about a set of economic trade-offs. From their responses to these questions, it is then possible to draw conclusions about average or typical preferences based on the data collected from that sample.

In the study at hand, we give a representative sample of the WW customer base an opportunity to state their preferences about trade-offs between different methods that WW could use to improve the sustainability of its abstraction, and the cost of implementing each of those methods. We then use the data collected to draw conclusions about the preferences of the typical WW customer regarding these trade-offs, which WW can in turn use to plan investment in sustainable abstraction in a way that responds to customer preferences.

We worked closely with WW to design the stated preference study such that we could draw robust conclusions from the data that would provide meaningful input to WW's business planning process. In this section, we set out the key design features of the study and explain how our design choices ensure that our conclusions are robust and meaningful.

## 2.1. Rationale and Motivation for Phase II

WW commissioned this Phase II research to further explore the initial finding from Phase I that customers were willing to pay a higher water bill in exchange for improvements to the sustainability of WW's abstraction activities. Of the ten attributes examined in Phase I, the attribute pertaining to sustainable abstraction (Attribute F: Taking water out of rivers and streams) was the only attribute for which customers exhibited willingness to pay for improvement. For this reason, and because the service levels from which customers could choose in the Phase I survey were defined qualitatively rather than quantitively, it is important for WW to conduct further research to understand customers' preferences around sustainable abstraction.

### 2.1.1. Phase I findings and limitations

In Phase I of WW's customer valuation research, we asked customers to choose between four service levels for sustainable abstraction, as shown in Table 2.1 below. Each option had a different impact on the bill: no change for the status quo, a decrease in the bill for the deterioration option, and small and large increases for the small and large improvements.[4]

[4] We generate customer-specific bill impacts by firstly randomly applying one of four percentage changes to the customer's estimated bill for the period 2025-2030, and then calculating customer-specific bill impacts by assuming costs of service level changes are spread across customers in proportion to the bill that they pay and using draws from a random distribution on the range (0, 1), stretching cost (or saving) estimates a scaling factor of 2.5 to allow for variation beyond the estimates provided by WW. For further details, see NERA (9 September 2022), Estimating Customers' Willingness to Pay for Changes in Service at PR24: Prepared or Wessex Water, Section 2.4.3 pp. 15-17.

**Table 2.1: Service Levels for Phase I Attribute F (Taking Water Out of Rivers and Streams)**

| Deterioration | Status Quo | Small Improvement | Large Improvement |
|---|---|---|---|
| Take more water from rivers and streams with some negative environmental impact | Maintain current activities | Improve the way water is taken from rivers and streams to protect some more areas | Significantly improve the way water is taken from rivers and streams to protect some more areas |

*Source: NERA.*[5]

As Table 2.1 shows, the service levels are described in general terms. Improvements would *"protect some more areas"* but the survey does not indicate how many areas or what those areas are. A deterioration would *"take more water"* and have *"some negative environmental impact"* but again, it is not clear how much or what kind of impact. In this Phase II survey, we make the service levels more concrete by allowing customers to choose the number of megalitres of water per day (ML/d) by which they would like WW to reduce its abstraction activities.

In the Phase I survey, we were limited in the amount of information we could give customers about each attribute since we were looking at ten different attributes. For sustainable abstraction, the information we provided is shown in Table 2.2. This gives customers a very high-level overview of the issue and potential actions WW could take. In this Phase II survey, we give customers more information about how much WW currently abstracts, the nature of the environmental impact, and how the different actions that WW could take to reduce abstraction would work in practice.

**Table 2.2: Information Provided to Customers in Phase I about Attribute F (Taking Water Out of Rivers and Streams)**

| Attribute | | Issue | Current situation | What could change |
|---|---|---|---|---|
| F | Taking water out of rivers & streams | To protect the environment whilst achieving a balance between taking water out of rivers, streams and providing water for a growing number of customers. | Wessex Water currently strikes a good balance between taking water out, while also protecting the environment, but the amount of water it can take from its existing sources is reducing. | Greater investment in activities such as helping customers reduce their water use, the creation of more water sources like reservoirs, and Wessex Water reducing leakage from its network would mean Wessex Water can still protect the environment whilst having enough water for customers. |

*Source: NERA.*[6]

5 NERA (9 September 2022), Estimating Customers' Willingness to Pay for Changes in Service at PR24: Prepared or Wessex Water, Table 2.4 p. 8.

6 NERA (9 September 2022), Estimating Customers' Willingness to Pay for Changes in Service at PR24: Prepared or Wessex Water, Table 2.3 p. 7.

In Phase I, we established that both household (HH) and non-household (NHH) customers are willing to pay for incremental improvements in the sustainability of WW's abstraction activities.

- NHH customers would pay up to a 1.53 per cent increase in their annual bill for a small improvement, and a further 1.53 per cent (so 3.06 per cent overall) for a large improvement.[7]
- HH customers' preferences were more complex. We found that they attach additional value to the status quo option. This status quo preference means that HH customers would only accept an increase to their bill in exchange for an improvement in sustainable abstraction if the improvement was large enough to exceed the additional value they place on the status quo.
  - Looking at the full sample surveyed, we found that HH customers would pay up to £5.41 for a large improvement in attribute F (taking water out of rivers and streams).[8]
  - However, when we adjusted the analysis to account for under-representation of certain demographic groups, we found that neither the small nor large improvement was enough to exceed the additional value HH customers placed on the status quo.[9]

In this Phase II study, we give customers the option to define their preferred service level, which may allow us to better understand how much improvement they would need to see to overcome their status quo preference.

### 2.1.2. Phase II research questions

We worked closely with WW to understand what additional information this Phase II study should provide. WW has identified a number of different methods it could use to improve the sustainability of its abstraction and wanted to understand whether customers have preferences between those different methods. It also wanted to understand whether customers' preferences between methods would remain constant if customers were provided with more information about the different methods. Finally, it wanted to understand what level of improvement customers wanted to see, and in particular whether customers wanted more or less improvement than the target level set by water sector experts.

Together, we agreed on six key research questions that WW wanted the study to answer:

1. How much are customers willing to pay per unit of each method when they are required to meet a sustainable abstraction (SA) target?

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7 NERA (9 September 2022), Estimating Customers' Willingness to Pay for Changes in Service at PR24: Prepared or Wessex Water, p. 72.

8 NERA (9 September 2022), Estimating Customers' Willingness to Pay for Changes in Service at PR24: Prepared or Wessex Water, p. 59.

9 NERA (9 September 2022), Estimating Customers' Willingness to Pay for Changes in Service at PR24: Prepared or Wessex Water, p. 35.

The under-represented groups included individuals with lower levels of education and from the C2DE (as distinct from ABC1) socio-economic groups. It is likely that these under-represented groups have relatively less disposable income and therefore require more value for money in improvements funded by water bill increases, which may lead them to be less willing to pay for improvements described in general terms.

2. How much are customers willing to pay per unit of each method when they are not required to meet a SA target?
3. How much are customers willing to pay per unit of SA?
4. Is there evidence that customers do not have strong preferences between methods, but rather want WW to meet the SA target in the least expensive way possible?
5. How do the answers to the above questions change once customers learn more about SA and about each method?
6. How would customers solve WW's planning problem?

The sixth question requires some further explanation. For the first five questions, we were primarily focused on estimating customers' willingness to pay. In order to collect data to estimate willingness to pay, we ask respondents about a stylised and simplified version of WW's planning problem. For example, we present customers with a single per-unit price for each method of improving sustainable abstraction, and we need to generate random variation in prices, so the prices customers see do not match the actual costs WW faces.

WW was also interested in understanding how customers would react to a choice exercise that more closely reflected the reality of the problem WW itself faces. That is, WW wanted to present all customers with an accurate estimate of the costs of each method and the maximum feasible scale of each method's deployment, to see what customers chose. The sixth question meets this requirement, as discussed in Section 2.3 below.

## 2.2. Methods to Improve Sustainable Abstraction

WW identified six different methods of intervention that could reduce the amount of water it needs to abstract from the environment. These six methods are set out in Table 2.3.

**Table 2.3: We Examined Customer Preferences Over Six Methods to Improve the Sustainability of WW's Abstraction**

| Method | | Abbreviation |
|---|---|---|
| 1 | Reducing leakage from water supply pipes | Leakage |
| 2 | Supporting household customers to reduce the amount of water they use at home | HH Support |
| 3 | Supporting businesses and other organisations to reduce the amount of water they use | NHH Support |
| 4 | Switching customers to smart water meters | Smart Meters |
| 5 | Seeking changes to laws and legislation to introduce water efficiency labelling for domestic appliances and make all new homes more water efficient | Regulation |
| 6 | Creating a new reservoir from a former quarry as a new source of water | Reservoir |

*Source: Qa.*[10]

We developed the names of the methods, and associated material, through an iterative process including discussions with WW, feedback from WW's Customer Challenge Group (CCG), and testing of the method names and associated material with WW customers. The associated material comprises:

[10] Qa, Wessex Water Sustainable Abstraction Survey 2023 – Main Version.

- The different service levels that WW could achieve for each method and the cost of each service level; and
- A showcard providing additional information about each method.

WW provided an initial version of the names of the methods, the service levels, and the material to be included on each showcard.

In our initial discussions with WW, we focused on ensuring that for each attribute the customer-facing material clearly identified the action that would be enabled by additional investment from WW, and how that action would lead to reduced abstraction. This was particularly important for attributes 2, 3, 4, and 5, each of which requires some behaviour change by entities other than WW (either customers or government) to be fully effective.

Based on the initial material provided by WW, Qa developed mock-ups of the showcards for each of the six methods. Qa then presented these showcards to household customers at a series of focus groups and depth interviews. Based on the insights gained from this qualitative research, we further refined the showcards to ensure that they were understandable to customers while still providing useful material for business planning purposes. We discuss this further in Section 2.3. We have also implemented suggestion from the CCG, as we discuss in Section 2.7.

## 2.3. Pre-Survey Qualitative Research on Sustainable Abstraction

Qa conducted a series of focus groups and depth interviews with household and non-household customers, based around the mock-ups of the showcards providing information on each of the six methods. The purpose of these focus groups and interviews was twofold:

1. To test customer comprehension of the methods and supporting information and to recommend refinements that would improve customer understanding.
2. To understand customers' views on sustainable abstraction more generally.

Initially, WW provided all information around the six different methods that could be adopted to reduce the level of sustainable abstraction. This includes descriptions of each activity, delivery methods, quantified impacts on water saved, impacts on carbon and the environment, unit costs for different delivery levels, and other advantages and disadvantages.

Then, Qa revised and conveyed the information into infographics/showcards (one for each of the six methods) which would help visually present the information to customers. The six infographic designs used in the qualitative research present slightly different features to test customers' preferences for different styles and positioning of the information (together with customers' understanding).

The qualitative research comprised:

- Six 90-minute online deliberative focus groups performed via video conferencing (on Zoom) with general household customers (from different socio-economic statuses and ages);
- Two 90-minute online deliberative focus groups performed via video conferencing (on Zoom) with non-household customers (from different geographical areas, i.e., urban-based vs. rural/coastal-based businesses); and

- Twelve 60-minute in-depth interviews performed via video conferencing (on Zoom) or by telephone with customers in "vulnerable households" (including people over 75 years old living in single-person households, people with long term health conditions, and people living in low-income households).

The qualitative research provided a list of suggested changes around how to present and explain the topics to customers in a more effective way, to address the issues and challenges identified through the research. Further, the qualitative research provided evidence around how to change and ensure consistency and clarity between the different showcards' designs and layouts.

Key changes to the showcards included:

- Changing some of the visual imagery to make it clearer;
- Excluding icons representing the indicative cost and impact on water saving of the method;
- Excluding any reference to methods' carbon impacts, which caused confusion to respondents and proved not to help customers' decision-making process; and
- Phrasing the advantages and disadvantages of each method to focus on sustainable abstraction and their short- and longer-term impacts.

The qualitative research also revealed a low level of awareness of issues related to water abstraction from rivers and streams, as this is not something customers generally know or have heard about, nor something they have physically seen. Further, the qualitative research revealed that customers found it difficult to visualise some of the numbers we present in the survey and showcards. For example, respondents struggled to practically picture 20 or 50 million litres per day. Qa re-phrased the introductory information to the survey to address these issues and explain the issue at hand in a clearer and customer-friendly way.

The full report on the qualitative research is provided as Appendix B.1.

## 2.4. Structure of Survey

The survey includes three parts: an initial screening section, the stated preference exercises, and a set of closing questions on the customer's experience of the stated preference exercises and demographic characteristics.

The initial screening section ensures that we only record responses from billpayers within the WW area and that we do not record responses from certain categories of respondent (e.g., WW employees). It also provides us with contextual information to tailor the stated preference exercise, including current bill levels.

The stated preference exercises are the core of the survey. They collect data on customers' preferences around sustainable abstraction.

The closing questions collect information that we can use to assess whether our sample is representative of the WW customer base and examine whether the results of the stated preference exercise differ across customer sub-groups.

Most customers completed the survey online. We interviewed a small sample of digitally disengaged HH customers face-to-face using an interviewer administered Computer Assisted

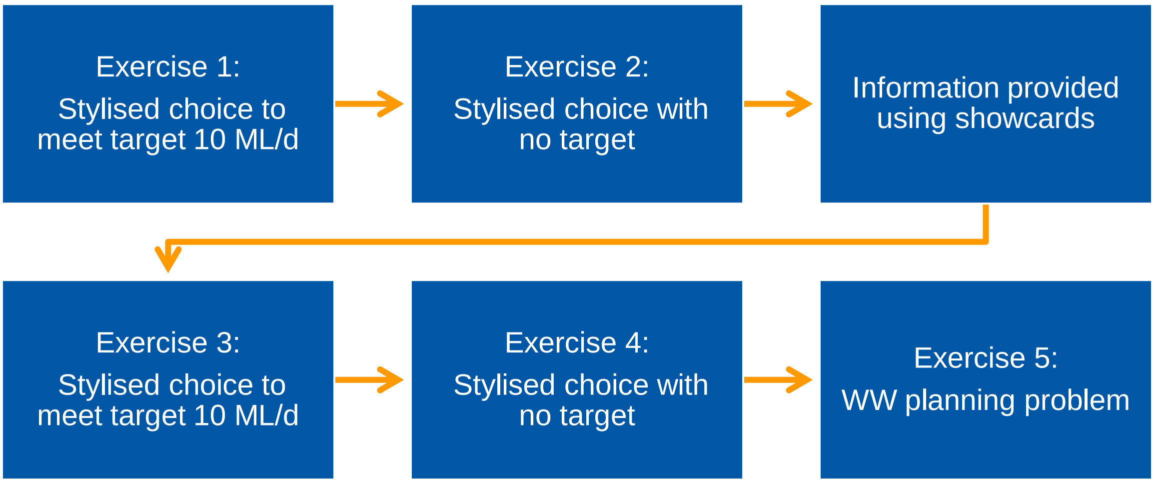
Personal Interview (CAPI) survey. This is the Vulnerable Customer Survey (VCS), which we describe further in Section 3.1.3.

## 2.5. Format of Stated Preference Exercises

### 2.5.1. Overview of stated preference exercises

In order to address the six research questions set out in Section 2.1.2, we have developed a multi-part survey with five distinct stated preference exercises. These exercises appear in a logical sequence. Figure 2.1 provides an overview of the sequence, which is described in further detail in the remainder of this section.

**Figure 2.1: Overview of Stated Preference Exercise**




*Source: Qa.*[11]

The first exercise (Exercise 1) is designed to provide answers to the first and fourth questions set out in Section 2.1.2, that is, what are customers willing to pay per unit for each method of sustainable abstraction when they are required to meet a target, i.e. do customers have preferences regarding the means of achieving the target, or are they motivated to achieve the target at least cost.

First, we first explain to customers that WW currently abstracts water at the rate of 330 megalitres (million litres) per day (330 ML/d), and that it has a target to reduce the amount of water that it abstracts by 10 ML/d by 2030. This target was based on advice from the Environment Agency (EA) at the time of drafting the survey that WW would need to reduce its abstraction by 50 ML/d by 2050.[12] WW assumed an incremental approach to meeting this target for the purposes of the survey, in which the reduction would be spread equally over the five investment periods between 2025 and 2050.

We then show customers a table with a row for each of the six methods that WW could use to improve the sustainability of its abstraction, as shown in Figure 2.2. The table includes a bill

[11] Qa, Wessex Water Sustainable Abstraction Survey 2023 – Main Version.

[12] We understand from WW that the EA has since revised its advice, and that WW will need to reduce abstraction by more than 50 ML/d by 2050.

impact per ML/d of reduction for each method. The bill impacts are randomly generated but linked to the true cost to WW per ML/d of that method and scaled to the customer's current bill. We provide further detail on how the survey generates bill impacts in Section 2.5.2.

We ask customers to specify how many ML/d they would like to be provided from each of the six methods. Customers can enter any amount between 0 ML/d and 10 ML/d for each method (up to one decimal place), but they must select a total of 10 ML/d across all methods. The survey asks customers to revise their response if they select more or less than 10 ML/d in total.

The survey also displays the total impact of customers' choices on their bill, both for each method and overall. This updates as customers change their choices so that they can see how different combinations of methods would affect their bill.

**Figure 2.2: Example of Exercise 1**

Remember;
- You can add whole numbers or numbers with up to 1 decimal place
- You can enter 0.0 for some methods if you want – you don't have to include them all
- Make sure you're happy with the total impact on your bill of the choices you've made before you press NEXT
- As a reminder, your annual water bill is £492

**Your choices mean that your water bill would increase by £5.04 per year.**

| Method | Cost of every 1 ML/d of water saved | Impact on your bill of your choice | ENTER THE NUMBER OF ML/d YOU'D LIKE TO SAVE USING EACH METHOD |
|---|---|---|---|
| Creating a new reservoir from a former quarry as a new source of water | £0.47 | **£0.23** | 0.5 |
| Seeking changes to laws and legislation to introduce water efficiency labelling for domestic appliances and make all new homes more water efficient | £0.05 | **£0.12** | 2.4 |
| Supporting household customers to reduce the amount of water they use at home | £0.35 | **£0.39** | 1.1 |
| Reducing leakage from water supply pipes | £0.91 | **£3.19** | 3.5 |
| Switching customers to smart water meters | £0.46 | **£1.10** | 2.4 |
| Supporting businesses and other organisations to reduce the amount of water they use | £0.07 | **£0.01** | 0.1 |
| **Number of ML/d you've selected: (REQUIRED NUMBER IS 10)** | | | **10.0** |

*Source: Qa.*

The second exercise (Exercise 2) is designed to provide answers to the second and third questions set out in Section 2.1.2, that is, what are customers willing to pay per unit for each method of sustainable abstraction when they are not required to meet a target, and what are they willing to pay for sustainable abstraction overall.

The second exercise is very similar to the first exercise, except that we remove the requirement to select a total amount of sustainable abstraction equal to the target of 10 ML/d. We allowed customers to select a total amount of sustainable abstraction that was either above or below the target. They could select any amount between 0 ML/d and 50 ML/d for each method, but were limited to a total of 50 ML/d across all methods. We set the maximum amount based on guidance from WW as to what would be feasible to achieve by 2030 in an "extreme" scenario.

**Figure 2.3: Example of Exercise 2**

Remember;

- You can add whole numbers or numbers with up to 1 decimal place
- Your final total can be any amount between 0 and 50 ML/d
- You can leave some methods blank if you want
- Make sure you're happy with the total impact on your bill of the choices you've made before you press NEXT
- As a reminder, your annual water bill is £492

**Your choices mean that your water bill would increase by £13.36 per year.**

| Method | Cost of every 1 ML/d of water saved | Impact on your bill of your choice | ENTER THE NUMBER OF ML/d YOU'D LIKE TO SAVE USING EACH METHOD |
|---|---|---|---|
| Creating a new reservoir from a former quarry as a new source of water | £0.47 | **£0.52** | 1.1 |
| Seeking changes to laws and legislation to introduce water efficiency labelling for domestic appliances and make all new homes more water efficient | £0.05 | **£0.83** | 16.5 |
| Supporting household customers to reduce the amount of water they use at home | £0.35 | **£5.35** | 15.3 |
| Reducing leakage from water supply pipes | £0.91 | **£5.10** | 5.6 |
| Switching customers to smart water meters | £0.46 | **£1.06** | 2.3 |
| Supporting businesses and other organisations to reduce the amount of water they use | £0.07 | **£0.50** | 7.1 |
| **Number of ML/d you've selected: (YOU CAN SELECT UP TO 50)** | | | **47.9** |

*Source: Qa.*

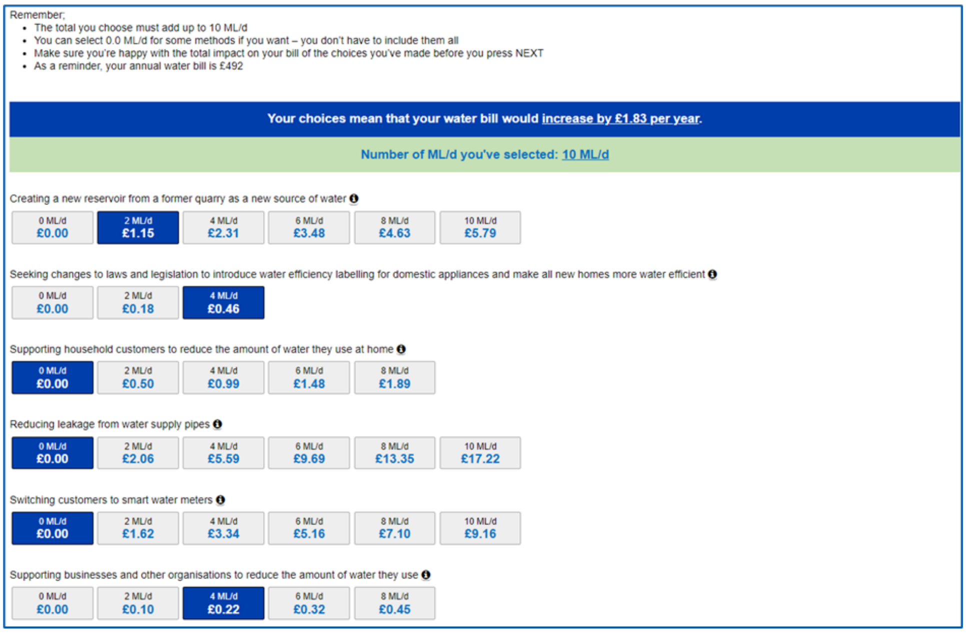
After the second exercise, we present customers with an information showcard for each method, setting out details of how the method would reduce the amount of water that WW abstracts, additional contextual information, and some advantages and disadvantages of that method. The showcards include colour and images to ensure they are visually engaging for customers. We present one showcard at a time and ask a simple question based on the information presented in the showcard, to encourage customers to engage more actively with the showcards.

We then ask customers to complete Exercises 3 and 4, which are identical to Exercises 1 and 2, respectively. That is, Exercise 3 asks customers to select their preferred combination of methods to meet a target reduction in abstraction of 10 ML/d, while Exercise 4 allows customers to choose any amount of abstraction between 0 and 50 ML/d for each of the six methods up to a total of 50 ML/d across all six methods.

The purpose of Exercises 3 and 4 is to provide an answer to the fifth question set out in Section 2.1.2, i.e., how customers' preferences change when they are provided with additional information. We pre-fill the exercises with the choices customers made in exercises 1 and 2 to reduce the repetitiveness of the exercise for customers.

The final exercise (Exercise 5) is designed to provide an answer to the sixth question set out in Section 2.1.2, i.e., how customers would solve WW's planning problem. Again, we again restrict customers to the target level of reduction in abstraction of 10 ML/d. We present them with fixed options in 2 ML/d increments for each method, including a fixed price for each option, and ask them to choose their preferred combination of methods to meet the target of 10 ML/d, as shown in Figure 2.4.

**Figure 2.4: Example of Exercise 5**




*Source: Qa.*

For some methods, in Exercise 5 we limit the maximum number of ML/d that customers are allowed to choose to below 10 ML/d. This is because we understand from WW that there is an upper limit to how much it can feasibly reduce abstraction via each method and in some cases that limit is less than 10 ML/d.

The prices for each option reflect WW's best estimate of its actual cost to implement that level of that method. These prices are of course different to the prices that customers saw in previous exercises. To avoid confusion, we explicitly address this change, telling customers that bill impacts for each method can change (e.g., due to general economic conditions) and that the prices shown in this exercise are different as WW wanted to understand how choices would change if prices changed too.

### 2.5.2. Calculation of customer-specific bill impacts

In this section, we explain how we use information provided by customers in the screening section of the questionnaire to set the per-ML/d bill impact that the customer sees for each method of sustainable abstraction. By using information from the screening section to tailor these values to the customer, we ensure that the stated preference exercise is realistic and meaningful for the customer. This may make customers more likely to report their true preferences.

In the screening portion of the questionnaire, we ask customers to state the level of their current water bill. We allow respondents to report their bill in a number of different formats based on different billing options (i.e., per week, per month, biannually, and per year), which the survey software then converts into an annual bill.

For customers that do not know the level of their current water bill, we use the response from a prior screening question on household size to present respondents with an average water bill for a household of that size based on data provided by WW (see Table 2.4). We give respondents the option to accept that bill, or to revise the bill if it does not look right.

We replicate the methodology we employed in Phase I to account for implausibly high reported water bills. Where respondents report a water bill of over £1,000 per annum, we tell them that the reported bill seemed comparatively high, show the average bill for their household size, and ask whether they would like to revise their reported amount.[13]

**Table 2.4: Average Bill by Household Size (WW Data)**

| Household Occupancy | Average Annual Metered Charge |
|---|---|
| 1 | £314 |
| 2 | £470 |
| 3 | £563 |
| 4 | £665 |
| 5 | £726 |
| 6 or more | £790 |

*Source: Data provided by WW.*

We use the customer's water bill to calculate the customer-specific bill impacts of changes in service levels for each attribute.

First, we collect data from WW on (a) the average customer bill, (b) the estimated per unit cost (in £ per ML/d) of each method of sustainable abstraction on the average customer bill, and (c) physical constraints on the amount of sustainable abstraction that can be achieved by WW. For each of the six methods, WW provided the cost to the average customer to achieve a number of different total levels of sustainable abstraction (in ML/d of reduced abstraction). The total levels varied across the six methods, based on specific feasible interventions that WW had costed.

We required costs per unit for a standardised set of levels of ML/d for use in Exercise 5. Therefore, we converted the information provided by WW to a standardised set of levels. We opted for 2 ML/d increments to simplify the choices customers faced, i.e., 0 ML/d, 2 ML/d, 4 ML/d, 6 ML/d, 8 ML/d, 10 ML/d). We generated a bill impact per ML/d at each of these levels as follows:

- For a level where WW provided cost estimates for both higher and lower ML/d amounts, we calculated the unit costs at each at of WW's provided amounts and interpolated between these. For example, WW provided estimates for the cost of improving sustainable abstraction via leakage reduction by 2.5 ML/d or by 5 ML/d, but not by 4 ML/d.[14] We estimate the per unit cost at 4 ML/d by (i) calculating unit costs at 2.5 ML/d and 5 ML/d, and (ii) assuming the unit cost changes linearly between the two levels. To get the total cost of improving sustainable abstraction by 4 ML/d via leakage reduction we multiply the unit cost by the amount of water saved (4 ML/d).

[13] This amount was agreed at Phase I following discussion with Wessex.

[14] WW's per-unit cost estimates vary by level because of economies or diseconomies of scale. For example, for leakage reduction, the per-unit cost increases with the level because of diseconomies of scale: WW will start with leaks that are easy to fix and then move on to more difficult leaks, which become progressively more expensive per ML/d.

- For a level where WW provided cost estimates for either a higher or lower amount only, we assumed that the cost per ML/d is equal to that of the closest estimate we have. For example, for smart metering, the smallest level for which WW provided an estimate is 2.2 ML/d. We thus assume that the per-ML/d cost at 2 ML/d is the same as at 2.2 ML/d. We calculate the overall cost of improving sustainable abstraction by 2 ML/d via smart metering by multiplying the per-ML/d cost by 2.

The total costs of each method at each standardised level are reported in Table 2.4 below.

**Table 2.5: Total Bill Impact of Each Method on the Average Bill at Standardised Levels**

| **Total reduction in water abstracted (ML/d)** | **0** | **2** | **4** | **6** | **8** | **10** |
|---|---|---|---|---|---|---|
| **Total bill impact on the average bill (£)** | | | | | | |
| Leakage | 0.00 | 1.78 | 4.84 | 8.39 | 11.56 | 14.91 |
| HH Support | 0.00 | 0.43 | 0.86 | 1.28 | 1.64 | N/A |
| NHH Support | 0.00 | 0.09 | 0.19 | 0.28 | 0.39 | N/A |
| Smart Meters | 0.00 | 1.40 | 2.89 | 4.47 | 6.15 | 7.93 |
| Regulation | 0.00 | 0.16 | 0.40 | N/A | N/A | N/A |
| Reservoir | 0.00 | 1.00 | 2.00 | 3.01 | 4.01 | 5.01 |

*Note: Some bill impacts are reported as "N/A" because there is no feasible intervention at that scale for that method. Specifically, Leakage can deliver a maximum of 20 ML/d, HH Support 8.2 ML/d, NHH Support 9.2 ML/d, Smart Meters 19.2 ML/d, Regulation 4.3 ML/d. Reservoir can deliver more than 50 ML/d.*
*Source: NERA analysis of WW data.*

We then derive the price levels we show respondents in the five choice exercises as follows.

- In Exercises 1-4, we present respondents with random but realistic per unit prices for each method, which we estimate as follows:
  - First, we calculate (for each method) the minimum and maximum unit prices (i.e., prices on a £ per ML/d basis) from Table 2.4 above.
  - Second, we stretch these values per unit prices adjusting them for an additional allowance of 50 per cent. That is, we allow the lower (upper) bound to be smaller (larger) than the real minimum (maximum) by 50 per cent. The scaling factor 0.5 is judgement-based. It ensures that we examine WTP at values for the costs of the method which are beyond the levels provided by WW. This is useful in the event that the true prices exceed WW's estimates.
  - Third, we multiply these estimates by a random draw from the uniform distribution on the range (0, 1). This randomisation is essential to get the variation needed for WTP analysis.
  - Lastly, we scale the randomly generated prices for each respondent's bill size, relative to the average customer bill.
- In Exercise 5, we present respondents with the actual bill impacts they would face for each method and level.

– We use the bill impacts in Table 2.4, which reflect WW's best estimate of its actual cost to implement that level of that method. We scale the prices for each respondent's bill size, relative to the average customer bill.

## 2.6. Pilot Testing of Survey Instrument

We conducted a pilot to determine how the survey would work in practice when accessed by customers. The pilot ran from Friday 3 March to Wednesday 8 March 2023, and provided an opportunity to test the survey among customers under 'real world' conditions.

WW drew a random sample from its database of HH customers for whom an email address was available. Qa issued email invitations to those customers. The invitation explained the purpose of the survey and included a link to access it, along with detail around data protection, the Market Research Society (MRS) Code of Conduct, and contact details for Qa should the customer wish to make comments about the survey or ask for clarification. It also included a link to an explanatory letter from WW, outlining the scope and purpose of the survey in more detail. In total, Qa issued 4,976 pilot email invitations. These produced a total of 190 completed surveys, giving a response rate of 3.8%.

Overall, our analysis of the pilot suggested that respondents are willing to pay for sustainable abstraction above the target of 10 ML/d. With respect to customers' choices over the different methods of sustainable abstraction, we found that customers have clear preferences over the different methods of achieving sustainable abstraction, and the sensitivity of these preferences to the relative prices shown in the survey is low. Specifically, we found that, on average, customers want to pursue a strategy that prioritises leakage reduction (and building a new reservoir) but includes some of each of the six methods.

In terms of survey performance, we found customers were able to understand the survey and we considered the collected data was reliable. However, based on the results of the pilot analysis, we made a number of changes to the survey to increase our confidence in the reliability of the collected data.

Specifically, we:

- Adjusted the set of possible answers to the questions on rationale for choices by including an "other" options to reduce the likelihood of customers answering "don't know";
- Pre-populated Exercises 3 and 4 with customers' responses at Exercises 1 and 2, to make the survey easier to complete and less repetitive for consumers;
- Increased the range of unit prices shown for each method, to see whether customers are price-responsive at some higher prices. Specifically, we increased the scaling factor we discuss in Section 2.5.2 for Exercises 1-4 from 25 per cent to 50 per cent; and
- Revised some of the introductory text to the survey and exercises to draw out some key points to customers, including that their choices may actually affect their bills in the future. We made this change to address customer reports that the survey was difficult and to ensure that price-insensitivity was not driven by a failure to internalise prices (i.e., by the fact that customers did not understand that their choices would affect their water bill).

Due to these changes, we did not include pilot stage responses in our final data analysis.

## 2.7. Incorporating Guidance on Best Practice

Throughout the project, we have worked to incorporate guidance on best practice from both Ofwat and the Consumer Council for Water (CCW). We have also engaged with the CCG to get feedback on our proposed methodology and have incorporated several of their suggestions into the project.

We explain how we have accounted for Ofwat's standards for customer engagement in Section 2.7.1, describe how we incorporated guidance on best practice from the CCW in Section 2.7.2, and summarise how we have responded to CCG feedback in Section 2.7.3.

### 2.7.1. Addressing Ofwat's customer engagement policy

In advance of PR24, Ofwat defined a set of standards for high-quality research, customer challenge, and assurance of customer engagement during price reviews.[15] Ofwat states that water company research and engagement should provide evidence of a meaningful, significant understanding of customers' and wider stakeholders' preferences. In particular, water company research should be:

- **Useful and contextualised**: The objectives of the research and the potential implications of the findings (i.e., how they will be used) should be clear from the final output.[16]
  - In the early stages of this research, we worked closely with WW to define six research questions and to design the survey to address those six questions. We set out these questions at the beginning of this report (see Section 2.1.2). Later in the report (see Section 6), we conclude by summarising the results from this study with respect to each of the six research questions.
  - We also explain in Section 2 of this report that the results of the study will be used to "*draw conclusions about the preferences of the typical WW customer regarding these trade-offs [between methods of sustainable abstraction and costs], which WW can in turn use to plan investment in sustainable abstraction in a way that responds to customer preferences*".
  - For survey respondents, we provided information about how the study will be used by WW at the beginning of the survey (see Appendix A.4).
- **Neutrally designed**: The research should be designed to be neutral and free from bias. Sources of bias should be considered at every stage of the research. If some type of bias in unavoidable, this should be noted and explained in the research findings.[17]
  - At every stage of the research process, we took steps to mitigate sources of bias:
    - ***Survey development:*** We used qualitative engagement to assess customers' prior knowledge around sustainable abstraction as well as the accessibility of the survey material to customers. Based on the findings from this engagement, we implemented changes to the way we presented information in the survey to reduce bias (see Section 2.3). We also made changes to the survey based on the CCG's

[15] Ofwat (February 2022), PR24 and beyond: Customer engagement policy – a position paper, p. 4.

[16] Ofwat (February 2022), PR24 and beyond: Customer engagement policy – a position paper, p. 6.

[17] Ofwat (February 2022), PR24 and beyond: Customer engagement policy – a position paper, p. 6.

feedback to mitigate the potential for bias arising from customer differences in understanding and evaluating the methods of sustainable abstraction (e.g., balancing advantages and disadvantages in the showcards – see Section 2.7.3).

- ***Survey development:*** We included in the survey several questions to allow us to understand whether stated customer preferences might be biased by a lack of understanding or by protest attitudes (see Section 3.2.3). We were then able to use the answers to these questions to test whether customer preferences were affected by lack of understanding or protest attitudes (see Section 4.7). This analysis did not find consistent, statistically significant evidence that preferences were biased by lack of understanding or protest attitudes.
- ***Survey design:*** We randomise the order in which methods are displayed to different respondents to ensure that the results are not biased by order effects.
- ***Fieldwork:*** We conducted additional top-up and vulnerable customer recruitment (see Section 3.1) to ensure that we collected data from customers across the full range of demographic and billing characteristics.
- ***WTP estimation:*** We include demographic and billing controls in our regression model, and then evaluate that model at population values for those demographic and billing controls (see Section 4.2 and Section 4.4). This approach allows us to derive WTP estimates that are corrected for any under- or over-representation of demographic or billing characteristics in our sample. We further test whether the preferences of particular, vulnerable sub-groups differ from the generality of respondents (see Section 4.7).

- **Fit for purpose**: Both the sample and the methodology should be appropriate for the research setting. Ofwat welcomes innovation as long as *"it is likely to lead to meaningful and trusted insight and learning"*.[18] Further, respondents should be able to understand the questions they are asked.
  - Our final sample includes individuals across the full range of each demographic and billing characteristic, and we therefore conclude that the survey data collected provides a reliable basis for performing our analysis.
  - We test respondents' understanding of the survey by asking them to self-report the ease with which they understood the materials in the survey as well as including questions around each of the six methods to objectively test whether they understood the information on the showcards. Overall, we consider that respondents had sufficient understanding to provide reliable answers and accurately express their preferences (see Section 3.2.3).
  - We estimate customers' willingness to pay by estimating their demand functions, a standard economic tool to understand price/quantity trade-offs.
- **Inclusive**: The sample should be representative of the full spectrum of the company's customers. Results should consider and report differences in preferences by socio-demographics and consumer types.[19]

[18] Ofwat (February 2022), PR24 and beyond: Customer engagement policy – a position paper, p. 6.

[19] Ofwat (February 2022), PR24 and beyond: Customer engagement policy – a position paper, p. 6.

- As mentioned above, we designed the sampling approach to provide a robust and representative sample of all WW customers. We provide summary statistics on the representativeness of the sample in Section 3.2.
- We estimate and report the impact of socio-demographic characteristics and customer type (i.e., billing characteristics) on WTP. As mentioned above, we adjust WTP estimates for any under- or over-representation of demographic or billing characteristics in our sample, and test whether the results change when we restrict the sample to certain sub-groups. Overall, we do not find that the preferences of any sub-group to be statistically different from the rest of the sample (see Section 4.7).

- **Continual**: Companies should carry out research on a continual basis, enabling both day-to-day and longer-term research.[20]
  - We maintained continuity with previous WW research. Specifically, this study directly follows from a Phase I study we conducted in 2022 to examine customer willingness to pay for a broader set of service attributes (see Section 2.1.1).[21]
- **Independently assured**: Research should be reviewed by entities that are independent of water companies and have the relevant skills and know-how to evaluate the research findings.[22]
  - Several members of the WW CCG have relevant experience that means they are well-positioned to review and evaluate the research findings.
- **Shared in full with others**: Research findings should be made available in full, as early as possible, and include detailed discussions around the methodology employed (including, e.g., questionnaires and discussion guides).[23] Publishing research will allow methodologies to be improved on, build a common knowledge base about customers' views, and allow similar research to be compared.
  - We engaged with the CCG early in the research process to discuss our proposed methodology and seek suggestions for improvement.
  - We understand that WW plans to make the findings from this research more widely available, for example through publication of the findings on its website.
- **Ethical**: Research should adhere to "the ethical standards of a widely recognised research body".[24]
  - Qa Research adhered to the Market Research Society (MRS) Code of Conduct in administering the survey and the prize draw.

### 2.7.2. Addressing the CCW critique of the PR19 approach

Following PR19, the CCW commissioned Blue Marble to conduct a study on water companies' customer engagement research. The study examines how customers feel about

20 Ofwat (February 2022), PR24 and beyond: Customer engagement policy – a position paper, p. 7.

21 NERA (9 September 2022), Estimating Customers' Willingness to Pay for Changes in Service at PR24: Prepared or Wessex Water.

22 Ofwat (February 2022), PR24 and beyond: Customer engagement policy – a position paper, p. 7.

23 Ofwat (February 2022), PR24 and beyond: Customer engagement policy – a position paper, p. 7.

24 Ofwat (February 2022), PR24 and beyond: Customer engagement policy – a position paper, p. 7.

the research processes in which they are asked to participate, in particular, whether customers feel that the research processes enable them to make meaningful contributions.

The CCW and Blue Marble identify five themes on which customer engagement research could improve to ensure that customers feel that their contribution is meaningful.

**Figure 2.5: The CCW/Blue Marble Identify Five Themes that Customers Require for Meaningful Research**

| Criteria | | Threshold questions |
|---|---|---|
| | **Ease** | • Am I able to answer the questions that I am being asked?<br>• Is what I'm being asked to do straightforward and reasonable? |
| | **Relevance** | • Is the topic relevant / of interest to me?<br>• Do I actually have a view on what I am being asked? |
| | **Listening** | • Do I feel like the organisation that has commissioned the research is paying attention to what I say? |
| | **Making a difference** | • Do I think anything will happen as a result of taking part?<br>• Will taking part benefit others / the wider community? |
| | **Financial incentive** | • Do I receive a financial incentive for taking part? Or the prospect of a prize? |

*Source: CCW and Blue Marble.*[25]

- **Ease:** The CCW and Blue Marble are concerned that traditional WTP studies are not easy for customers to complete. They are particularly concerned about the cognitive burden of remembering all the attribute descriptions (traditionally provided at the beginning of the survey) and that asking customers to make multiple choices between paired bundles is confusing.[26]
  - The format of our stated preference exercises (see Section 2.5 above) addresses both points of concern to the CCW. First, we limit the cognitive burden for customers by asking them to express preferences about a single attribute only (i.e., sustainable abstraction). While we do examine their preferences about six different methods for achieving improvement in this attribute, we consistently refer to the methods using clear one-sentence descriptions of the methods throughout the survey to facilitate customer understanding (see Table 2.3 above in Section 2.2). Second, there is no risk of confusion from being asked to make multiple similar choices between paired bundles, as each customer is asked to build their preferred bundle to improve sustainable abstraction in three different and clearly explained settings. Where we ask customers to repeat tasks (e.g. Exercises 3 and 4) or ask them to complete similar-seeming tasks (e.g. Exercise 5), we clearly explain how the exercise is slightly different and why we need them to complete a seemingly repetitive task to avoid causing confusion.
  - As we explain above (and further discuss below), we designed the survey to ensure it is easily understandable for customers and implemented a number of changes to the

25 CCW and Blue Marble Research (April 2020), Engaging water customers for better consumer and business outcomes, p. 4.

26 CCW and Blue Marble Research (April 2020), Engaging water customers for better consumer and business outcomes, p. 37.

presentation of the exercises to make it easier for customers to complete the survey. This included: changing the way we present numerical information in the survey based on findings from the qualitative research (see Section 2.3); changing the way we present the additional information in the showcards based on feedback from the CCG (see Section 2.7.3); and pre-populating Exercises 3 and 4 with customers' responses at Exercises 1 and 2 to make the survey easier to complete and less repetitive for consumers based on findings from the pilot study (see Section 2.6).

- **Relevance:** Customers only want to be consulted on a subset of the decisions made by water utilities. The CCW/Blue Marble study finds that customers do want to be consulted on near-future investment scenarios (5-15 years) and prefer consultations that are framed in terms of the impact on the customer's own bill and services.[27] Customers also feel that *"it is more valid to ask for consumers' views on specific business planning topics once they are briefed and feel able to give a considered answer"*.[28]
  – Our WTP exercise falls within the set of topics that the CCW and Blue Marble identify as relevant to customers, because it focuses on how near-future investment (i.e., in 2025-2030) might impact customers' own bills and environmental attributes about which it is reasonable to think customers might have opinions. To ensure that customers are able to give considered answers, we provide contextual information about the topic of sustainable abstraction as well as information about the six methods using showcards. We tailored this contextual information to customer needs through a series of focus groups and depth interviews with customers as well as engagement with the CCG.
- **Listening:** Customers view research as more meaningful when it is clear that someone is actually listening. The CCW and Blue Marble suggest that this can be achieved in quantitative research through a well-introduced survey and expressions of gratitude.[29]
  – The email from Qa inviting customers to take part in the survey included an attached letter from Wessex Water which tells customers that the survey is "very important" and thanks customers for their interest (see Appendix A.2).
  – The introduction to our survey includes text to show customers WW is interested in what they have to say. For example, "this survey asks for your views", and "we want to hear your opinions". We thank customers for their time at the end of the survey.
- **Making a difference:** The CCW and Blue Marble find that customers are more likely to feel that their contribution is meaningful if they believe that their participation in research will have a real impact.
  – We explain in the introduction to the survey that the purpose of the survey is to inform the five-year business plan that WW must submit to Ofwat. The introduction states that "*the findings from this survey will help Wessex Water plan for the future"*. The email inviting customers to participate in the survey also included a link to a

[27] CCW and Blue Marble Research (April 2020), Engaging water customers for better consumer and business outcomes, p. 21.

[28] CCW and Blue Marble Research (April 2020), Engaging water customers for better consumer and business outcomes, p. 8.

[29] CCW and Blue Marble Research (April 2020), Engaging water customers for better consumer and business outcomes, p. 19.

letter from WW, explaining how the findings from the survey will be used to *"help us to agree with Ofwat what our service and charges will be between 2025 and 2030"*.

- **Financial incentive:** Offering a financial incentive makes it more likely that customers will make time to participate in the survey.
  - We offer survey participants the chance to be included in a prize draw to encourage participation (one prize of £500 and two prizes of £250).
  - All customers that participated in time-intensive qualitative research were compensated for their time.

In addition to the five themes outlined above, the CCW and Blue Marble identify a number of other factors that should be taken into consideration as part of customer engagement research.

- The CCW and Blue Marble highlight the importance of adopting "an iterative process to questionnaire development" and ensuring that feedback from cognitive testing and pilots is incorporated in the survey design.[30] Due to time constraints for the completion of this project we were not able to implement all three of qualitative testing, cognitive testing, and a pilot study; since we prioritised qualitative testing and a pilot study, we did not have time for a cognitive survey. We instead drew on insight from the qualitative work and pilot and feedback from the CCG to ensure our survey was accessible to customers. We provide further details on how we adapted our survey based on feedback from the pilot study in Section 2.6.
- The CCW and Blue Marble find that a number of customers are happy to leave decisions about water services to experts working within the water company and regulator.[31] We offer customers the opportunity to express this preference when we ask them about their rationale for selecting a certain level of sustainable abstraction, by giving them the option to say that they "trust that Wessex's target amount is the right one" (see Section 4.1.3).

Alongside their research into customer preferences, the CCW and Blue Marble also spoke to CCGs, who suggested that water companies could make more use of CCG expertise and advocated for greater coherence in company research programmes.[32] We engaged with WW's CCG early in the research process and adopted a number of CCG suggestions, as we discuss more extensively in Section 2.7.3 below.

### 2.7.3. Responses to feedback from the CCG

We gave the CCG the opportunity to review and provide feedback on the qualitative discussion guides and draft showcards. Further, we also provided a link to the pilot version

[30] CCW and Blue Marble Research (April 2020), Engaging water customers for better consumer and business outcomes, p. 24.

[31] This "leave it to the experts" type is one of four customer types that the CCW and Blue Marble identify. Most customers were either of this type or of a second "I want to be involved, but I'm struggling" type, who want to give feedback but struggle with cognitively demanding research formats. The other two minority types were "I don't care" and "Give me everything you've got" (very disengaged and very engaged, respectively). See CCW and Blue Marble Research (April 2020), Engaging water customers for better consumer and business outcomes, p. 5.

[32] CCW and Blue Marble Research (April 2020), Engaging water customers for better consumer and business outcomes, p. 28.

of the survey to the CCG for them to experience what customers would see and provide feedback and comments where relevant.

We accounted for the CCG feedback on the survey, discussion guides, and design of the infographics as follows:

- **Discussion guides**: Members of the CCG provided comments and feedback on the discussion guides that would be given to Qa's qualitative research specialists leading the focus groups. This feedback led to changes to the questions set out in the final version of the discussion guides used in the focus groups.
- **Survey**: Members of the CCG provided three suggestions to improve the presentation of information within the survey, which we implemented. The CCG's comments aimed at improving the level of clarity in the introductory and explanatory text in the survey, the way the information on methods was presented in the showcards, and the way the stated preferences exercises were displayed.
- **Showcards**: Members of the CCG provided a number of comments around the showcards, which we implemented. The main comment was with respect to the showcard explaining leakage reduction and its impact on sustainable abstraction. The CCG considered that the draft showcard needed to be more balanced in the numbers of advantages and disadvantages listed, in order to avoid inducing any bias in customers' choices. We addressed this comment by listing additional advantages, ensuring that an equal number of advantages and disadvantages were shown in the showcard (three of each).

Finally, we presented the results of our analysis and our key conclusions to the CCG prior to finalising this report, to give the CCG the opportunity to comment on our interpretation of the results. The CCG did not propose any changes to our interpretation of the results.

# 3. Survey Implementation

## 3.1. Fieldwork and Sampling Approach

For HH customers, we designed the sampling approach to provide a robust and representative sample of all Wessex Water customers while at the same time balancing the practicalities of implementing a complex survey within the available budget and timeframe.

The scope of Phase II, unlike that of Phase I, is only relevant for those customers who receive water services (i.e., either only water services or both water and wastewater services) from WW. Thus, we excluded from the Survey any customers receiving sewerage services from WW but water services from other companies (i.e., Bristol Water or Bournemouth Water).

We used four different survey formats to collect responses from HH customers, which we describe in turn in sections 3.1.1 to 3.1.4.

### 3.1.1. Main stage survey

We collected the majority of responses through an online survey, programmed and hosted by Qa Research. Using the same approach that was adopted for the Pilot, WW drew a random sample from its database of HH water service customers for whom an email address was available. Qa issued email invitations to those customers.

The email invitation contained an explanation of the purpose of the survey, details of data protection and adherence to the MRS Code of Conduct, and contact details for Qa Research. To provide further reassurance and encouragement to respondents, the email invitation also included a link to an accompanying letter from WW which provided further explanation about the survey and how the findings would be used. To encourage participation, all respondents were invited to take part in a prize draw (administered in line with MRS guidelines) with one cash prize of £500 and two prizes of £250 each, giving a total prize fund of £1,000. Two reminder emails were issued during the surveying period to non-responders.

Qa issued 44,801 invitations to participate in the survey, expecting a response rate of around 4-5 per cent (i.e., expecting around 1,800-2,200 survey completions). The expectation of a lower response rate compared to that achieved for the Phase 1 survey reflects the narrower nature of the topic of the survey and its longer length (and thus the longer time respondents would require to complete the survey).

We issued email invitations on Thursday 23 March and the survey closed on Monday 17 April 2023. In total, from the 44,801 main stage invitations issued a total of 2,557 surveys were completed by recipients of the email invitation, giving a higher-than-expected final response rate of 5.7 per cent. Of these, 2 were deleted due to quality control leaving us with 2,555 surveys.

As discussed more extensively in Section 3.2 below, we assessed the representativeness of the respondents to the profile of all WW HH customers, to determine where, and if, it would be desirable to target additional survey completions from certain customer types. We assessed customers' representatives on both operational criteria and demographics.

WW was able to provide a profile of operational criteria for all customers, including whether the customer is metered, payment methods (direct debit or other), and tariff types (social or other).

To determine the demographic profile of the WW customer base, we used data from the ONS Annual Population Survey (APS) and Census 2011.

- We used data from the APS on Household Reference Persons (HRPs) to establish a demographic profile for age and gender; HRPs are those responsible for paying the rent/mortgage on the property and therefore are a reasonable proxy for water bill payers. We only used data from Local Authorities (LAs) that approximately aligned with the WW operating area.[33]
- We used data from Census 2011 to construct a profile by socio-economic group (SEG). Since this data is now over a decade old it provides only a rough indication of current SEG profile of bill payers.

### 3.1.2. Top-up survey

We anticipated that certain customer types might be under-represented in the final main stage survey sample due to non-response to the email invitation. In order to mitigate the impact of this, we conducted a parallel top-up survey to specifically target groups that appeared to be under-represented from the main stage survey (as far as we could estimate while the survey was ongoing).

We ran this top-up survey online using a commercial access panel provider. The questionnaire used was identical to the one used for the main stage survey, with some small amendments to screen respondents and identify target customer types.

The survey was originally intended to target male customers, customers in the C2DE socio-economic group, and customers aged 16-54 (i.e., the groups more likely to be under-represented in the main stage survey) for an additional 100 completions. However, due to the high response rate for the main stage survey we were able to collect sufficient completions for each of the targeted groups from the main stage alone, allowing us to close the top-up survey early. The total number of top-up surveys collected was 29. However, due to project timescales, only 18 top-up surveys were included in the final analysis.

### 3.1.3. Vulnerable customer survey

As we conducted both the main stage survey and top-up survey online, we needed to take additional steps to ensure that digitally disengaged customers were included in the final sample. Therefore, we carried out a separate survey specifically to target these customers, using an interviewer administered face-to-face survey. We adopted a door-knocking approach to collect this sample, as this enabled us to screen and identify suitable customers. We only included customers who said they ‘use the internet’ either ‘Never’ or ‘Rarely (few times in the year)’. We also used quota sampling to target two vulnerable customer groups to ensure sufficient representation of those groups in the final sample, as follows:

[33] We included the following LAs: Bath and North East Somerset; Dorset; Sedgemoor; Somerset West and Taunton; South Somerset; Wiltshire.

- At least 50 per cent of respondents had a long term physical or mental health condition (a response of 'Someone in my household has a long-term physical health condition' OR 'Someone in my household has a long-term mental health condition' at question D2).
- At least 50 per cent of respondents had difficulties paying their water bill on time (a response of 'I regularly struggle with paying my water bill on time, as other payments have priority' OR 'I occasionally struggle with paying my water bill on time, when other payments have priority' at question D3).

To implement this survey, we created a CAPI version of the main survey (administered using a tablet). We made small amendments to this version including the addition of screening questions and interviewer instructions. Crucially, we set up the stated preference section of the survey to be self-completion to mirror the online version and asked respondents to complete this section on their own where possible. If respondents were not able to complete this section on their own, the interviewer was instructed to help them through this section.

In total, we collected 101 responses via this vulnerable customer survey.

### 3.1.4. Wessex Panel

To increase the total number of survey responses and for consistency with the approach at Phase I, we also distributed the survey to members of the Wessex Panel. The Wessex Panel is a continuous customer engagement panel maintained by WW.

WW advertises the existence of the Wessex Panel to its customers, who can choose to opt-in to panel membership. Panel members are invited to participate in surveys or customer engagement activities, typically 2-4 per year.[34] Members are entered into a prize draw for every survey they complete. The panel is operated by Future Focus on behalf of WW.

We understand from WW that the total number of panel members fluctuates but is typically in the region of 2,000 customers. Surveys issued to the panel have a relatively high response rate, typically between 800 and 1,200 responses, although more technical surveys typically see a lower response rate.

For the Phase II survey, Future Focus provided Qa with a list of panel members' email addresses, to which Qa distributed a generic survey link. We collected 153 responses through the Wessex Panel

## 3.2. Summary Statistics

We have 2,827 completed household surveys. Of these, 2,555 are from the main survey and pilot, 18 are from the 'top-up' survey, 101 are from the face-to-face 'vulnerable' surveys, and 153 are from an additional online survey completed via the Wessex Panel.

We omit 82 completed surveys that we deem unusable. This includes 64 respondents who report an implausibly high annual water bill (i.e., exceeding £1,000 per year) and 18 who report an implausibly low annual water bill (i.e., below £100 per year).

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34 WW has invited panel members to participate in 25 surveys in total since the Panel's inception in 2013. See https://www.wessexwater.co.uk/corporate/customer-service/customer-engagement/customer-panel (accessed 6 May 2022).

Therefore, we perform the main stage analysis on a sample consisting of 2,745 responses.

### 3.2.1. Demographic characteristics

Our final sample includes individuals across the full range of each demographic characteristic we captured in the survey. Compared to population average, the sample shows some over-representation of women, highly educated individuals, and high socioeconomic status individuals.

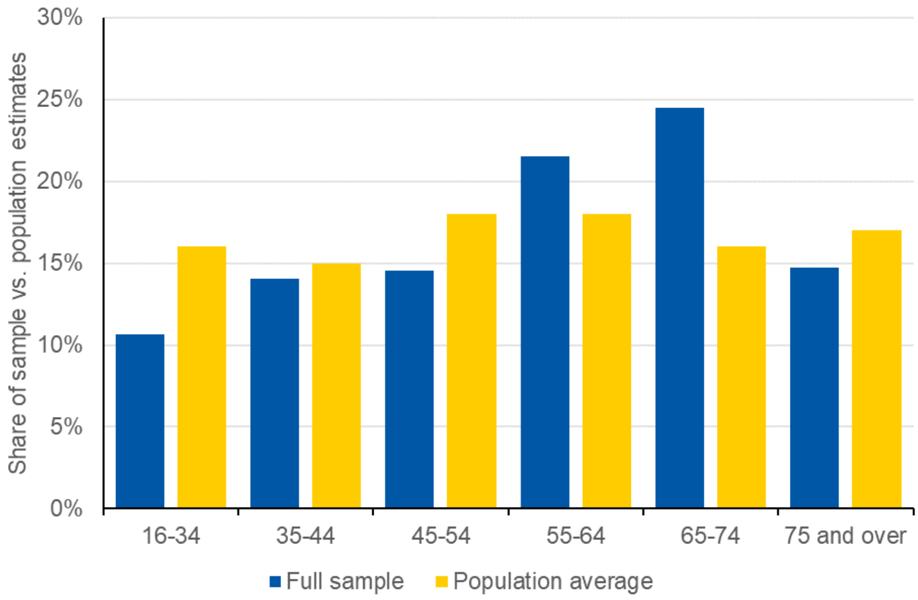
We summarise the key demographic variables below, then set out the implications for our subsequent analysis.

- *Responsiveness*: Most respondents are willing to answer demographic questions. Respondents had the option to select "prefer not to say" for all demographic questions. The share of respondents selecting this option only exceeds 10 per cent for two variables: education (10 per cent) and income (24 per cent).
- *Gender*: 51 per cent of respondents willing to describe their gender are male and 49 per cent are female.[35] Based on data from the Annual Population Survey, the expected gender profile for the operating area is 60 per cent male and 40 per cent female.[36]
- *Age*: The 65-74 age group has the largest number of respondents. However, based on data from the Annual Population Survey, this age group is over-represented in the sample (see Figure 3.1).

[35] These percentages are rounded; the sample also includes 12 non-binary respondents.

[36] Percentages provided by Qa, based on Office for National Statistics, Annual Population Survey (October 2020 to September 2021) for the following local authority areas: Bath and North East Somerset; Bournemouth, Christchurch & Poole; Bristol, City of; Dorset; Mendip; North Somerset; Sedgemoor; Somerset West and Taunton; South Gloucestershire; South Somerset; Wiltshire.

**Figure 3.1: Age Distribution of Respondents, Sample vs. Population**

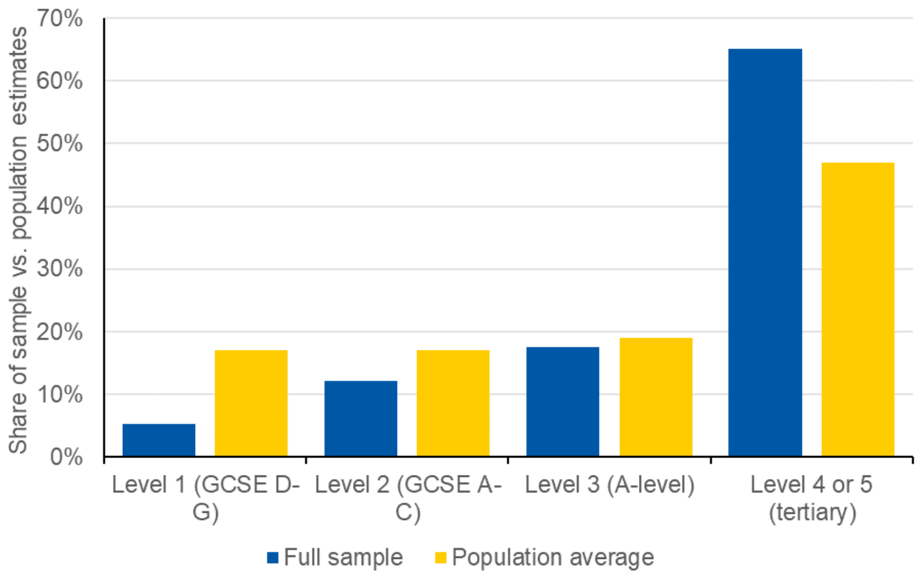



*Source: NERA analysis of WTP survey data.*

- *Education*: Respondents in our sample are relatively highly educated compared to the reference population. 65 per cent of respondents in our sample who report their highest educational qualification hold a qualification higher than A-level equivalent, whereas the UK government reports that, as of 2021, 47 per cent of adults aged 19-64 have a qualification higher than A-level equivalent (see Figure 3.2).[37]

[37] HM Government (25 November 2021), Education and training statistics for the UK. Link: Create your own tables, Table Tool – Explore education statistics – GOV.UK (explore-education-statistics.service.gov.uk) (accessed 3 March 2022).

**Figure 3.2: Education Level of Respondents, Sample vs. Population**

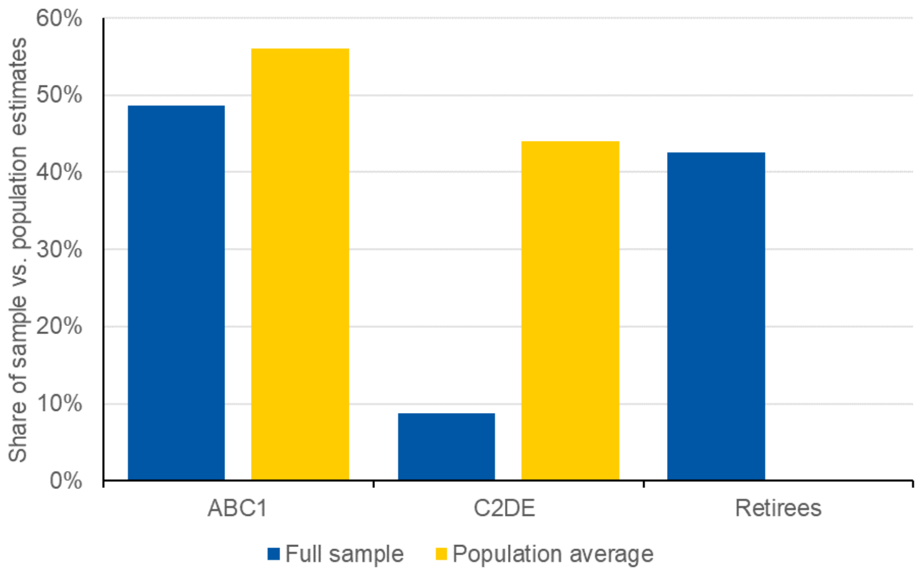



*Source: NERA analysis of WTP survey data.*

- *Socioeconomic group (SEG)*: Most respondents are from higher socioeconomic groups. 49 per cent of respondents who report the employment status of the main income earner reported socioeconomic groups ABC1. A further 43 per cent of respondents indicated that the main income earner is retired, with only 9 per cent C2DE other than retired. Our sample therefore suffers from under-representation of working-age C2DE individuals; based on the 2011 census, the expected profile for the operating area for adults aged 16-64 is 56 per cent ABC1 and 44 per cent C2DE (see Figure 3.3).[38]

[38] Percentages provided by Qa, based on 2011 census.

**Figure 3.3: Socio-Economic Group of Respondents, Sample vs. Population**




*Source: NERA analysis of WTP survey data.*

We account for the under- and over-representation of certain demographic characteristics in our sample in our estimation of WTP by calculating population-adjusted WTP estimates using the demographic control variables included in our model. We apply population average values of demographic characteristics when we evaluate the model to derive WTP estimates.[39]

### 3.2.2. Billing characteristics

The survey collects data on characteristics of the respondents in their capacity as Wessex Water customers. Customers paying via direct debit and metered customers are over-represented. Most respondents are not on a social tariff, and do not have difficulty paying that bill.

- *Social tariff*: Most respondents (91 per cent) indicate that they are not under a social tariff. This is in line with the target profile identified by Qa, based on criteria held by Wessex Water, of 96 per cent not in receipt of social tariff.
- *Direct debit*: Respondents willing to reporting their payment method pay via direct debit (85 per cent) are over-represented with respect to the target profile identified by Qa, based on criteria held by Wessex Water, of 74 per cent direct debit payees.
- *Metering*: Metered customers (86 per cent) are over-represented with respect to the target profile identified by Qa, based on criteria held by Wessex Water, of 68 per cent metered customers.
- *Difficulty paying*: Amongst respondents willing to share this information, most (73 per cent) report that they never struggle with paying their water bill, while only 2 per cent regularly struggle with paying their water bill.

39 This approach is effective under the assumption that those who complete the survey are representative of their group (i.e., survey non-completion is random).

- *Contact with water company:* Most respondents (59 per cent) report that they have never contacted their water company.

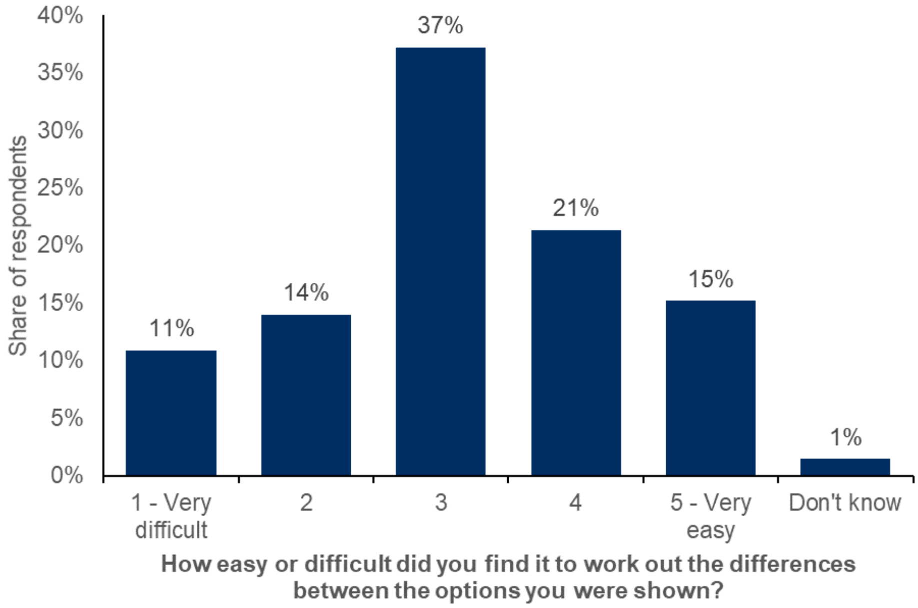
We use population weights to adjust our WTP estimates for over- or under-representation of billing characteristics, using the same technique adopted for demographic characteristics.

### 3.2.3. Experience of completing the survey

The survey includes data that allows us to evaluate whether respondents found the survey easy or difficult to complete, and to examine how respondents are making decisions when they complete the survey.

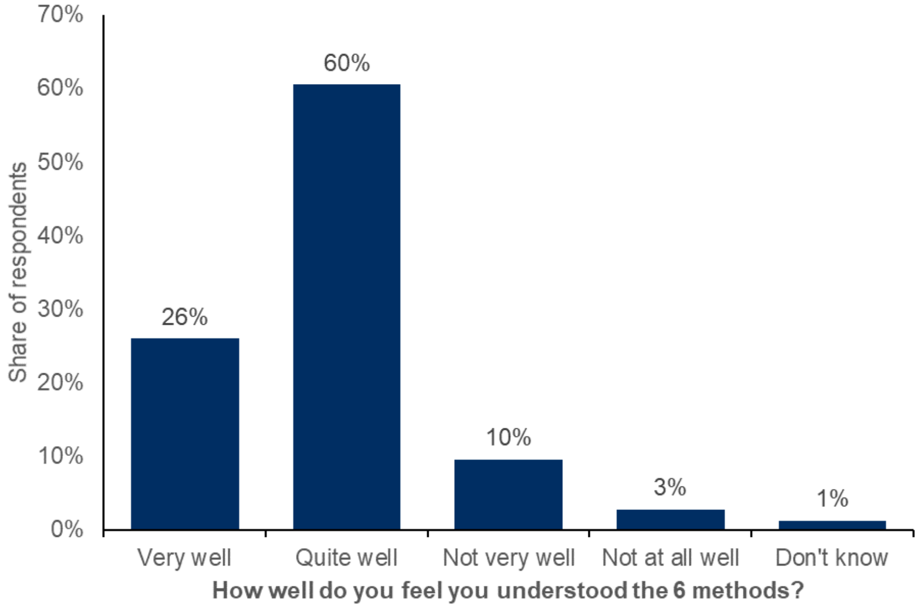
- *Self-reported ease of understanding options*: Respondents were asked to indicate both how easy they found it to work out the differences between options and how well they understood the 6 methods.  Most respondents report that it was relatively difficult (values between 1 and 3, 62 per cent) to understand the different options presented, but that they understood the 6 methods "very well" or "quite well" (86 per cent).

**Figure 3.4: Self-Reported Ease to Find Out the Differences Between the Options**




*Source: NERA analysis of WTP survey data.*

**Figure 3.5: Self-Reported Ease to Understand the Six Methods**




*Source: NERA analysis of WTP survey data.*

- *Objective measure of understanding options*: Given customers already reported that the pilot survey was difficult to understand, in the main stage we added additional questions to allow us to better understand the nature of this difficulty. After we presented them with the information showcards, respondents were also asked one multiple-choice question on each method to test their understanding of the information they had seen. Table 3.1 below shows that the majority of customers gave a correct answer, and 88 per cent of respondents answered at least 4 questions correctly (though only 47 per cent of respondents answered all questions correctly).

**Table 3.1: Share of Respondents Giving Correct Answers to Multiple-Choice Question**

| Topic | Correct answer (%) |
|---|---|
| Leakage | 74% |
| HH support | 81% |
| NHH support | 78% |
| Smart meters | 83% |
| Regulation | 93% |
| Reservoir | 94% |

*Source: NERA analysis of WTP survey data.*

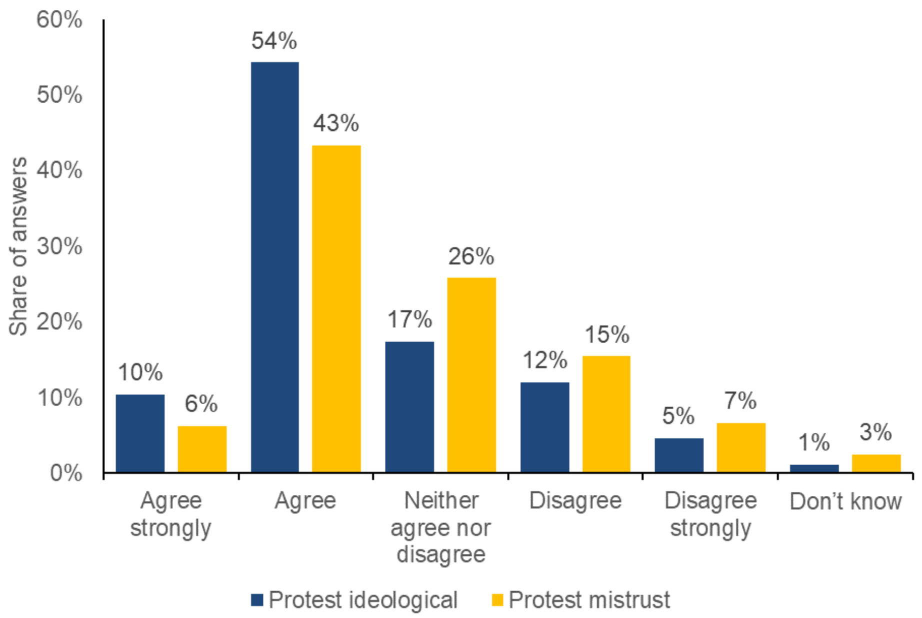
- *Protest*: We asked respondents two questions to elicit whether they held "protest" attitudes towards paying for water services, as there is evidence from academic literature that protest attitudes can influence behaviour in WTP studies.[40]

40 The exemplar study of protest attitudes and status quo preferences was investigating WTP for forest diversification in Germany. It asked respondents to indicate the extent to which they agreed with four different statements on a five-point

– Our first question asked whether respondents agreed that "if WW invests more so it can reduce the amount of water it takes from rivers and streams then bills will need to increase". This was designed to identify respondents who have an ideological objection to being asked to pay for water services. 17 per cent of respondents either disagreed or strongly disagreed with this statement.

– Our second question asked whether respondents agreed that "if your water bill increases so that WW can invest more to reduce the amount of water is takes from rivers and streams, then you would trust them to use this money to reduce that amount". This was designed to identify respondents who are mistrustful of WW. 22 per cent of respondents either disagreed or strongly disagreed with this statement.

**Figure 3.6: Share of Respondents Exhibiting Protest Attitudes**




*Source: NERA analysis of WTP survey data.*

In general, there is evidence that customers found aspects of this survey difficult to understand, more so than the Phase I survey. However, the extent to which this reduces the credibility of the findings from the study is likely limited. A number of findings support the conclusion that, while customers did find the Phase II survey more challenging than the Phase I survey, they had sufficient understanding to provide reliable answers and accurately express their preferences:

- Customers were consistent in their choices across all five exercises and did exhibit a clear preference both relating to the total amount of sustainable abstraction and between

scale. The statements were as follows (1) I already pay enough for other things (2) Lower Saxony should cut public spending for other things instead of expecting a voluntary contribution from me (3) It is my right to have a high level of biodiversity in forests and not something I should have to pay extra for (4) I refuse to assess nature in monetary terms. See Meyerhoff and Liebe (2009), *Status quo effect in choice experiments: empirical evidence on attitudes and choice task complexity, Land Economics 85*, pp. 515-528.

methods to achieve sustainable abstraction. Both the consistency and the clear preference suggest that they understood what they were being asked.

- As we describe in Section 4.1.3, we asked customers to explain the rationale for their choices. The fact that only a very limited share of respondents reported that they "don't know" the reasons of their choices suggests they did not find the exercise excessively confusing and rather understood it well enough to motivate their choices.
- As we mention above, most customers gave correct answers to the questions testing their understanding of the six methods after we present customers with an information showcard for each method.
- As explained below, running a new model specification where we control for understanding of the survey and options,[41] we do not find evidence of different preferences for customers with a good understanding of the topic and methods.

## 3.3. Conclusions on Survey Performance

Amongst customers directly invited to take part in the survey via an email invitation, 2,827 customers completed the survey, implying a higher-than-expected final response rate of 5.7 per cent.

The sample appears to over- and under-represent some socioeconomic groups. This reflects the fact we sent the survey to an extremely large number of people, and some groups exhibited a greater tendency to respond. For instance, highly educated and older people are over-represented in our sample relative to the population average. However, because of the significant sample size, we have a very high number of survey responses from all demographic groups. This means that our price sensitivity and willingness to pay analysis (discussed further below) can (i) accurately identify differences in customers' attitudes across demographic groups, and (ii) control for differences between our sample and population demographics when we estimate average willingness to pay.

The other data we collected on survey performance also suggested that the survey performed well. Most customers who participated in the survey understood the topic and methods sufficiently well, and only a relatively small proportion of the sample exhibited protest responses.

Overall, we therefore consider the survey data collected provides a reliable basis for performing our analysis, which we discuss more in detail in the following sections.

[41] In this instance, we define a respondent to have a good understanding of the survey and the methods if he answered correctly to *at least* 4 of the six multiple choice questions asked between Exercise 2 and Exercise 3.

# 4. Customers' Preferences Over Methods to Improve Sustainable Abstraction

In this section, we analyse the data collected from Exercises 1-4 to answer WW's research questions:

1. How much are customers willing to pay per unit of each method when they are required to meet a SA target?
2. How much are customers willing to pay per unit of each method when they are not required to meet a SA target?
3. How much are customers willing to pay per unit of SA?
4. Is there evidence that customers do not have strong preferences between methods, but rather want WW to meet the SA target in the least expensive way possible?
5. How do the answers to the above questions change once customers learn more about SA and about each method?

## 4.1. Summary of Descriptive Evidence

We first assess customers' preferences with a descriptive analysis of their choices in the survey and their responses to questions about the motivation for their choices. This descriptive analysis gives a general picture of which methods customers prefer and how they make decisions, but does not give us willingness to pay estimates.

Overall, this analysis shows that customers have clear preferences over the different methods of achieving sustainable abstraction. We draw three main conclusions from our initial descriptive analysis of the survey data:

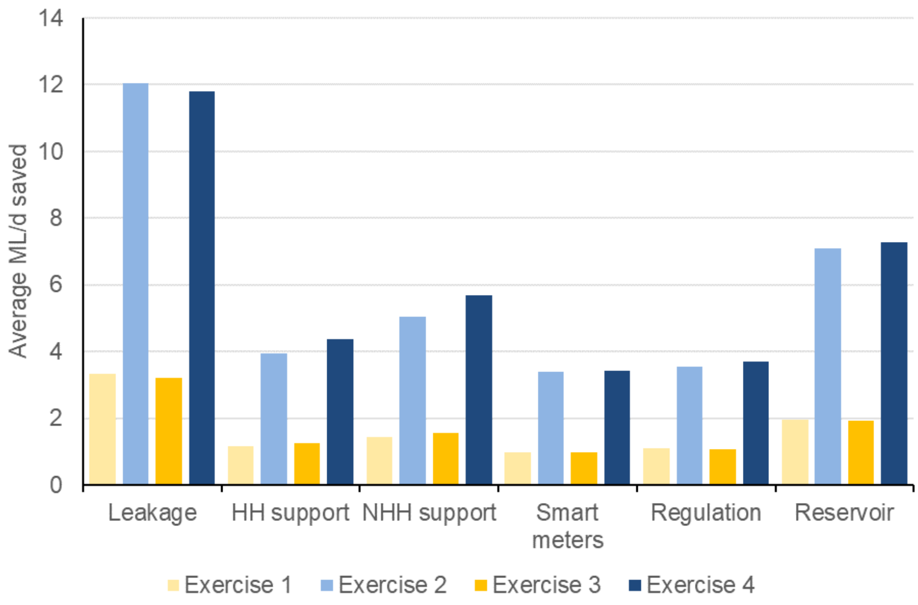
- Of the six methods available, customers' most preferred methods are leakage reduction and building a new reservoir. However, customers do not want WW to rely on these two methods exclusively. They prefer a strategy that includes some of each of the six methods, as we discuss in Section 4.1.1.
- Customers are willing to pay for improvements in sustainable abstraction beyond the target 10 ML/d. When given free choice, most customers chose materially more than 10 ML/d of sustainable abstraction activity, as we discuss in Section 4.1.2.
- On average, customers are motivated by the aim of improving the sustainability of WW's abstraction activities and want WW to do this using the methods that are most likely to be effective (i.e., they prefer methods where they perceive there to be less risk of failure to improve sustainability). While cost is a concern for some customers, for most customers it is a secondary consideration, as we discuss in Section 4.1.2.

### 4.1.1. Customers prefer leakage reduction and building a reservoir, but favour a strategy including a mix of methods

Across all four package-building exercises (Exercises 1- 4), customers' preferred method for sustainable abstraction was leakage reduction, followed by constructing a reservoir. Conversely, the least preferred method across the exercises was smart meter installation, followed closely by seeking changes to laws and legislation, denoted "Regulation" (see Figure 4.1).

- When presented with WW's target to reduce the amount of water that it abstracts by 10 ML/d by 2030, on average, customers allocated over 3 ML/d to leakage reduction, approximately 2 ML/d to building a new reservoir, and only approximately 1 ML/d to smart metering or seeking changes to laws and legislation.
- Similarly, when we remove the requirement to select an amount of sustainable abstraction equal to the target 10 ML/d, leakage reduction and building a new reservoir remain the preferred options (at approximately 12 ML/d and 7 ML/d on average, respectively), with smart metering remaining the least preferred option (at 3.4 ML/d on average).

**Figure 4.1: Customers' Allocation of Units of Sustainable Abstraction Across Package-Building Exercises**

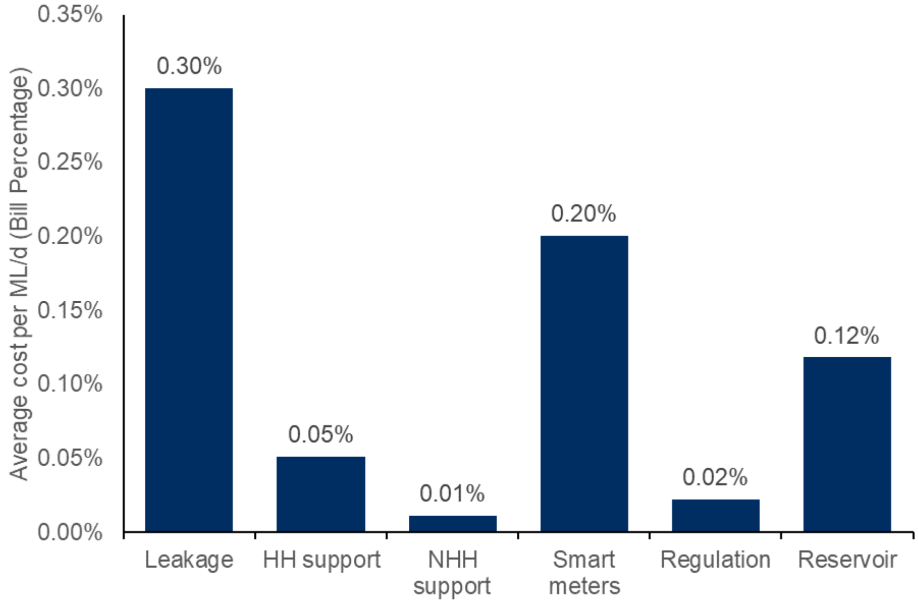



*Source: NERA analysis of WTP survey data.*

These preferences mean that respondents are not choosing the cheapest option available. As shown in Figure 4.2, leakage reduction was on average the most expensive method shown to respondents, with the highest average cost per ML/d at 0.30 per cent of the bill per ML/d saved.[42] On the other hand, implementing non-household support measures and seeking changes to laws and legislation were on average the two cheapest options (at 0.01 and 0.02 per cent of the respondent bill), but customers did not choose high levels of these options.

42 Percentage calculated as the average across respondents of the ratio of the (randomised) price shown to the respondent to that respondent's total annual bill, as reported by the respondent in the survey.

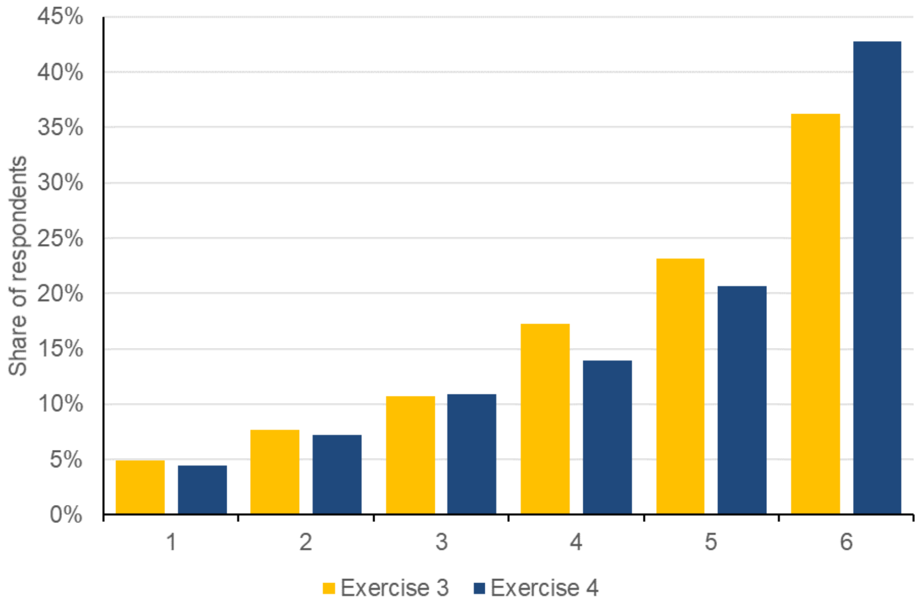
**Figure 4.2: Costs as Shown to Respondents**




*Source: NERA analysis of WTP survey data.*

Across the package-building exercises, customers preferred to spread the 10 ML/d across different methods rather than using only one method. Figure 4.3 shows the number of methods for which respondents selected a non-zero amount of intervention in Exercise 3 and Exercise 4 (i.e., after they become more informed about the six methods, having reviewed showcards with additional information on each method). Customers likely choose fewer methods in Exercise 3 because they were constrained in the quantity of units of sustainable abstraction could select (they were limited to a total of 10 ML/d to match WW's target).

**Figure 4.3: Number of Individual Methods Selected, Exercise 3 vs. Exercise 4**




*Source: NERA analysis of WTP survey data.*

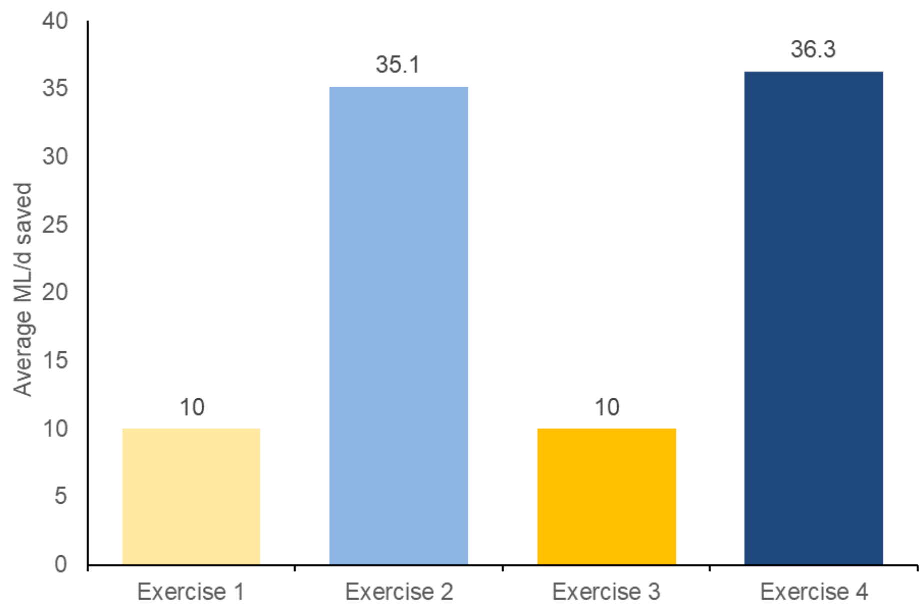
The figure shows that customers prefer to select a variety of methods, with 77 per cent per cent of respondents allocating a non-zero amount of intervention to at least 4 methods in both Exercises 3 and 4, and 36 and 43 per cent allocating some amount of sustainable abstraction to each of the six methods (Exercises 3 and 4, respectively). On the other hand, only 5 and 4 per cent (Exercise 3 and Exercise 4, respectively) allocated units of sustainable abstraction to only one method, and 8 and 7 per cent to only two.

Among respondents that allocated intervention to only one method, 56 and 53 per cent (Exercise 3 and Exercise 4, respectively) chose Leakage reduction, again showing that customers' preferred method for WW to reduce the amount of water it needs to abstract from the environment is reducing leakage.

### 4.1.2. Customers are willing to pay for improvement beyond the target

We find that respondents are generally willing to pay for improvement in sustainable abstraction well above the 10 ML/d target. In Exercises 2 and 4, where customers were not restricted to the target of 10 ML/d but could choose their preferred amount of ML/d, customers typically chose a materially higher amount of sustainable abstraction. On average, as Figure 4.4 shows, they selected 35.1 ML/d in Exercise 2 and 36.3 ML/d in Exercise 4.

**Figure 4.4: Total Amount of Sustainable Abstraction Selected, Exercises 1-4**

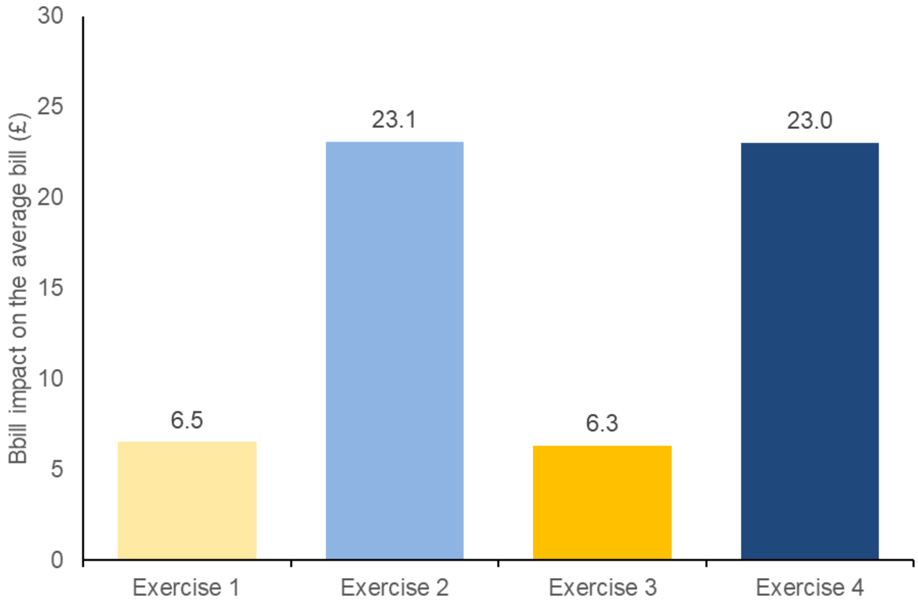



*Source: NERA analysis of WTP survey data.*

Moreover, 49 per cent of respondents chose the maximum amount of water saved (50 ML/d) in Exercise 2, whereas just 1 per cent chose 0 ML/d. In Exercise 4, after receiving additional information, 51 per cent of respondents chose the upper limit, and again only 1 per cent chose 0 ML/d.

The average impact of respondents' chosen level of sustainable abstraction on the average bill increased from £6.5 in Exercise 1 to around £23 in Exercise 2 and Exercise 4, respectively, suggesting that customers are willing to pay for a quantity of sustainable abstraction which exceeds 10 ML/d. [43]

**Figure 4.5: Bill Impact on Average Bill, Exercises 1-4**




*Source: NERA analysis of WTP survey data.*

### 4.1.3. Customers are motivated by sustainability and effectiveness

We asked respondents about the rationale for their decisions in Exercise 3 and Exercise 4, after they had received the additional information about each of the six methods.

After Exercise 3 (i.e., where we required respondents to allocate exactly 10 ML/d), we asked respondents to explain how they chose to allocate intervention between the six methods. The purpose of this question was to understand which aspects of the different methods customers prioritised in their decision-making.

The responses (summarised in Figure 4.6) suggest that customers are particularly concerned about the credibility of each of the proposed methods. The most frequently selected explanation by customers was that they chose the methods they thought would be most effective and certain to reduce the amount of water taken from rivers and streams; 44 per cent of respondents selected this option, more than twice as many as selected the next two most frequently selected options. This may explain why customers chose more tangible options (leakage reduction and new resevoirs), over less tangible options involving demand reduction.

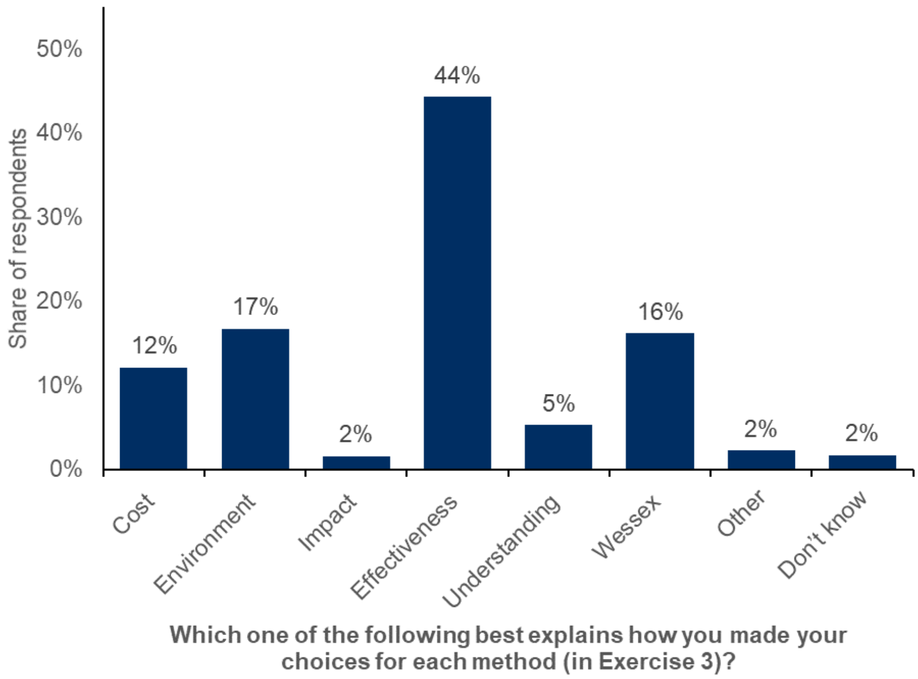
The next most frequently selected options were environmental considerations (17 per cent) and choosing the "methods that put the focus on Wessex Water, more than customers, to do as much as it can to reduce the amount of water taken from rivers and streams" (16 per cent,

[43] To generate these figures, for each respondent we calculate the impact on their bill considering (i) the amount of sustainable abstraction units they allocated to each method, and (ii) the price of each method scaled back to reflect the average respondent bill (£426 per annum).

"Wessex" in Figure 4.6 below). The latter may further explain why some customers did not select methods such as HH Support, NHH Support, and Regulation, each of which requires customers to take action (either by changing their consumption or by purchasing new appliances) to be effective.

Only 12 per cent of customers reported that cost was a significant factor in their choice between the six methods. This is consistent with our finding, reported later in Section 4.3, that customers' choices do not appear to be sensitive to the price of the different methods.

**Figure 4.6: Reasons for Choices in Exercise 3**



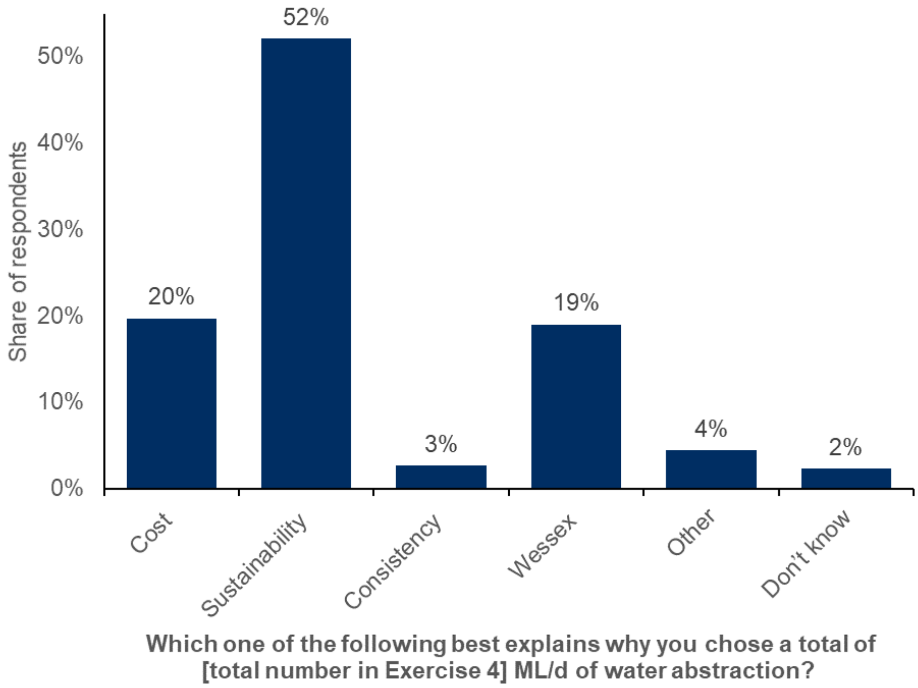

*Note: "Wessex" means that customers "chose methods that put the focus on Wessex Water, more than customers, to do as much as it can to reduce the amount of water taken from rivers and streams".*
*Source: NERA analysis of WTP survey data.*

After Exercise 4, in which we allowed respondents to select any amount of intervention up to 50 ML/d, we asked respondents to explain how they decided on the total level of intervention that they chose.

Over half of respondents (52 per cent) reported that they prioritised improving sustainability when selecting the total level of intervention (see Figure 4.7). This may explain why over half of respondents selected the maximum possible level of intervention (50 ML/d).

A somewhat higher proportion of respondents said that cost was the main factor in their decision in Exercise 4 (20 per cent) than in Exercise 3 (12 per cent). This is not surprising as the range of possible total bill impacts in Exercise 4 is substantially wider than the range in Exercise 3, making it more likely that cost would become a salient factor in customers' decision-making. Respondents saying that cost was the main factor in their decision making selected fewer units of sustainable abstraction than respondents selecting any other motivation, albeit they still select materially above the target (on average, over 30 ML/d).

**Figure 4.7: Reasons for Choices in Exercise 4**




*Note: Wessex" means that customers "trust that Wessex's target amount is the right one".*
*Source: NERA analysis of WTP survey data.*

## 4.2. Methodological Approach

For WW to plan its actions to improve the sustainability of its abstraction activities, it requires a more precise understanding than can be obtained through descriptive statistics of the type set out in Section 4.1 of:

1. How customers make trade-offs between increases to their bill and investment in different methods to improve sustainable abstraction; and
2. Whether customers see the different methods of SA as substitutable for one another.

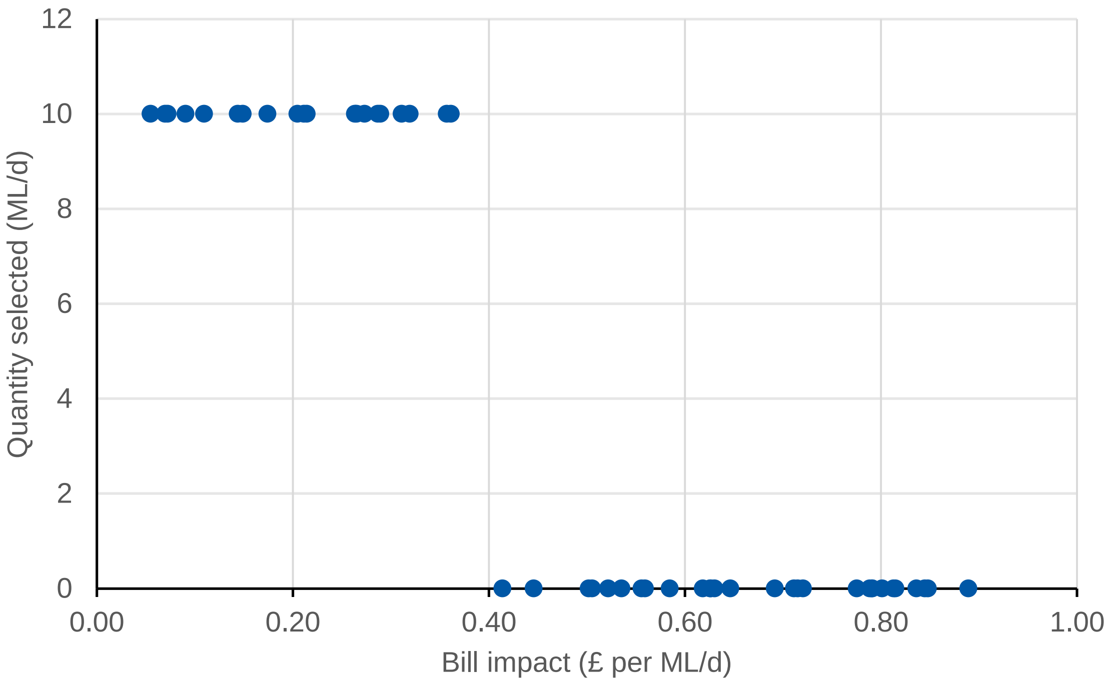
For point (1) above, we need to estimate customer willingness to pay (WTP), that is, a price (or bill impact) that customers would be willing to pay per unit of improvement by each method. In this setting, the unit of improvement is one ML/d of reduced abstraction.

It is conventional in willingness to pay studies to assume that customers are willing to pay the same amount per additional unit regardless of how many units they receive in total, that is, to assume that customers have a *constant WTP*. If customers do have a constant WTP for each of the six methods of improving sustainable abstraction, then in Exercises 1-4 of our survey, customers would choose as follows:

- If the price for a given method were *at or below* the constant WTP, the customer would choose as much of that method as possible;
- If the price for a given method were *above* the constant WTP, the customer would choose none of that method.

Therefore, assuming all customers had the same WTP, we should a following pattern like that shown in Figure 4.8, below, in the data collected from our survey (in this example customers' WTP is constant at £0.40 per ML/d).

**Figure 4.8: Stylised Illustration of Constant WTP**



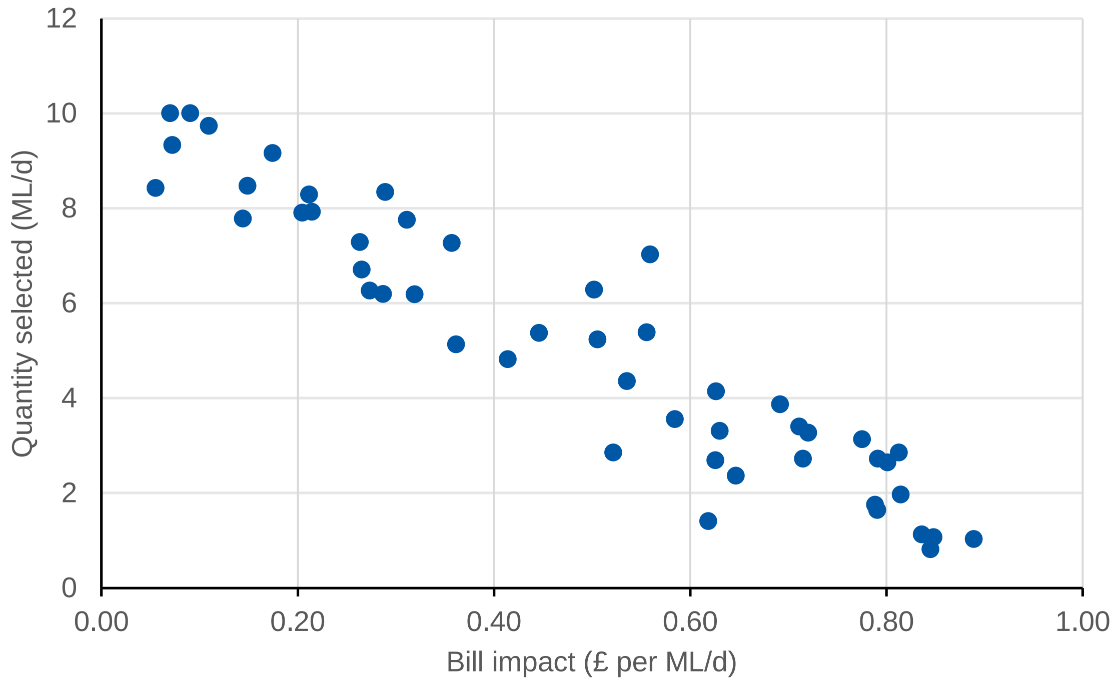

*Source: NERA analysis*

It is also possible that customers may not have a constant WTP. In particular, customers may care more about the first ML/d reduced through any given method that WW provides than subsequent ML/d. That is, their WTP may *decrease* as the number of ML/d provided by a given method increases. If customers' WTP decreases as the number of units of a given method increases, then we would expect that in Exercises 1-4 of our survey, customers would choose as follows:

- If the price for a given method is relatively high, customers should choose a small amount of that method; and
- As the price becomes lower, customers should choose more of that method, but only up to the point that their WTP for the additional unit exceeds the price.

Therefore, assuming all customers have the same WTP, we should see a pattern like that shown in Figure 4.9, below, in the data collected from our survey.

**Figure 4.9: Stylised Illustration of WTP that Decreases with Quantity**




*Source: NERA analysis*

We include the actual, outturn patterns of respondents' choices in Exercises 3 and 4 of our survey in Figure C.1 to Figure C.12 in Appendix C.

Overall, then, to understand and estimate customers' WTP for each method, we need to analyse the relationship between the price the customer sees and the quantity they choose. In our survey we randomly vary the price that each customer sees and so to understand the relationship between price and quantity we analyse how the quantity chosen changes with the price shown, i.e., the *own-price sensitivity* of customers' choices.[44]

For point (2) above, i.e., understanding whether customers see the different methods of SA as substitutable, we need to assess whether customers would switch between methods as the relative prices of the different methods change. Specifically, if customers do see the different methods as substitutable, we would expect that as any given method becomes more expensive customers would select less of that method and select more of (at least one of) the other five methods.

Therefore, to understand whether customers see the different methods of SA as substitutable, we need to examine whether there is a relationship between the quantity of each method that the customer chooses and the prices of the other methods, i.e., the *cross-price sensitivity* of customers' choices.

We use a regression approach to analyse the data from Exercises 1-4 to assess:

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44 We adopt a survey design where we vary the price and ask customers to choose a quantity (rather than vice versa) because this is likely to be more accessible to customers, since it is more reflective of their day-to-day market experiences, where they see fixed prices (e.g., in a supermarket) and choose how much they want to buy.

1. The degree of *own-price sensitivity*, that is, how customers' chosen amount of any given method changes as it becomes more expensive;
2. The degree of *cross-price sensitivity*, that is, whether customers considered the prices of the other five methods when deciding how much of a given method to select. If customers did consider the prices of the other five methods, this would indicate that customers view the methods as *substitutes*, that is, they see the methods as (at least partially) interchangeable;
3. Whether any relevant sub-group shows materially different preferences and price-sensitivity compared to the generality of respondents; and
4. The impact of additional information regarding the six methods, as conveyed to respondents using the information showcards, on respondents' preferences.

We assess customer price-sensitivity by estimating a *demand function*, which describes the relationship between the quantity a customer chooses of a given method and other factors on which we have data that may influence their choice and (such as the price of that method or other methods).

We assume that demand for sustainable abstraction (*SA*) through a given method ($j$) for each respondent ($i$) can be represented by the following equation (i.e., the demand function):

$$SA_{ij} = \alpha_j + \beta_j P_{ij} + \eta_j P_{i,-j} + \gamma_j B_i + \lambda_j D_i + \epsilon_{ij} \qquad (1)$$

Thus, we assume that the demand for sustainable abstraction through any given method $j$ depends on:

- A constant, $\alpha_j$, which captures the baseline amount of method $j$ that the customer would choose before accounting for other factors;
- The price the customer sees for that method, $P_{ij}$ (hereafter *own-price*). Section 2.5.2 provides further information about how we set the price that each customer sees;
- A parameter $\beta_j$ that captures the average relationship between the own-price of method $j$ and demand for method $j$. We expect that, if customers exhibit *own-price sensitivity*, their demand for sustainable abstraction through method $j$ would decrease if that price is higher; therefore, we expect $\beta_j$ to be negative;
- The price that the customer sees for other, alternative methods, $P_{i,-j}$ (hereafter *cross-prices*);
- A parameter $\eta_j$ that captures the average relationship between the cross-price of each alternative method ($-j$) and demand for method $j$. We expect that, if customers exhibit *cross-price sensitivity*, their demand for sustainable abstraction through method $j$ would increase if the price of alternative methods (i.e., the other 5 methods WW could implement to improve sustainable abstraction) is higher, to the extent that the methods are perceived as substitutes. Therefore, we expect $\eta_j$ to be positive;
- The respondent's total bill, $B_i$;
- A parameter $\gamma_j$ that captures the average relationship between a customer's bill and their demand for method $j$. We include this parameter because the prices that a customer sees are scaled to that customer's bill, so customers with higher bills typically see higher

prices. Including $\gamma_j$ ensures that the estimated price effects $\beta_j$ and $\gamma_j$ are not distorted by this relationship between prices and the bill;[45] and

- The respondent's demographic and billing characteristics, including payment method, metering status, gender, age, socio-economic group, and whether they qualify for a social tariff ($D_i$).

We estimate this model for each of the six methods and for each of the four package-building exercises using a simple Ordinary Least Square (OLS) regression.

We use the estimated own-price coefficients $\beta_j$ to draw conclusions about customers' willingness-to-pay (WTP) for each of the methods in each exercise as follows:

- Where the coefficient $\beta_j$ is statistically insignificant, this means there is no evidence that the amount of a given method that customers choose changes with prices, i.e., that on average, customer demand is not *own-price sensitive* (at least for the range of values for the price shown in the survey).
  - This is consistent with the average customer having a constant WTP at a level above the range of prices used in these exercises. The maximum price shown in the survey can therefore be treated as a lower bound on that constant WTP.
  - In some cases, even if customers do not appear to be price-sensitive, we do not see that they select the maximum possible amount of a given method. Instead, they seem to have a preference for a particular amount of the method that is below the maximum possible. We reflect this in our final estimate by reporting that customers have a constant WTP *up to* a fixed amount of a given method, beyond which they do not want more of that method.
- Where the coefficient $\beta_j$ is statistically significant, this means there is evidence that the amount of a method customers choose does depend on its price (i.e., *own-price sensitivity*), this means that customers do not have a constant WTP. Instead, the WTP changes depending on the quantity of the method provided. We use the parameters of the estimated demand function (equation (1)) to calculate the WTP at each quantity of that method provided by WW. As we explain in Section 3.2, we adjust our WTP estimates for over- or under-representation of demographic and billing characteristics by using the population average values for demographic variables to construct WTP from the estimated demand curve, instead of the sample average values for these variables.

We discuss this further in Section 4.4.

We use the cross-price coefficients $\eta_j$ to inform our understanding of whether customers see the different methods as substitutes, such that it is possible to derive a single, common WTP estimate for sustainable abstraction.

- To the extent that the cross-price coefficients are statistically significant, this constitutes evidence that customers see the different methods as substitutes.

45 Specifically, we are concerned that customers with higher bills may have more disposable income and therefore be more willing to select higher levels of each method (i.e., an income effect). Including the total bill in the regression controls for any income effects.

- If the cross-price coefficients are statistically insignificant, this suggests that the customers do not see the different methods as substitutes and therefore cannot be described as having an overall WTP for sustainable abstraction irrespective of the method of delivery.

We discuss this further in Section 4.5.

## 4.3. Summary of Regression Results

As explained in Section 4.2, we estimate the demand function in equation (1) for each of the four package-building exercises using an OLS regression.[46] We report the full results of this analysis in Table D.3 to Table D.6 of Appendix D.[47] Below, we describe the key findings with respect to own-price sensitivity, cross-price sensitivity, and controls in turn.

First, the results show **limited evidence of own-price sensitivity**. The only method for which there is robust evidence of own-price sensitivity is building a new water source (Reservoir). This is the only method for which there is a statistically significant relationship between the price of the method and the quantity selected by customers across all four exercises.[48]

For the other five methods, we see only limited evidence of own-price sensitivity. All coefficients on the own price, with the exception of the coefficients on smart meters in Exercises 1 and 3, have the expected sign (i.e., they are negative, meaning that as the price of the method increases, the quantity that customers choose decreases). However, only five of the remaining 18 own-price coefficients are statistically significant at the 5 per cent level, and the methods for which the own-price coefficients are statistically significant vary across exercises.[49] Given the relatively large sample size of 2,228 valid responses, the lack of statistical significance means that the relationship between the price of a method and the quantity selected is relatively weak.

These findings lead us to adopt a constant WTP for five of the six methods and a quantity-specific WTP for the Reservoir.

Second, the results show **very limited evidence of cross-price sensitivity.** Customers' preferences for the amount of SA to be delivered by each method are typically not sensitive to the prices of alternative methods. Although we find a small number of cross-price

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46 We also estimated a more general demand function which also controlled for interaction effects between (i) respondents' demographic and billing characteristics and (ii) the prices they were shown in the survey and their bills. The estimated coefficients in this model typically either were statistically insignificant, had directional effects that ran counter to our expectations and economic theory, or had inconsistent directional effects and statistical significance across exercises. We concluded that the poor performance of this model was likely because the model included too many parameters (we were estimating 55 coefficients for each method, considering own-prices, cross-prices, bill size, and controls included both alone and interacted with prices and bill size). We therefore opted to reduce the complexity of the model by excluding interaction terms, which seemed not to have any meaningful impact on customers' choices.

47 Note that, despite the starting sample of 2,745 observations, the number of observations included in the regression model is lower due to some respondents not providing information around their demographic and billing characteristics. For each model, we report the number of observations in the regression tables in Appendix D.

48 Here and throughout we assess statistical significance at the 5 per cent significance level.

49 Specifically, the methods for which own-price coefficients are statistically significant at the 5 per cent level are: HH Support (in Exercises 1 and 3), NHH Support (in Exercise 3), Regulation (in Exercise 1), and Leakage (in Exercise 4).

parameters to be statistically significant,[50] only one cross-price coefficient remains statistically significant across multiple package-building exercises: the coefficient describing the relationship between the quantity of reservoir construction that customers select and the price of HH support. The other occasional findings of statistical significance are likely to be spurious and a result of the number of coefficients that we estimate.[51]

The lack of cross-price sensitivity suggests that customers make choices about their preferred amount of each method based on other, unobservable characteristics of the methods rather than just sustainable abstraction. This means that customers do not perceive the methods as substitutes (e.g., they may not feel all methods are actually able to improve sustainable abstraction or they value significantly other characteristics of the methods).

Given the lack of cross-price sensitivity, as a robustness check we also estimated a model in which we excluded cross-price effects to see whether using a smaller, more focused model might increase the statistical significance of some of the own-price effects.[52] We found that excluding the cross-price effects had very little impact on the other parameters of the model, and so we do not discuss that specification further. For reference, the full results of that specification are reported in Table D.7 to Table D.10 of Appendix D.

Another possible explanation for the lack of both own- and cross-price sensitivity is that customers may not be internalising price information and the fact that their bills would increase to pay for these interventions. This is a general limitation of customer stated preference surveys. To the extent possible, we have sought to limit the risk of this by emphasising at several points throughout the survey that any improvements would need to be paid for through customers' bills, using targeted language (i.e., "**your** bill will increase" [emphasis added]), and linking the bill impacts shown to the customer's current bill.

The fact that the estimated effects of control variables are broadly consistent with expectations supports the hypothesis that customers are engaging with the survey and making choices that appear consistent with intuition:

- As compared to other customers, customers on social tariffs select statistically significantly more of a relatively cheaper option (HH support) in exercises 1 and 3, and statistically significantly less of the most expensive option (leakage reduction) in exercises 2 and 4. This may reflect the fact that customers on social tariffs are income-constrained and so when required to meet the target 10 ML/d they do so using the cheaper options, while when not required to meet the target they are less willing to pay the cost of additional leakage reduction.
- As compared to other customers, customers in the ABC1 socio-economic group choose statistically significantly less of the cheaper options when constrained to meet the target 10 ML/d, and statistically significantly more of expensive options like leakage and the

[50] Here and throughout we assess statistical significance at the 5 per cent significance level.

[51] With six methods and four exercises, we have 120 cross-price coefficients (24 models and five cross-price effects per model). Therefore in expectation we should see 6 statistically significant coefficients at the 5 per cent significance level by pure chance, since 5 per cent of 120 is 6. Other than coefficients describing the relationship between the amount of Reservoir and the price of HH support, the total number of cross-price coefficients that are statistically significant in our analysis is 5.

[52] Specifically, we wanted to test whether increasing the degrees of freedom in the model would result in a higher number of statistically significant coefficients.

reservoir when unconstrained. We find similar results for older customers and for men. All three groups (ABC1, older customers, and men) are likely to have more disposable income than other survey respondents and therefore may be more willing to accept bill increases to pay for their preferred methods of sustainable abstraction.

- Direct customers select significantly higher levels of HH support and regulation when unconstrained (i.e., exercises 2 and 4) than other customers. Again, direct debit customers are likely to have more disposable income than other respondents and therefore be less constrained by cost. It may also be the case that individuals who are willing to set up direct debits are more trusting of their water company and therefore more willing to pay for measures like HH support and regulation, whereas less trusting customers may be sceptical regarding the effectiveness of these measures.
- Metered customers select a statistically significantly higher level of smart metering across all four exercises. Metered customers may be more to be aware of the potential benefits of smart meters.

## 4.4. Customers' Estimated WTP For Each Method

In this section, we report our estimates of customer WTP for each of the six methods from each of the four exercises, following the analytical approach set out in Section 4.2 and based on the regression results described in Section 4.3.

The only method for which customers consistently exhibit own-price sensitivity is improving the sustainability of WW's abstraction by building a new water reservoir. This means that this is the only method for we estimate a variable WTP (as per the illustration in Figure 4.9).

We calculate the variable WTP values for the reservoir option using the approach set out in Section 4.2. That is, we calculate WTP using the parameters we estimated for equation (1), adjusted for population average values to account for the sample over- or under-representation of demographic and billing characteristics, to reflect the "average respondent".

Specifically, we calculate quantity-specific WTP values adopting the following three-step procedure:

- First, we note that equation (1) above estimates the relationship between methods' prices (and other factors such as demographic and billing characteristics) and the quantity respondents select. Thus, we re-write it to express the price of the methods as a function of the quantity of sustainable abstraction and other factors as follows, using the same notation as in Section 4.2:

$$P_{ij} = \frac{(\alpha_j + \eta_j P_{i,-j} + \gamma_j B_i + \lambda_j D_i - SA_{ij})}{\beta_j} \qquad (2)$$

- Second, we input the parameters estimated through regression analysis and average population values into the new equation (equation (2) above).[53] This now expresses the (negative) relationship between the method's price and quantity selected only.

53 Specifically, for each method and exercise, we input the parameters $\alpha_j$, $\eta_j$, $\gamma_j$, $\lambda_j$, and $\beta_j$ as estimated by the regressions discussed in Section 4.3, and the average population values for $B_i$ and $D_i$.

- Lastly, we calculate the marginal WTP (represented by $P_{ij}$) at different quantities ($SA_{ij}$, going from 1 to 10 ML/d). The results, as we explain below, should be interpreted as customers' WTP for the marginal (i.e., last) unit of sustainable abstraction.

The results of this analysis of WTP for the reservoir option are presented in Table 4.1 below. Taking Exercise 4 as an example, the results should be read as follows. In Exercise 4, where respondents could choose sustainable abstraction quantities between 0 and 50 ML/d, the average respondent would be willing to pay £2.68 for the first ML/d of sustainable abstraction achieved by building a reservoir, £2.35 for the second ML/d of sustainable abstraction, £2.02 for the third ML/d of sustainable abstraction, and so on. It would not be willing to pay any amount for the tenth ML/d of sustainable abstraction achieved by building a reservoir.

The results are consistent with the descriptive evidence reported in Section 4.1, which shows that respondents select just below 2 (in Exercises 1 and 3) and around 7 (in Exercises 2 and 4) units of SA. Noting that the average price they face in the survey is £0.50 per ML/d, the same findings emerge considering the average respondent's WTP for Reservoir, which is greater than the method's average per unit price for only the first unit of SA in Exercises 1 and 3, and up to the seventh unit of SA in Exercises 2 and 4.

**Table 4.1: Per Unit WTP for Reservoir for the Average Respondent**

| Demand for SA (ML/d) | Per unit WTP (£ per ML/d) | | | |
|---|---|---|---|---|
| | **Exercise 1** | **Exercise 2** | **Exercise 3** | **Exercise 4** |
| 1 | 1.92 | 2.69 | 1.96 | 2.68 |
| 2 | 0.48 | 2.34 | 0.46 | 2.35 |
| 3 | 0 | 1.98 | 0 | 2.02 |
| 4 | 0 | 1.62 | 0 | 1.69 |
| 5 | 0 | 1.26 | 0 | 1.37 |
| 6 | 0 | 0.91 | 0 | 1.04 |
| 7 | 0 | 0.55 | 0 | 0.71 |
| 8 | 0 | 0.19 | 0 | 0.38 |
| 9 | 0 | 0 | 0 | 0.05 |
| 10 | 0 | 0 | 0 | 0 |

*Source: NERA analysis of WTP survey data.*

For the remaining five methods, respondents are not price-sensitive. We therefore estimate a constant WTP, on the basis that the evidence suggests that customers are willing to pay at least up to the maximum price shown, for the quantity of SA that they selected. As Table 4.2 shows, this means that it is reasonable to assume that customers are willing to pay:

- At least £2.22 per ML/d for improving SA by ca. 3 ML/d (Exercises 1 and 3) and ca. 12 ML/d (Exercises 2 and 4) through Leakage reduction;
- At least £0.34 per ML/d for improving SA by ca. 1 ML/d (Exercises 1 and 3) and ca. 4 ML/d (Exercises 2 and 4) through HH Support;
- At least £0.09 per ML/d for improving SA by ca.1.5 ML/d (Exercises 1 and 3) and ca. 5 ML/d (Exercises 2 and 4) through NHH Support;

- At least £1.35 per ML/d for improving SA by ca. 1 ML/d (Exercises 1 and 3) and ca. 3.5 ML/d (Exercises 2 and 4) through Smart Meters; and
- At least £0.16 per ML/d for improving SA by of 1 ML/d (Exercises 1 and 3) and ca. 3.5 ML/d (Exercises 2 and 4) through Regulation.

**Table 4.2: Methods' Price Ranges Presented in the Survey**

| | Average (£) | Std. Dev. (£) | Minimum (£) | Maximum (£) |
|---|---|---|---|---|
| Leakage | 1.28 | 0.54 | 0.34 | 2.22 |
| HH Support | 0.22 | 0.07 | 0.09 | 0.34 |
| NHH Support | 0.05 | 0.02 | 0.02 | 0.09 |
| Smart Meters | 0.85 | 0.29 | 0.36 | 1.35 |
| Regulation | 0.10 | 0.03 | 0.03 | 0.16 |
| Reservoir | 0.50 | 0.14 | 0.25 | 0.75 |

*Source: NERA analysis of WTP survey data.*

## 4.5. No Common WTP for Sustainable Abstraction

It is clear from the descriptive evidence in Section 4.1.2 that customers are willing to pay for a quantity of sustainable abstraction which exceeds the target of 10 ML/d. This indicates that customers do place value on improving the sustainability of WW's abstraction activities. However, because customers' choices indicate that they do not see the different methods that WW could use to achieve that abstraction as substitutes, it would not be an accurate reflection of customers' preferences to estimate a single combined WTP for sustainable abstraction. Instead, the evidence from this survey suggests WW should use the WTP values for each individual method in its business planning, not a single value on the sustainable abstraction outcome.

Both the descriptive evidence in Section 4.1 and the regression analysis in Section 4.3 shows that customers do not perceive the six methods as substitutes:

- If customers perceived the methods as *perfect substitutes* and based their choices solely on sustainable abstraction, we expect that they would always choose the maximum amount of the cheapest method. However, from Section 4.1, we know that respondents mostly selected the most expensive option (leakage reduction).
- If customers perceived the methods as *partial (imperfect) substitutes* and based their choices largely on sustainable abstraction, they would have exhibited some degree of cross-price sensitivity, shifting between methods depending on the relative prices of each. However, from Section 4.3 we know that there is very little evidence of cross price sensitivity.

Instead, the evidence suggests that customers make choices based on other characteristics of the methods (i.e., besides their capability to improve WW's sustainability when it abstracts water from the environment). The evidence on customers' motivations in Section 4.1.3, for example, suggests that customers' preferred methods that primarily required action by WW (rather than behaviour change by customers) and also were concerned about the wider environmental impacts of the different methods.

In practice, this means that we cannot aggregate customers' choices in a sensible way to estimate a common WTP for sustainable abstraction, independent of the method used. That is, we cannot infer from the fact that customers have a relatively high WTP for leakage that they would be happy for WW to increase bills by up to that amount to improve sustainable abstraction through another, less expensive method.

What we can infer from the data collected in the survey is that, on average, customers want more sustainable abstraction than the target of 10 ML/d and would be willing to pay for it through their favoured means of doing so. We take customers' choices in Exercise 4 to be the best evidence on customers' preferences for the overall level of sustainable abstraction, as in this exercise customers have received additional information about the six methods and can choose their preferred total amount of improvement. On average, in Exercise 4 customers choose to increase their annual bill by £23 to improve sustainable abstraction by 36 ML/d (in total) through a strategy that prioritises leakage reduction and building a new reservoir but includes some of all six methods.

## 4.6. The Impact of Additional Information

Finally, we assess the impact of providing customers with additional information on the six different methods on the customers' choices. We find that there is a small but statistically significant impact of the information on customers' choices. Specifically:

- Looking at customers' choices for each method individually when they are constrained to meet WW's 10 ML/d target, we see that after receiving additional information customers' preferences change slightly. Customers choose less of leakage reduction and the reservoir, and more of HH and NHH support.
- Looking at customers' choices for each method individually when they are not constrained to meet WW's 10 ML/d target, we again see that customers choose less leakage reduction and more HH and NHH support. However, in this case customers also increase the amount of reservoir and regulation that they choose.
- Finally, looking at the total amount of improvement in sustainable abstraction that customers choose, we see that between Exercise 2 and Exercise 4 respondents increase the total amount of improvement they select by 1.22 ML/d on average. However, there is no significant increase in customers' bills between Exercise 2 and Exercise 4.

Overall, this means that once customers learn more about the six different methods, they are more willing to select the less expensive methods, so they can achieve more improvement in sustainable abstraction for the same overall bill impact. However, the impact of additional information is small.

To assess whether customers' WTP for each method changes once customers learn more about each method, we test whether the amount of each method each customer chooses changes between the exercise *before* the customer receives the information and the exercises *after* the customer receives the information. Since the prices that the customer sees do not change between the exercises before and after receipt of information, looking at whether the amount chosen changes between methods is sufficient to understand whether the WTP changes.

We test this for both types of exercise: the exercises where customers are constrained to select 10 ML/d, in line with the Wessex target, and the exercises where customers can freely choose between 0 and 50 ML/d. Specifically, we test whether the following are statistically significantly different from zero:

- The average across customers of the change in ML/d selected between exercise 1 and exercise 3, for each method; and
- The average across customers of the change in ML/d selected between exercise 2 and exercise 4, for each method.

We implement this using a simple t-test and summarise the results in Table 4.3 and Table 4.4. The first column of each table reports the average amount of ML/d selected in the exercise before customers receive additional information. The second column of each table reports the average amount of ML/d selected after customers receive additional information. The third column and fourth column report the average, across customers, of the *difference* in the amount selected between the two exercises in absolute ML/d and as a percentage of the total SA selected in each exercise. The stars indicate whether these differences are statistically significantly different from zero.

**Table 4.3: t-test – Exercise 1 (E1) vs. Exercise 3 (E3)**

| | Average E1 (ML/d) | Average E3 (ML/d) | Average Diff. E3-E1 (ML/d) | Average Diff. (% of total SA in E1) |
|---|---|---|---|---|
| Leakage | 3.337 | 3.203 | -0.135*** | -1.35%*** |
| HH Support | 1.165 | 1.251 | 0.086*** | 0.86%*** |
| NHH Support | 1.445 | 1.553 | 0.108*** | 1.08%*** |
| Smart Meters | 0.997 | 0.984 | -0.013 | -0.13% |
| Regulation | 1.097 | 1.084 | -0.013 | -0.13% |
| Reservoir | 1.959 | 1.926 | -0.033** | -0.33%** |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

**Table 4.4: t-test – Exercise 2 (E2) vs. Exercise 4 (E4)**

| | Average E1 (ML/d) | Average E3 (ML/d) | Average Diff. E3-E1 (ML/d) | Average Diff. (% of total SA in E2) |
|---|---|---|---|---|
| Leakage | 12.017 | 11.799 | -0.218*** | -0.62%*** |
| HH Support | 3.962 | 4.371 | 0.41*** | 1.17%*** |
| NHH Support | 5.030 | 5.694 | 0.664*** | 1.89%*** |
| Smart Meters | 3.432 | 3.464 | 0.032 | 0.09% |
| Regulation | 3.549 | 3.695 | 0.146*** | 0.42%*** |
| Reservoir | 7.132 | 7.314 | 0.183** | 0.52%** |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

Although the t-tests provide evidence of a statistically significant difference between respondents' choices before and those after the showcards, the magnitude of the difference is small. When we express the differences as percentages relative to the average number of

ML/d selected (10 in Table 4.3 and 35.1 in Table 4.4), we see that the change never exceeds 2 per cent of the total selected ML/d.

To assess whether the total amount of sustainable abstraction customers select changes once they have received additional information about the six different methods, we again rely on a t-test. In this case we test whether the average, across customers, of the difference between the amount selected in Exercise 2 and that selected in Exercise 4 is significantly different from zero. We report the results in Table 4.5.

Table 4.5 shows that customers select more ML/d of sustainable abstraction overall after they become more informed. On average, customers select an additional 1.22 ML/d of sustainable abstraction in Exercise 4 than they do in Exercise 2, which is an increase of 3.5 per cent. However, the increase in overall sustainable abstraction is not matched by a statistically significant change in the average customer's bill, which remains the same across Exercise 2 and Exercise 4.

**Table 4.5: t-test – Total Quantity of Sustainable Abstraction Selected and Bill Impact, Exercise 4 (E4) vs. Exercise 2 (E2)**

| | Mean E4 | Mean E2 | Diff. (1 - 2) | Diff. (% compared to E2) |
|---|---|---|---|---|
| Total SA (ML/d) | 36.34 | 35.12 | 1.22*** | 3.46%*** |
| Bill Impact (£) | 23.08 | 23.09 | -0.01 | -0.05% |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## 4.7. No Significantly Different Price-Sensitivities for Particular Sub-Groups

We test a number of variations on the simple model described in Section 4.2 to examine whether the results change when we restrict the sample to certain sub-groups. Specifically, we test whether customers' preferences and price-sensitivity differ across sub-groups to:

- Check whether the results are consistent when we consider the different experiences respondents had with the survey. Specifically, we control for whether the results change when we consider whether respondents understood the survey,[54] or whether they exhibited protest responses;[55] and
- Check whether certain targetable and relevant sub-groups appear more price-sensitive (i.e., the amount of any given method they choose changes more with the method's price, compared to the generality of respondents), to allow WW to take (if needed) fairness considerations into account when designing charging structures which reflect the increased costs from improving sustainable abstraction. Specifically, we check this for customers on a social tariff, customers who reported to struggle to pay their water bill,

54 We use as a measure the "objective measure of understanding options" discussed in Section 3.2.3 and thus consider a respondent to understand the survey well if they answered 4 or more questions correctly.

55 We consider a respondent to exhibit protest attitudes if they expressed either "ideological" or "mistrust" concerns, as discussed in Section 3.2.3.

and customers with someone in their household with a long-term physical or mental health condition.

We test these models by employing a methodology similar to that outlined in Section 4.2, and running a set of regressions (for each exercise and method) to assess the preferences of each of the five subgroups considered. The methodology includes two main changes:

- First, given the lack of evidence of a statistically significant relationship between respondents' choices and prices of alternatives, we adopt a more focused model in which we do not control for cross-price effects.[56]
- Second, we include (for each set of regressions) two new control variables:
  - A dummy variable for the sub-group considered (i.e., a variable taking value equal 1 if the respondent is part of the sub-group and 0 otherwise). The parameter attached to this variable would capture the average relationship between the sub-group under analysis and their baseline demand for the method; and
  - An interaction variable between the dummy variable for the sub-group (as explained above) and the method's price. The parameter attached to this variable is what we are interested in to assess whether the sub-group, on average, shows a different degree of price-sensitivity compared to the rest of the sample. If this parameter is statistically significant, it would mean that the sub-group increases (if positive) or decreases (if negative) their demand for sustainable abstraction through the method if the method's price is higher.

We report the full results of this analysis in Table D.11 to Table D.30 in Appendix D.

Overall, we find again very limited evidence of own-price sensitivity (reservoir construction remains the only method for which there is robust evidence of own-price sensitivity).

Further, we find there is very limited evidence that the sub-groups have a different degree of price sensitivity to the whole sample. Across the sub-groups and sets of regressions, only four of the coefficients on the interaction variables remain statistically significant across two or more package-building exercises:

- The coefficients on Smart Meters (positive) and Regulation (negative) in the model controlling for understanding of the survey and methods (Exercises 1 and 3);
- The coefficient on HH Support (positive) in the model controlling for respondents paying a social tariff (Exercises 1 and 3); and
- The coefficient on Regulation (positive) in the model controlling for whether respondents reported to struggle to pay their water bill (Exercises 2, 3 and 4).

However, these coefficients sometimes have counterintuitive directional effects or magnitudes, suggesting that they may be spurious and a result of the number of coefficients that we estimate across the models and exercises.[57]

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56 As discussed, in Section 4.3, we already estimated this model with the main demographic and billing characteristics we control for as a robustness check to the main model.

57 With six methods, four exercises, and five sub-groups we estimate a total of 120 coefficients.

Hence, the general lack of statistical significance and consistency in directional effect and magnitude suggests that the relationship between the price of the methods and the quantity selected is weak, and it is not statistically different for any of the sub-groups when compared to the rest of the sample.

# 5. Customers' Solution to Wessex Water's Planning Problem

In this section, we review the evidence on customers' responses to Exercise 5, in which we ask them how they would solve WW's planning problem. Whilst in Section 4 we are interested in estimating customers' willingness to pay for each method and thus relied on respondents' answers to questions about a stylised and simplified version of reality, we now ask respondents to make decisions in a world that incorporates more of the actual costs and constraints WW faces.

In Exercise 5 we show respondents the actual impact on their bill that would result from implementing a given level of each method, as well as any constraints on the feasible scale of each method. Then, we ask respondents to choose between five levels for each method to reach the overall target of 10 ML/d of water saved.[58] This exercise was designed to see whether customers' preferences changed when presented with the actual planning constraints faced by WW, which include physical constraints on the amount of each method that can be achieved, and unit prices for each method that vary with the amount of each method delivered.[59]

We find the results of Exercise 5 are similar to those of Exercises 1-4: customers would like WW to pursue a strategy that prioritises leakage reduction and building a new reservoir but includes some of each of the six methods. Figure 5.1 shows customers' allocation of sustainable abstraction units across methods. For example, the top bar shows that 10 per cent of respondents allocated 0 ML/d to leakage reduction (blue segment), approximately 45 per cent of respondents allocated 2 ML/d to leakage reduction (yellow segment), and so on.

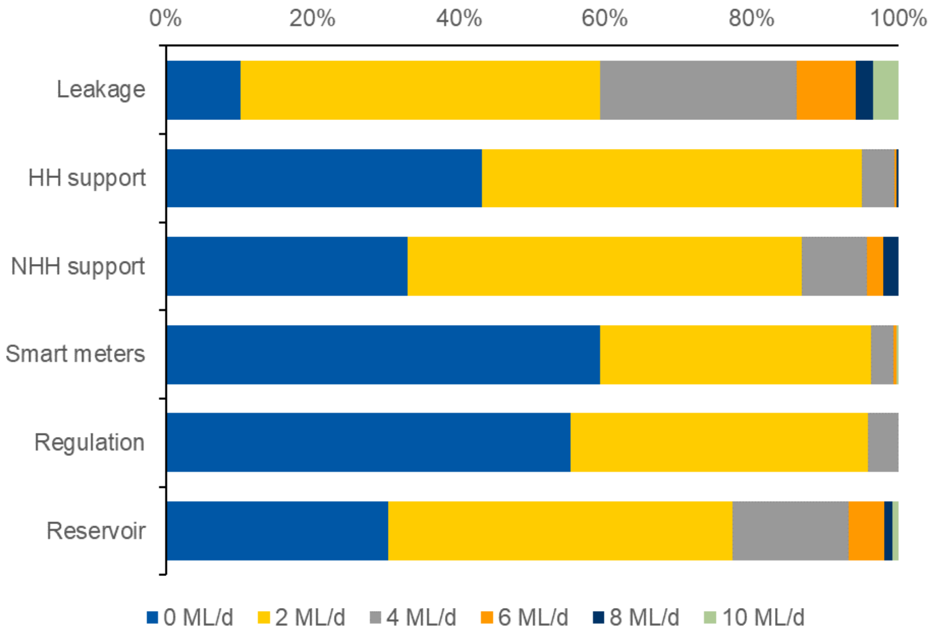
Respondents typically preferred leakage reduction and building a new reservoir, despite these being the first and third most expensive methods. Almost 41 per cent of respondents allocated at least 4 of the 10 ML/d to leakage reduction, and almost 23 per cent allocated at least 4 ML/d to reservoir construction. Only 1 out of 10 customers did not allocate any ML/d to leakage reduction.

Conversely, customers' least preferred option was smart metering (59 per cent of respondents assigned 0 ML/d to this method). This was followed by regulation and HH support, to which 55 and 43 per cent of respondents, respectively, assigned 0 ML/d.

58 The possible levels for each method were 0 ML/d, 2 ML/d, 4 ML/d, 6 ML/d, 8 ML/d and 10 ML/d.

59 In particular, there are diseconomies of scale for leakage reduction.

**Figure 5.1: Customers' Allocation of SA Units, Exercise 5**




*Source: NERA analysis of WTP survey data.*

As in exercises 1-4, customers preferred to spread the 10 ML/d across different methods rather than using only one method. Figure 5.2 shows the number of methods for which respondents selected a non-zero amount of water in Exercise 3 and Exercise 5.[60]

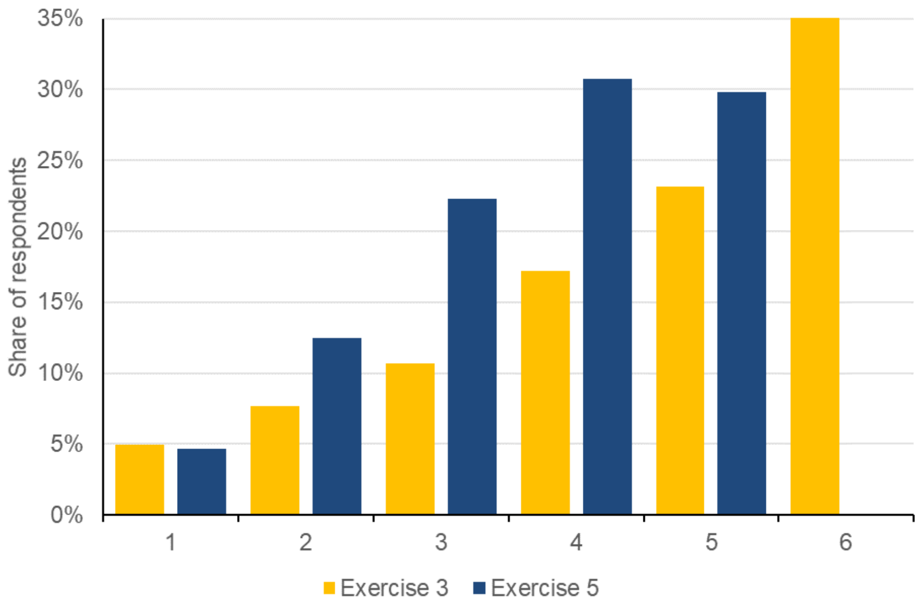
In Exercise 5, the most common approach was to allocate some ML/d to four methods, indicating that customers selected 2 ML/d for three methods and then 4 ML/d for the fourth, most preferred method. This was closely followed by the approach of allocating 2 ML/d to each of five methods (the maximum possible number). Only 5 and 12 per cent of respondents allocated the 10 ML/d to only one or two methods, respectively. Among those that allocated all units to one method, 76 per cent chose leakage reduction.

This is consistent with customers' responses in Exercise 3, where they were constrained to meet a target of 10 ML/d but faced randomly drawn prices and no feasibility constraints on the amount of each method they could choose. In Exercise 3, the most common approach was to allocate some ML/d to all six methods.

Hence, across Exercise 3 and Exercise 5, customers' preferences were consistent, picking leakage reduction as preferred options but showing desire to spread the 10 ML/d across different methods rather than using only one method.

[60] Note that in Exercise 5 respondents could allocate ML/d to a maximum of five methods as they were required to choose in increments of 2 ML/d.

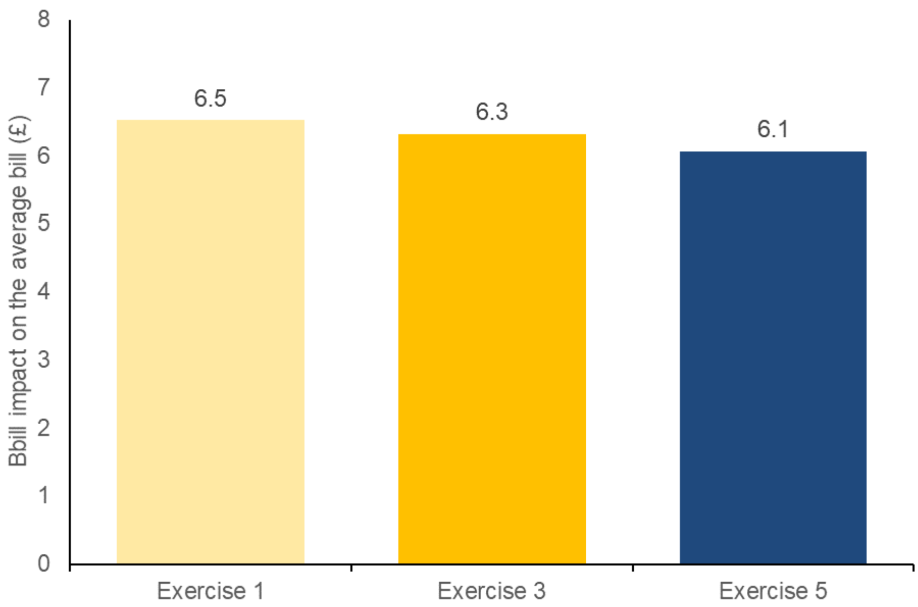
**Figure 5.2: Number of Methods Selected, Exercise 3 vs. Exercise 5**




*Source: NERA analysis of WTP survey data.*

Respondents' choices in Exercise 5 imply an average impact on the average bill of just over £6 per annum (see Figure 5.3).

**Figure 5.3: Impact on Average Bill, Exercises 1, 3, 5**




*Source: NERA analysis of WTP survey data.*

# 6. Conclusion

We set out below the answers obtained in this study to the six research questions agreed with WW.

1. **How much are customers willing to pay per unit of each method when they are required to meet a sustainable abstraction (SA) target?**
2. **How much are customers willing to pay per unit of each method when they are not required to meet a SA target?**

We find that for five of the six methods WW could use to deliver SA, customers' preferences on how much of each method WW should implement are not driven by price. This is true both when customers are asked to select an amount of each method to meet a target of 10 ML/d of water saved and when customers have the freedom to choose any amount of water saved.

Instead, customers select a preferred total amount of ML/d to be saved through each method, irrespective of price. Therefore we conclude that for each of these five methods, customers are willing to pay an amount per ML/d up to the maximum bill impact per ML/d shown in the survey, up to their preferred total level of ML/d. The WTP values and preferred levels of investment for the average customer are shown in Table 6.1.

**Table 6.1: Customers have a Constant WTP per ML/d for Five of Six Methods, up to their Preferred Level of ML/d**

| | | Preferred level (ML/d) | |
|---|---|---|---|
| **Method** | **WTP (£ per ML/d)** | **To achieve target 10 ML/d** | **Without target** |
| Leakage Reduction | 2.22 | 3 | 12 |
| HH Support | 0.34 | 1 | 4 |
| NHH Support | 0.09 | 1.5 | 5 |
| Smart Meters | 1.35 | 1 | 3.5 |
| Regulation | 0.16 | 1 | 3.5 |

*Source: NERA analysis of survey responses (Exercises 3 and 4).*

For the sixth method that WW could use to deliver SA, building a reservoir, we find that customers' preferences on how much of that method WW should implement do change with the price per ML/d. This means that customers see a trade-off between price and ML/d of water saved through building a reservoir: the higher the price of each ML/d the fewer ML/d they want, and similarly, the higher the total amount of ML/d saved through building a reservoir, the lower their WTP for one additional ML/d to be saved.

Table 6.2 reports customers' WTP for one additional ML/d to be saved through building a reservoir. This table should be read as follows. Looking at the second column, WTP (£ per ML/d) to achieve target 10 ML/d, we see that customers are WTP £1.96 per ML/d for the first ML/d saved and a further £0.46 per ML/d for the second unit. Therefore, if WW were to build a reservoir to reduce abstraction by 2 ML/d in total, then the average customer would be WTP in total an additional £2.42 per year on their bill to fund this.[61]

[61] Recognising that 2 ML/d is not a feasible size for a reservoir.

**Table 6.2: Customers' WTP per ML/d of a Reservoir Changes with the Total Amount of ML/d Saved**

| | WTP (£ per ML/d) | |
|---|---|---|
| **Water saved (ML/d)** | **To achieve target 10 ML/d** | **Without target** |
| 1 | 1.96 | 2.68 |
| 2 | 0.46 | 2.35 |
| 3 | 0 | 2.02 |
| 4 | 0 | 1.69 |
| 5 | 0 | 1.37 |
| 6 | 0 | 1.04 |
| 7 | 0 | 0.71 |
| 8 | 0 | 0.38 |
| 9 | 0 | 0.05 |
| 10 | 0 | 0 |

*Source: NERA analysis of survey responses (Exercises 3 and 4).*

Overall, the combined evidence on all six activities suggests that customers are WTP for some amount of each method and would prefer that WW invest in a mix of methods to achieve improvement in sustainable abstraction. Customers' most preferred methods appear to be leakage reduction, building a reservoir, and supporting NHH customers to reduce their water consumption. However, although customers do exhibit a preference for a reservoir in small amounts, the evidence from Table 6.2 suggests that they may not be willing to pay for a reservoir at its feasible scale (i.e., providing 30 ML/d of reduction in water abstracted) solely to improve sustainable abstraction.[62]

**3. How much are customers willing to pay per unit of SA?**

**4. Is there evidence that customers do not have strong preferences between methods, but rather want WW to meet the SA target in the least expensive way possible?**

There is clear evidence that customers are willing to pay for WW to invest to improve the sustainability of its abstraction activities by more than its 10 ML/d target.

In the two exercises where customers were not restricted to the target of 10 ML/d but could choose their preferred amount of ML/d, customers typically chose a materially higher amount of sustainable abstraction. On average, they selected 35.1 ML/d in Exercise 2 and 36.3 ML/d in Exercise 4, which increased the total annual bill by £23 in each case.[63]

Moreover, in both exercises where customers were not restricted to the target of 10 ML/d, approximately 50 per cent of customers chose the maximum allowable amount of water saved of 50 ML/d.

Although there is clear evidence that customers are willing to pay for more sustainable abstraction, customers do also have clear preferences over *how* improvements in

[62] Note, this study does not consider the question of whether customers would support reservoir development for other reasons, such as to improve drought resilience or meet increased demand, because this was not the context explained to respondents.

[63] Customers selected slightly less of the relatively expensive methods and slightly more of the relatively low-cost methods in Exercise 4, as we explain further in the answer to research question 5.

sustainability should be delivered. As explained above, they would prefer that WW adopt a mix of the six methods presented, with a focus on leakage reduction.

The evidence does *not* suggest that customers are willing to substitute between methods and would prefer WW to meet the SA target in the least expensive way possible.

- First, we see that customers' most preferred method of achieving sustainable abstraction is leakage reduction, which is typically the most expensive method offered (the bill impacts that customers see for each method are randomly drawn within a range set based on the true cost of delivering each method).
- Second, if customers were willing to substitute between methods based on price, we would expect to see evidence of *cross-price sensitivity* in the amount of each method that customers select. That is, we would expect to see that – as the price of one method increases – the amount of *other* methods that customers select would increase. We used a regression analysis to test for cross-price sensitivity and found no statistically significant evidence of cross-price sensitivity.

Since customers do not see the methods as substitutable, it would not be an accurate reflection of customers' preferences to derive a single, common WTP for sustainable abstraction that could be used to select the least cost method of delivering a given level of improvement irrespective of the method used. For example, we cannot infer from the finding that customers are WTP £2.22 per ML/d for leakage reduction that they would also be WTP £2.22 per ML/d for sustainable abstraction delivered through another method, like HH support. Customers' WTP for leakage reduction also reflects other characteristics of that method (e.g., that it requires action from WW rather than consumers, or that the impact seems more certain) and we cannot disentangle how much of the value customers place on leakage reduction as an activity is driven by those characteristics rather than the amount of sustainable abstraction delivered.

Therefore, we do not estimate a single, common WTP for sustainable abstraction. Instead, we recommend that WW relies on the estimated WTP for each method, alongside the descriptive evidence that customers do want a higher level of sustainable abstraction than the target 10 ML/d.

**5. How do the answers to the above questions change once customers learn more about SA and about each method?**

We tested whether customers' preferences changed after we presented them with additional information about each of the six methods that WW could use to improve the sustainability of its abstraction. We found that the information resulted in a small but statistically significant change in customers' preferences. Specifically, after receiving the additional information:

- When constrained to meet WW's 10 ML/d target, customers moved approximately 0.2 ML/d from leakage reduction and the reservoir option to HH and NHH support.
- When customers could freely choose their preferred amount of sustainable abstraction:
  - Customers again chose less leakage reduction (by 0.2 ML/d) and more HH and NHH support (by 0.4 ML/d and 0.7 ML/d respectively). However, in this case customers also increased the amount of the reservoir and regulation options that they chose (by 0.1 ML/d and 0.2 ML/d respectively).

- This means that customers increased the total amount of sustainable abstraction they chose, by approximately 1.2 ML/d on average.
- However, because they reduced the amount of the most expensive option (leakage reduction), the total bill impact of their choices did not increase.

Overall, this means that once customers learn more about the six different methods, they are slightly more willing to select the less expensive methods, so they can achieve more improvement in sustainable abstraction for the same overall bill impact. However, the adjustments are marginal in terms of magnitude.

**6. How would customers solve WW's planning problem?**

We tested whether customers' preferences changed when faced with a choice exercise that more realistically reflected the costs and feasibility constraints of WW's actual planning problem to achieve its target of 10 ML/d of water saved. We found that customers' preferences were in line with those expressed in the preceding exercises. That is, customers want WW to use a mix of methods to deliver improvement in sustainable abstraction, with emphasis on leakage reduction despite it being the highest cost option. On average, in this exercise customers selected options that led to a £6 increase in their annual bill.

# Appendix A. List of Attachments: Survey Materials

## A.1. Email Invitation to Participate in Survey

See attachment.

## A.2. Letter from Wessex Water to Accompany Survey Invitation

See attachment.

## A.3. Information Showcards for the Six Methods

See attachment.

## A.4. Survey of Household Customers

See attachment.

# Appendix B. List of Attachments: Findings from Qualitative Research and Pilot Survey

## B.1. Report on Pre-Survey Qualitative Research

See attachment.

## B.2. Report on Pilot Survey

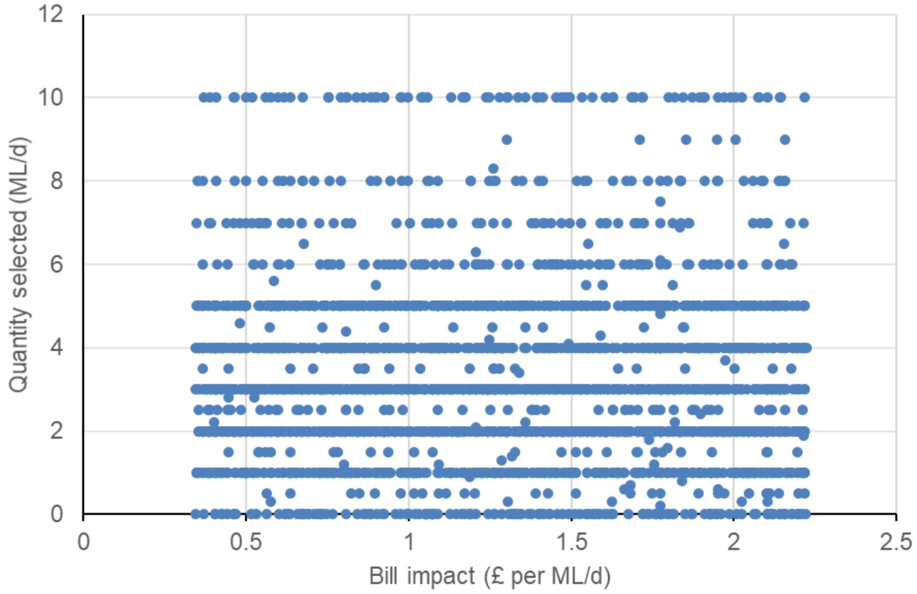
See attachment.

## B.3. Summary of Survey Adjustments Following Pilot Survey

See attachment.

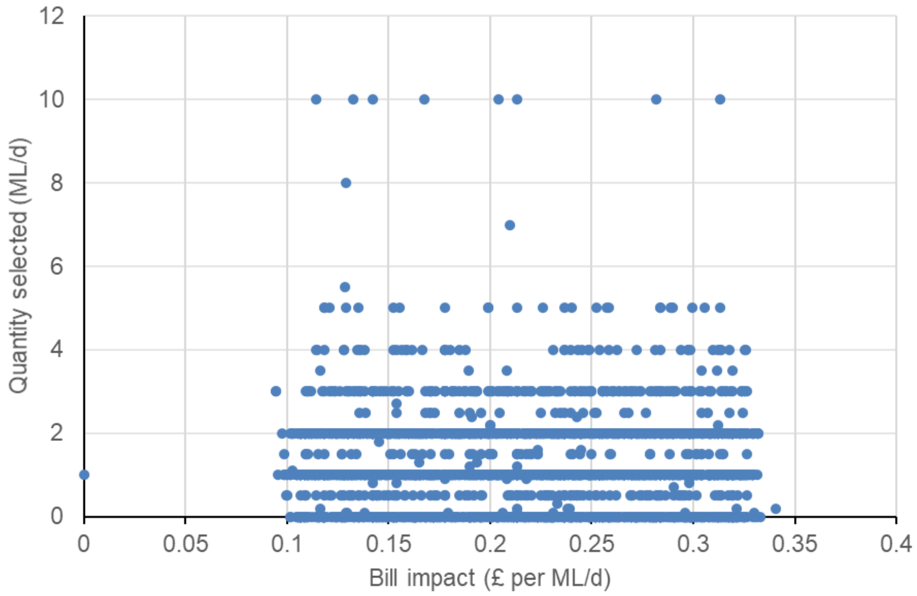
# Appendix C. Distribution of Respondents' Choices in the Survey

**Figure C.1: Exercise 3 – Leakage**



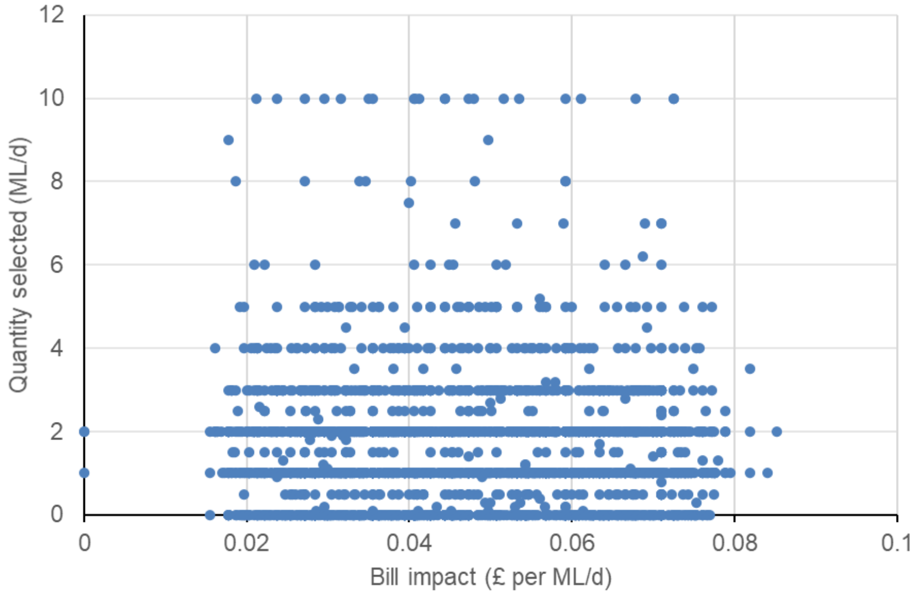

*Source: NERA analysis of WTP survey data.*

**Figure C.2: Exercise 3 – HH Support**



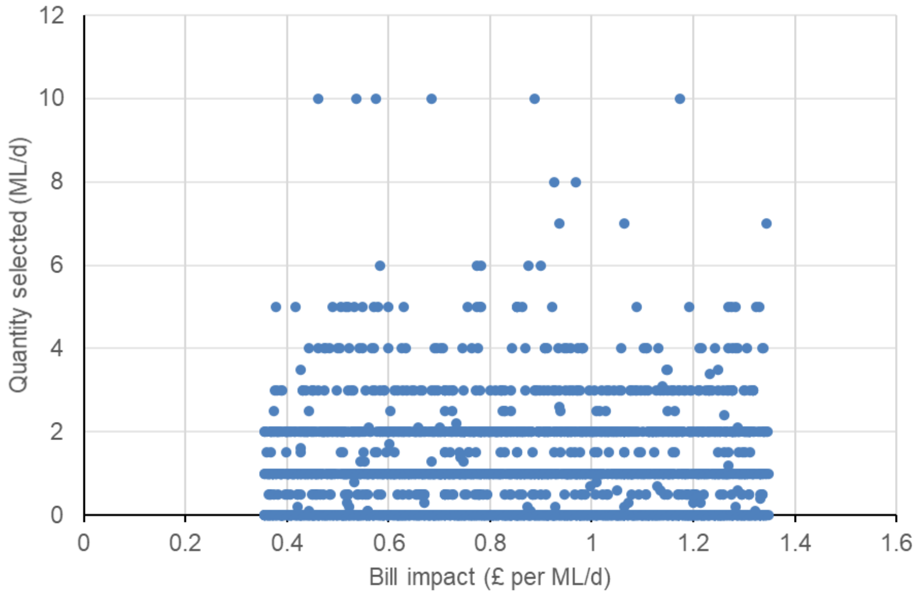

*Source: NERA analysis of WTP survey data.*

**Figure C.3: Exercise 3 – NHH Support**



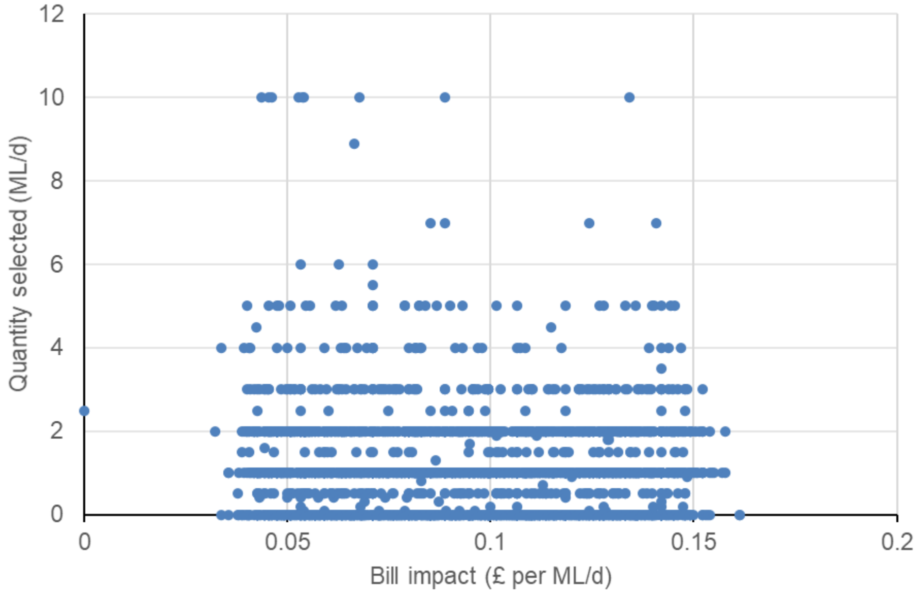

*Source: NERA analysis of WTP survey data.*

**Figure C.4: Exercise 3 – Smart Meters**



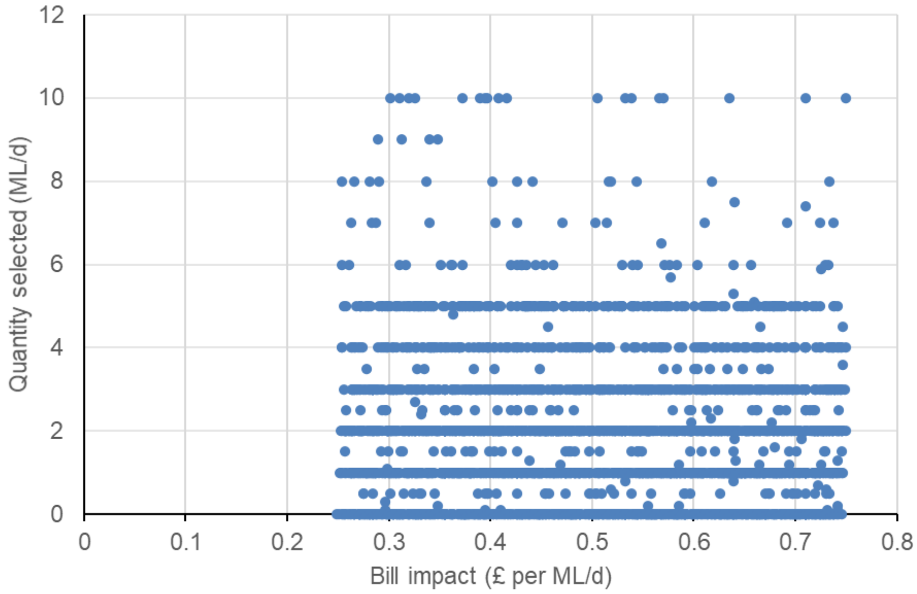

*Source: NERA analysis of WTP survey data.*

**Figure C.5: Exercise 3 – Regulation**



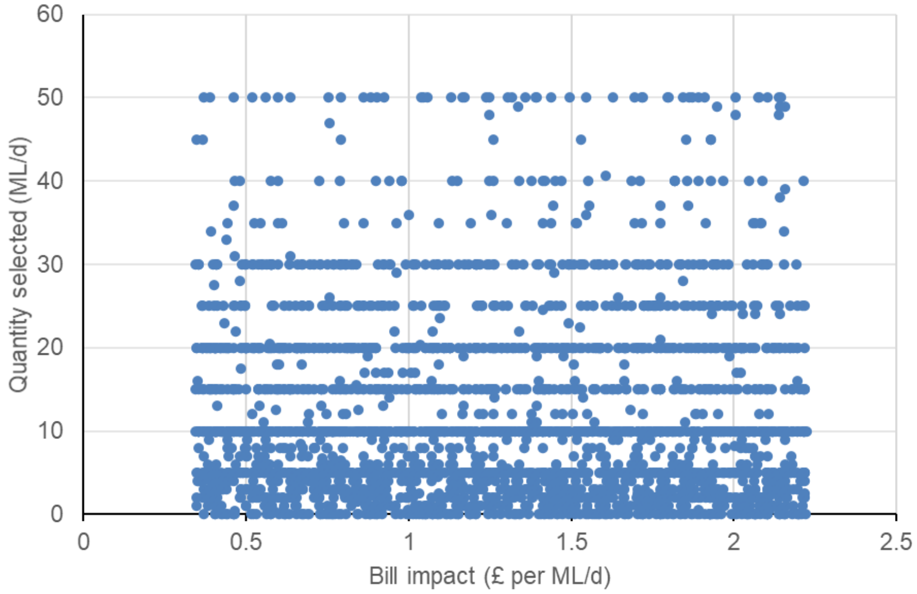

*Source: NERA analysis of WTP survey data.*

**Figure C.6: Exercise 3 – Reservoir**



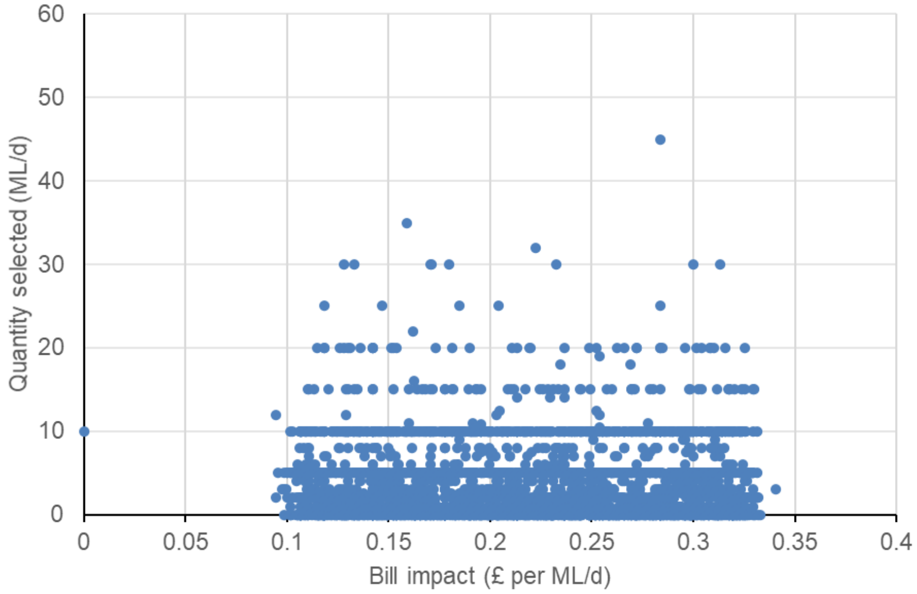

*Source: NERA analysis of WTP survey data.*

**Figure C.7: Exercise 4 – Leakage**



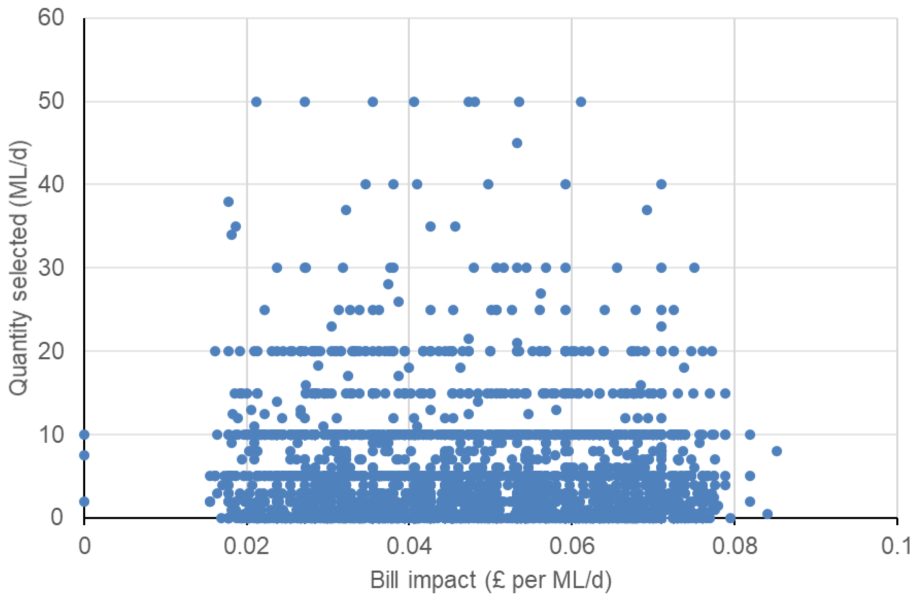

*Source: NERA analysis of WTP survey data.*

**Figure C.8: Exercise 4 – HH Support**



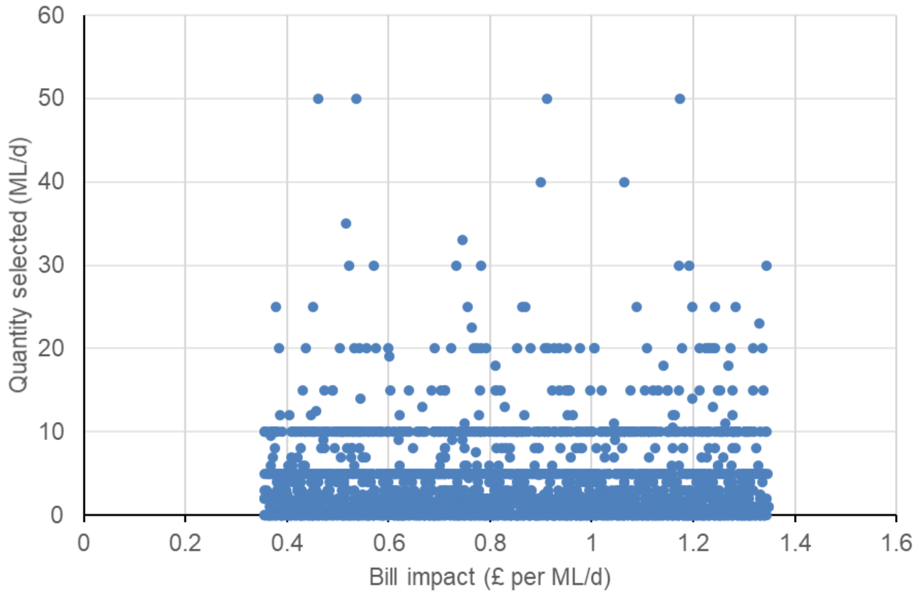

*Source: NERA analysis of WTP survey data.*

**Figure C.9: Exercise 4 – NHH Support**



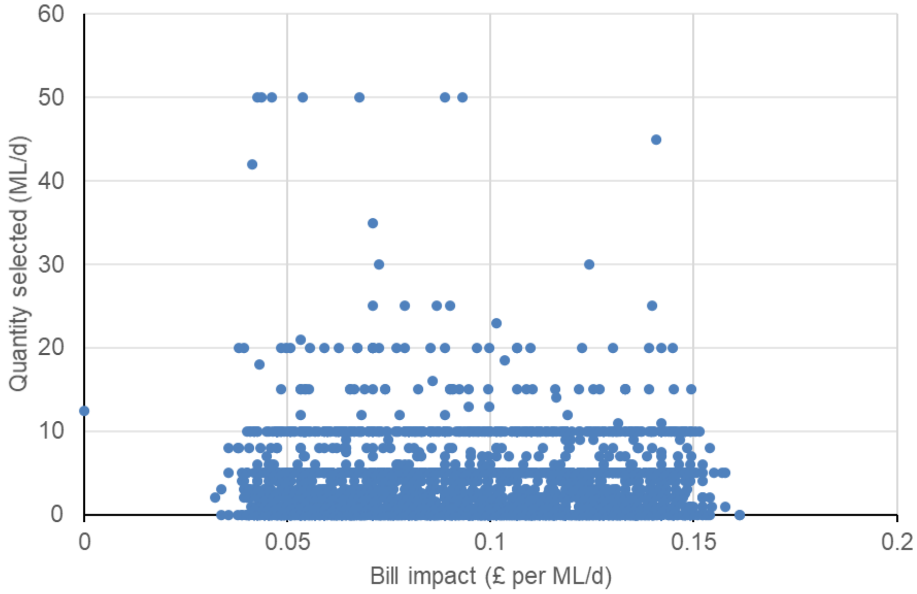

*Source: NERA analysis of WTP survey data.*

**Figure C.10: Exercise 4 – Smart Meters**



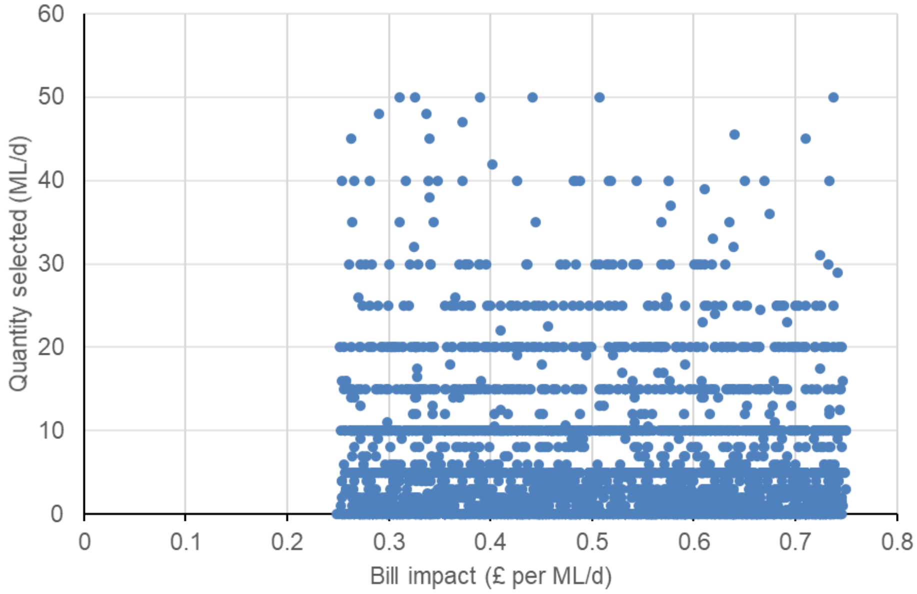

*Source: NERA analysis of WTP survey data.*

**Figure C.11: Exercise 4 – Regulation**




*Source: NERA analysis of WTP survey data.*

**Figure C.12: Exercise 4 – Reservoir**




*Source: NERA analysis of WTP survey data.*

# Appendix D. Regression Tables

Table D.3 to Table D.6 report the results of the main regressions as described in Section 4.2 and Section 4.3. Table D.7 to Table D.10 report the results of regressions excluding cross-price effects, which as we explain in Section 4.3 we use to understand the impact on estimated own-price effects of excluding statistically insignificant cross-price effects. Finally, Table D.11 to Table D.30 report the results of the regressions as described in Section 4.7.

The interpretation of these coefficients is as follows, taking the example of the own-price effects on demand for investment in building a reservoir:

- The own-price coefficient on Reservoir in Table D.3 is -0.69. This means that in Exercise 1. where respondents must allocate 10 ML/d of sustainable abstraction between the six methods, an increase of £1 per ML/d in the cost of building a new reservoir for the average consumer is related to a reduction in the amount allocated to Reservoir of 0.69 ML/d, on average. The coefficient of -0.67 in Table D.5 has a similar interpretation.
- The own-price coefficient on Reservoir in Table D.4 is 2.80. This means that in Exercise 2, where respondents could choose sustainable abstraction quantities between 0 and 50 ML/d, an increase of £1 per ML/d in the cost of building a new reservoir for the average consumer is related to a reduction in the amount allocated to Reservoir of 2.80 ML/d, on average. The coefficient of 3.05 in Table D.6 has a similar interpretation.

## Table D.3: Exercise 1 – Main Regression Results

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Price Leakage | -0.046 | 0.031 | 0.003 | -0.015 | -0.020 | 0.048 |
| | (0.591) | (0.483) | (0.954) | (0.762) | (0.660) | (0.493) |
| Price HH Support | 0.597 | -0.788** | -0.979** | 0.348 | -0.641* | 1.463** |
| | (0.404) | (0.031) | (0.039) | (0.414) | (0.097) | (0.012) |
| Price NHH Support | -1.023 | -0.720 | -2.234 | -0.672 | 1.348 | 3.301 |
| | (0.721) | (0.622) | (0.241) | (0.694) | (0.383) | (0.158) |
| Price Smart Meters | 0.062 | 0.013 | -0.063 | 0.046 | -0.075 | 0.017 |
| | (0.703) | (0.881) | (0.561) | (0.635) | (0.395) | (0.899) |
| Price Regulation | 0.445 | 1.262* | 0.904 | -0.432 | -1.988** | -0.192 |
| | (0.762) | (0.093) | (0.356) | (0.622) | (0.012) | (0.873) |
| Price Reservoir | 0.171 | 0.155 | 0.390* | -0.069 | 0.045 | -0.693*** |
| | (0.597) | (0.350) | (0.070) | (0.721) | (0.795) | (0.009) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.670) | (0.684) | (0.369) | (0.235) | (0.297) | (0.774) |
| Metered | -0.106 | -0.060 | -0.060 | 0.287*** | 0.051 | -0.111 |
| | (0.445) | (0.395) | (0.516) | (0.001) | (0.494) | (0.326) |
| Social Tariff | -0.311* | 0.260*** | -0.211* | 0.113 | 0.082 | 0.067 |
| | (0.081) | (0.004) | (0.076) | (0.290) | (0.393) | (0.646) |
| Direct Debit | -0.090 | -0.000 | 0.029 | 0.009 | 0.107 | -0.054 |
| | (0.499) | (0.998) | (0.745) | (0.909) | (0.139) | (0.618) |
| Male | 0.181* | -0.170*** | -0.090 | -0.090 | -0.165*** | 0.334*** |
| | (0.056) | (0.000) | (0.152) | (0.109) | (0.001) | (0.000) |
| Age | 0.017*** | -0.004* | -0.011*** | -0.004 | -0.011*** | 0.012*** |
| | (0.000) | (0.050) | (0.000) | (0.107) | (0.000) | (0.000) |
| ABC1 | 0.152 | -0.096 | -0.060 | -0.017 | -0.129** | 0.149 |
| | (0.197) | (0.111) | (0.446) | (0.809) | (0.043) | (0.122) |
| Constant | 2.235*** | 1.489*** | 2.216*** | 1.098*** | 1.966*** | 0.995** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.010) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.012 | 0.012 | 0.016 | 0.005 | 0.024 | 0.021 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.4: Exercise 2 – Main Regression Model

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Price Leakage | -0.822* | -0.034 | 0.023 | -0.159 | 0.078 | -0.111 |
| | (0.059) | (0.843) | (0.925) | (0.436) | (0.670) | (0.732) |
| Price HH Support | 6.173* | -3.100** | -2.940 | 1.284 | -0.322 | 4.424 |
| | (0.089) | (0.033) | (0.153) | (0.450) | (0.832) | (0.104) |
| Price NHH Support | -6.694 | -2.252 | -14.293* | -4.409 | -3.066 | 4.547 |
| | (0.645) | (0.699) | (0.083) | (0.518) | (0.614) | (0.676) |
| Price Smart Meters | -0.028 | 0.416 | 0.313 | -0.002 | 0.039 | 0.405 |
| | (0.973) | (0.210) | (0.505) | (0.995) | (0.911) | (0.514) |
| Price Regulation | 5.755 | 6.657** | 6.333 | 1.670 | -5.899* | -4.179 |
| | (0.441) | (0.026) | (0.135) | (0.634) | (0.059) | (0.455) |
| Price Reservoir | -0.828 | 0.459 | 0.287 | 0.134 | -0.317 | -2.796** |
| | (0.615) | (0.487) | (0.758) | (0.863) | (0.645) | (0.023) |
| Bill Size | -0.002 | -0.001 | -0.000 | -0.000 | -0.000 | -0.002 |
| | (0.134) | (0.268) | (0.655) | (0.553) | (0.555) | (0.124) |
| Metered | -0.536 | -0.305 | -0.237 | 1.084*** | -0.291 | -0.827 |
| | (0.447) | (0.280) | (0.553) | (0.001) | (0.324) | (0.117) |
| Social Tariff | -2.038** | 0.663* | -0.725 | 0.199 | 0.467 | -1.103 |
| | (0.025) | (0.068) | (0.158) | (0.640) | (0.218) | (0.104) |
| Direct Debit | -0.822 | 0.604** | 0.310 | 0.303 | 0.595** | 0.076 |
| | (0.225) | (0.026) | (0.419) | (0.340) | (0.036) | (0.880) |
| Male | 0.909* | -0.573*** | -0.057 | -0.365 | -0.503** | 1.110*** |
| | (0.058) | (0.003) | (0.833) | (0.105) | (0.012) | (0.002) |
| Age | 0.073*** | -0.004 | -0.044*** | -0.010 | -0.026*** | 0.037*** |
| | (0.000) | (0.580) | (0.000) | (0.236) | (0.001) | (0.007) |
| ABC1 | 1.867*** | 0.174 | -0.186 | 0.265 | 0.421* | 0.304 |
| | (0.002) | (0.468) | (0.583) | (0.345) | (0.093) | (0.497) |
| Constant | 8.531*** | 3.880*** | 8.093*** | 2.928*** | 5.667*** | 6.139*** |
| | (0.000) | (0.000) | (0.000) | (0.010) | (0.000) | (0.001) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.012 | 0.010 | 0.009 | 0.005 | 0.019 | 0.012 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

### Table D.5: Exercise 3 – Main Regression Model

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Price Leakage | -0.074 | 0.035 | 0.039 | 0.004 | -0.013 | 0.009 |
| | (0.359) | (0.421) | (0.500) | (0.937) | (0.760) | (0.893) |
| Price HH Support | 0.562 | -0.694* | -0.712 | 0.181 | -0.651* | 1.313** |
| | (0.402) | (0.059) | (0.136) | (0.639) | (0.070) | (0.021) |
| Price NHH Support | 0.506 | -1.186 | -4.030** | -0.798 | 0.398 | 5.109** |
| | (0.851) | (0.420) | (0.035) | (0.607) | (0.782) | (0.024) |
| Price Smart Meters | 0.100 | -0.045 | -0.032 | 0.038 | -0.109 | 0.049 |
| | (0.515) | (0.588) | (0.767) | (0.665) | (0.182) | (0.703) |
| Price Regulation | -0.171 | 1.034 | 2.296** | -0.353 | -1.864** | -0.942 |
| | (0.901) | (0.171) | (0.020) | (0.657) | (0.012) | (0.420) |
| Price Reservoir | 0.127 | 0.008 | 0.483** | -0.135 | 0.188 | -0.670*** |
| | (0.677) | (0.961) | (0.026) | (0.443) | (0.249) | (0.009) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.613) | (0.589) | (0.812) | (0.696) | (0.150) | (0.549) |
| Metered | 0.041 | -0.087 | -0.115 | 0.283*** | 0.025 | -0.147 |
| | (0.754) | (0.223) | (0.217) | (0.000) | (0.724) | (0.182) |
| Social Tariff | -0.294* | 0.035 | -0.220* | 0.200** | 0.184** | 0.095 |
| | (0.079) | (0.702) | (0.065) | (0.038) | (0.040) | (0.504) |
| Direct Debit | -0.110 | 0.042 | 0.030 | -0.010 | 0.067 | -0.018 |
| | (0.380) | (0.539) | (0.740) | (0.885) | (0.319) | (0.864) |
| Male | 0.256*** | -0.182*** | -0.116* | -0.100** | -0.151*** | 0.294*** |
| | (0.004) | (0.000) | (0.065) | (0.049) | (0.001) | (0.000) |
| Age | 0.017*** | -0.005*** | -0.012*** | -0.004** | -0.009*** | 0.013*** |
| | (0.000) | (0.004) | (0.000) | (0.041) | (0.000) | (0.000) |
| ABC1 | 0.166 | -0.070 | -0.137* | -0.016 | -0.111* | 0.169* |
| | (0.133) | (0.245) | (0.082) | (0.797) | (0.061) | (0.072) |
| Constant | 1.948*** | 1.813*** | 2.307*** | 1.118*** | 1.842*** | 0.971** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.010) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.018 | 0.011 | 0.019 | 0.009 | 0.024 | 0.023 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.6: Exercise 4 – Main Regression Model

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Price Leakage | -0.858** | 0.144 | 0.166 | -0.136 | 0.217 | -0.232 |
| | (0.039) | (0.429) | (0.519) | (0.490) | (0.219) | (0.466) |
| Price HH Support | 6.072* | -1.610 | -1.480 | 1.619 | -1.483 | 5.253** |
| | (0.080) | (0.288) | (0.492) | (0.325) | (0.316) | (0.048) |
| Price NHH Support | -9.418 | -6.383 | -15.685* | -2.890 | 1.910 | 8.714 |
| | (0.498) | (0.293) | (0.069) | (0.661) | (0.747) | (0.412) |
| Price Smart Meters | -0.430 | 0.146 | 0.054 | -0.066 | -0.107 | 0.172 |
| | (0.588) | (0.674) | (0.912) | (0.860) | (0.751) | (0.776) |
| Price Regulation | 3.407 | 5.389* | 7.732* | 2.572 | -5.805* | -6.786 |
| | (0.634) | (0.084) | (0.081) | (0.448) | (0.056) | (0.214) |
| Price Reservoir | -1.279 | -0.140 | 0.732 | -0.611 | 0.237 | -3.047** |
| | (0.416) | (0.838) | (0.453) | (0.412) | (0.723) | (0.011) |
| Bill Size | -0.002* | -0.001 | 0.000 | -0.000 | 0.000 | -0.002** |
| | (0.063) | (0.163) | (0.838) | (0.411) | (0.921) | (0.015) |
| Metered | -0.352 | -0.681** | -0.586 | 0.811** | -0.332 | -0.833 |
| | (0.602) | (0.021) | (0.162) | (0.011) | (0.248) | (0.106) |
| Social Tariff | -1.995** | -0.061 | -0.868 | 0.149 | 0.596 | -0.786 |
| | (0.021) | (0.872) | (0.107) | (0.716) | (0.107) | (0.236) |
| Direct Debit | -0.725 | 0.600** | 0.335 | 0.225 | 0.702** | 0.082 |
| | (0.263) | (0.034) | (0.405) | (0.464) | (0.011) | (0.869) |
| Male | 0.869* | -0.532*** | -0.128 | -0.136 | -0.529*** | 1.313*** |
| | (0.058) | (0.008) | (0.653) | (0.530) | (0.007) | (0.000) |
| Age | 0.076*** | -0.011 | -0.047*** | -0.009 | -0.022*** | 0.056*** |
| | (0.000) | (0.171) | (0.000) | (0.290) | (0.003) | (0.000) |
| ABC1 | 1.534*** | 0.222 | -0.433 | 0.214 | 0.253 | 0.998** |
| | (0.007) | (0.374) | (0.223) | (0.431) | (0.300) | (0.023) |
| Constant | 9.265*** | 5.424*** | 8.580*** | 3.346*** | 5.118*** | 5.515*** |
| | (0.000) | (0.000) | (0.000) | (0.002) | (0.000) | (0.002) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.015 | 0.009 | 0.010 | 0.001 | 0.017 | 0.022 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

### Table D.7: Exercise 1 – Regression Model without Cross-Prices

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.047 | -0.791** | -2.177 | 0.045 | -1.942** | -0.687*** |
| | (0.586) | (0.030) | (0.253) | (0.646) | (0.014) | (0.009) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.674) | (0.712) | (0.368) | (0.236) | (0.288) | (0.809) |
| Metered | -0.107 | -0.061 | -0.063 | 0.286*** | 0.050 | -0.107 |
| | (0.441) | (0.390) | (0.496) | (0.001) | (0.500) | (0.347) |
| Social Tariff | -0.307* | 0.264*** | -0.210* | 0.113 | 0.080 | 0.076 |
| | (0.086) | (0.004) | (0.077) | (0.288) | (0.407) | (0.602) |
| Direct Debit | -0.092 | -0.004 | 0.032 | 0.010 | 0.108 | -0.065 |
| | (0.490) | (0.953) | (0.718) | (0.898) | (0.131) | (0.552) |
| Male | 0.178* | -0.177*** | -0.099 | -0.087 | -0.165*** | 0.336*** |
| | (0.058) | (0.000) | (0.115) | (0.120) | (0.001) | (0.000) |
| Age | 0.017*** | -0.004* | -0.011*** | -0.004* | -0.011*** | 0.012*** |
| | (0.000) | (0.058) | (0.000) | (0.097) | (0.000) | (0.000) |
| ABC1 | 0.149 | -0.093 | -0.051 | -0.021 | -0.124* | 0.145 |
| | (0.204) | (0.121) | (0.512) | (0.765) | (0.052) | (0.132) |
| Constant | 2.505*** | 1.704*** | 2.225*** | 1.053*** | 1.812*** | 1.537*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.014 | 0.012 | 0.015 | 0.007 | 0.024 | 0.019 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

**Table D.8: Exercise 2 – Regression Model without Cross-Prices**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Price Leakage | -0.813* | -3.158** | -13.529 | -0.008 | -5.927* | -2.769** |
| | (0.061) | (0.030) | (0.100) | (0.984) | (0.057) | (0.025) |
| Bill Size | -0.002 | -0.001 | -0.000 | -0.000 | -0.000 | -0.001 |
| | (0.128) | (0.256) | (0.628) | (0.553) | (0.532) | (0.136) |
| Metered | -0.543 | -0.307 | -0.237 | 1.074*** | -0.289 | -0.819 |
| | (0.441) | (0.277) | (0.554) | (0.001) | (0.326) | (0.121) |
| Social Tariff | -2.004** | 0.670* | -0.734 | 0.206 | 0.462 | -1.091 |
| | (0.027) | (0.065) | (0.153) | (0.627) | (0.222) | (0.108) |
| Direct Debit | -0.867 | 0.585** | 0.300 | 0.302 | 0.596** | 0.073 |
| | (0.200) | (0.031) | (0.434) | (0.340) | (0.035) | (0.885) |
| Male | 0.905* | -0.591*** | -0.079 | -0.364 | -0.504** | 1.137*** |
| | (0.058) | (0.002) | (0.770) | (0.104) | (0.012) | (0.001) |
| Age | 0.073*** | -0.003 | -0.043*** | -0.010 | -0.026*** | 0.036*** |
| | (0.000) | (0.663) | (0.000) | (0.231) | (0.001) | (0.009) |
| ABC1 | 1.839*** | 0.191 | -0.153 | 0.258 | 0.418* | 0.276 |
| | (0.002) | (0.426) | (0.652) | (0.358) | (0.095) | (0.537) |
| Constant | 9.729*** | 4.937*** | 8.404*** | 3.042*** | 5.430*** | 7.133*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.013 | 0.009 | 0.009 | 0.006 | 0.021 | 0.013 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.9: Exercise 3 – Regression Model without Cross-Prices

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Price Leakage | -0.076 | -0.694* | -3.879** | 0.036 | -1.817** | -0.670*** |
| | (0.343) | (0.058) | (0.043) | (0.686) | (0.014) | (0.009) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.631) | (0.633) | (0.831) | (0.682) | (0.144) | (0.609) |
| Metered | 0.042 | -0.088 | -0.117 | 0.283*** | 0.022 | -0.141 |
| | (0.745) | (0.217) | (0.208) | (0.000) | (0.751) | (0.201) |
| Social Tariff | -0.291* | 0.038 | -0.215* | 0.199** | 0.184** | 0.101 |
| | (0.082) | (0.681) | (0.072) | (0.039) | (0.040) | (0.477) |
| Direct Debit | -0.111 | 0.038 | 0.026 | -0.010 | 0.071 | -0.026 |
| | (0.373) | (0.574) | (0.772) | (0.891) | (0.291) | (0.806) |
| Male | 0.257*** | -0.188*** | -0.131** | -0.098* | -0.154*** | 0.300*** |
| | (0.004) | (0.000) | (0.037) | (0.054) | (0.001) | (0.000) |
| Age | 0.017*** | -0.005*** | -0.012*** | -0.004** | -0.009*** | 0.013*** |
| | (0.000) | (0.004) | (0.000) | (0.038) | (0.000) | (0.000) |
| ABC1 | 0.164 | -0.069 | -0.127 | -0.020 | -0.107* | 0.166* |
| | (0.137) | (0.252) | (0.109) | (0.757) | (0.071) | (0.076) |
| Constant | 2.232*** | 1.871*** | 2.622*** | 1.029*** | 1.697*** | 1.467*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.019 | 0.012 | 0.015 | 0.010 | 0.023 | 0.020 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

**Table D.10: Exercise 4 – Regression Model without Cross-Prices**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Leakage | HH Support | NHH Support | Smart Meters | Regulation | Reservoir |
| Price Leakage | -0.848** | -1.651 | -15.060* | -0.079 | -5.542* | -3.034** |
| | (0.041) | (0.275) | (0.080) | (0.832) | (0.068) | (0.012) |
| Bill Size | -0.002* | -0.001 | 0.000 | -0.001 | 0.000 | -0.002** |
| | (0.059) | (0.140) | (0.868) | (0.399) | (0.936) | (0.019) |
| Metered | -0.364 | -0.682** | -0.587 | 0.805** | -0.325 | -0.827 |
| | (0.589) | (0.021) | (0.161) | (0.012) | (0.257) | (0.109) |
| Social Tariff | -1.965** | -0.055 | -0.856 | 0.152 | 0.596 | -0.771 |
| | (0.023) | (0.885) | (0.111) | (0.711) | (0.106) | (0.245) |
| Direct Debit | -0.760 | 0.581** | 0.311 | 0.211 | 0.702** | 0.084 |
| | (0.240) | (0.040) | (0.438) | (0.490) | (0.011) | (0.865) |
| Male | 0.871* | -0.554*** | -0.167 | -0.130 | -0.543*** | 1.354*** |
| | (0.057) | (0.006) | (0.556) | (0.548) | (0.005) | (0.000) |
| Age | 0.075*** | -0.010 | -0.046*** | -0.009 | -0.022*** | 0.054*** |
| | (0.000) | (0.198) | (0.000) | (0.295) | (0.003) | (0.000) |
| ABC1 | 1.495*** | 0.228 | -0.404 | 0.207 | 0.263 | 0.963** |
| | (0.009) | (0.361) | (0.255) | (0.445) | (0.281) | (0.028) |
| Constant | 9.544*** | 5.885*** | 9.571*** | 3.349*** | 5.161*** | 6.306*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.015 | 0.009 | 0.010 | 0.002 | 0.018 | 0.021 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.11: Exercise 1 – Lack of Understanding

| | (1) Leakage | (2) HH Support | (3) NHH Support | (4) Smart Meters | (5) Regulation | (6) Reservoir |
|---|---|---|---|---|---|---|
| Own-Price | -0.056 | -0.924** | -3.317* | -0.055 | -1.130 | -0.673** |
| | (0.531) | (0.016) | (0.098) | (0.595) | (0.178) | (0.016) |
| Lack Understanding | -0.139 | -0.125 | -0.639* | -0.745*** | 0.714*** | -0.030 |
| | (0.725) | (0.648) | (0.051) | (0.008) | (0.004) | (0.946) |
| Lack Understanding * Own-Price | 0.098 | 1.180 | 11.961* | 0.917*** | -7.517*** | -0.194 |
| | (0.728) | (0.321) | (0.063) | (0.003) | (0.003) | (0.820) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.674) | (0.729) | (0.364) | (0.262) | (0.281) | (0.830) |
| Metered | -0.108 | -0.061 | -0.058 | 0.289*** | 0.056 | -0.108 |
| | (0.438) | (0.392) | (0.529) | (0.000) | (0.455) | (0.342) |
| Social Tariff | -0.307* | 0.250*** | -0.210* | 0.120 | 0.075 | 0.091 |
| | (0.087) | (0.006) | (0.078) | (0.261) | (0.440) | (0.533) |
| Direct Debit | -0.091 | 0.000 | 0.029 | 0.015 | 0.108 | -0.067 |
| | (0.496) | (0.995) | (0.747) | (0.849) | (0.134) | (0.536) |
| Male | 0.179* | -0.182*** | -0.094 | -0.089 | -0.161*** | 0.340*** |
| | (0.058) | (0.000) | (0.133) | (0.113) | (0.002) | (0.000) |
| Age | 0.017*** | -0.004** | -0.011*** | -0.004* | -0.011*** | 0.012*** |
| | (0.000) | (0.042) | (0.000) | (0.077) | (0.000) | (0.000) |
| ABC1 | 0.148 | -0.092 | -0.056 | -0.024 | -0.125** | 0.142 |
| | (0.210) | (0.128) | (0.478) | (0.728) | (0.049) | (0.140) |
| Constant | 2.519*** | 1.734*** | 2.280*** | 1.138*** | 1.740*** | 1.531*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.013 | 0.013 | 0.015 | 0.010 | 0.027 | 0.019 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.12: Exercise 2 – Lack of Understanding

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.948** | -3.007* | -15.846* | -0.202 | -4.384 | -3.014** |
| | (0.038) | (0.051) | (0.067) | (0.622) | (0.184) | (0.021) |
| Lack Understanding | -3.524* | 0.253 | -1.462 | -1.906* | 1.584 | -2.020 |
| | (0.079) | (0.817) | (0.302) | (0.088) | (0.109) | (0.323) |
| Lack Understanding * Own-Price | 1.461 | -1.398 | 24.802 | 1.764 | -13.373 | 1.602 |
| | (0.308) | (0.769) | (0.372) | (0.157) | (0.186) | (0.687) |
| Bill Size | -0.002 | -0.001 | -0.000 | -0.000 | -0.000 | -0.001 |
| | (0.141) | (0.255) | (0.637) | (0.599) | (0.520) | (0.153) |
| Metered | -0.554 | -0.308 | -0.227 | 1.080*** | -0.280 | -0.807 |
| | (0.432) | (0.276) | (0.571) | (0.001) | (0.343) | (0.127) |
| Social Tariff | -1.853** | 0.675* | -0.719 | 0.272 | 0.418 | -0.964 |
| | (0.042) | (0.065) | (0.163) | (0.523) | (0.272) | (0.157) |
| Direct Debit | -0.878 | 0.582** | 0.290 | 0.302 | 0.601** | 0.050 |
| | (0.194) | (0.032) | (0.449) | (0.341) | (0.034) | (0.921) |
| Male | 0.969** | -0.590*** | -0.064 | -0.349 | -0.508** | 1.185*** |
| | (0.043) | (0.002) | (0.812) | (0.119) | (0.011) | (0.001) |
| Age | 0.075*** | -0.003 | -0.042*** | -0.010 | -0.027*** | 0.038*** |
| | (0.000) | (0.679) | (0.000) | (0.245) | (0.001) | (0.006) |
| ABC1 | 1.783*** | 0.191 | -0.165 | 0.241 | 0.422* | 0.250 |
| | (0.003) | (0.426) | (0.627) | (0.389) | (0.092) | (0.576) |
| Constant | 9.921*** | 4.903*** | 8.517*** | 3.208*** | 5.293*** | 7.253*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.015 | 0.008 | 0.009 | 0.007 | 0.021 | 0.014 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.13: Exercise 3 – Lack of Understanding

| | (1) Leakage | (2) HH Support | (3) NHH Support | (4) Smart Meters | (5) Regulation | (6) Reservoir |
|---|---|---|---|---|---|---|
| Own-Price | -0.069 | -0.776** | -5.074** | -0.042 | -0.980 | -0.620** |
| | (0.418) | (0.045) | (0.012) | (0.650) | (0.209) | (0.023) |
| Lack Understanding | 0.119 | -0.095 | -0.742** | -0.606** | 0.730*** | 0.239 |
| | (0.750) | (0.731) | (0.024) | (0.017) | (0.002) | (0.576) |
| Lack Understanding * Own-Price | -0.075 | 0.735 | 12.749** | 0.719** | -7.776*** | -0.455 |
| | (0.777) | (0.539) | (0.049) | (0.011) | (0.001) | (0.584) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.630) | (0.639) | (0.812) | (0.729) | (0.138) | (0.606) |
| Metered | 0.043 | -0.088 | -0.112 | 0.286*** | 0.028 | -0.144 |
| | (0.741) | (0.218) | (0.228) | (0.000) | (0.690) | (0.192) |
| Social Tariff | -0.292* | 0.031 | -0.208* | 0.207** | 0.180** | 0.102 |
| | (0.083) | (0.737) | (0.083) | (0.032) | (0.046) | (0.473) |
| Direct Debit | -0.112 | 0.041 | 0.021 | -0.006 | 0.070 | -0.026 |
| | (0.371) | (0.550) | (0.813) | (0.928) | (0.297) | (0.805) |
| Male | 0.256*** | -0.190*** | -0.124** | -0.099* | -0.150*** | 0.299*** |
| | (0.004) | (0.000) | (0.049) | (0.053) | (0.002) | (0.000) |
| Age | 0.017*** | -0.005*** | -0.011*** | -0.004** | -0.009*** | 0.013*** |
| | (0.000) | (0.003) | (0.000) | (0.031) | (0.000) | (0.000) |
| ABC1 | 0.166 | -0.069 | -0.132* | -0.023 | -0.108* | 0.166* |
| | (0.134) | (0.257) | (0.093) | (0.721) | (0.067) | (0.076) |
| Constant | 2.221*** | 1.889*** | 2.680*** | 1.096*** | 1.623*** | 1.443*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.018 | 0.012 | 0.017 | 0.012 | 0.027 | 0.020 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.14: Exercise 4 – Lack of Understanding

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.952** | -1.188 | -19.071** | -0.294 | -4.087 | -3.197** |
| | (0.030) | (0.458) | (0.035) | (0.459) | (0.204) | (0.012) |
| Lack Understanding | -2.626 | 0.825 | -2.731* | -1.965* | 1.384 | -1.341 |
| | (0.172) | (0.468) | (0.065) | (0.069) | (0.151) | (0.503) |
| Lack Understanding * Own-Price | 1.116 | -4.325 | 43.547 | 1.954 | -13.054 | 1.060 |
| | (0.416) | (0.382) | (0.134) | (0.105) | (0.185) | (0.785) |
| Bill Size | -0.002* | -0.001 | 0.000 | -0.000 | 0.000 | -0.002** |
| | (0.064) | (0.138) | (0.844) | (0.437) | (0.940) | (0.021) |
| Metered | -0.372 | -0.683** | -0.569 | 0.812** | -0.316 | -0.820 |
| | (0.581) | (0.020) | (0.173) | (0.011) | (0.271) | (0.112) |
| Social Tariff | -1.857** | -0.045 | -0.812 | 0.209 | 0.570 | -0.686 |
| | (0.033) | (0.905) | (0.133) | (0.612) | (0.124) | (0.303) |
| Direct Debit | -0.767 | 0.572** | 0.291 | 0.214 | 0.704** | 0.069 |
| | (0.236) | (0.043) | (0.468) | (0.485) | (0.011) | (0.890) |
| Male | 0.917** | -0.550*** | -0.135 | -0.119 | -0.540*** | 1.385*** |
| | (0.045) | (0.006) | (0.635) | (0.583) | (0.006) | (0.000) |
| Age | 0.077*** | -0.010 | -0.045*** | -0.009 | -0.023*** | 0.056*** |
| | (0.000) | (0.219) | (0.000) | (0.301) | (0.002) | (0.000) |
| ABC1 | 1.454** | 0.229 | -0.428 | 0.192 | 0.263 | 0.946** |
| | (0.011) | (0.359) | (0.228) | (0.479) | (0.280) | (0.031) |
| Constant | 9.692*** | 5.783*** | 9.765*** | 3.532*** | 5.032*** | 6.386*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.016 | 0.008 | 0.011 | 0.003 | 0.018 | 0.021 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

**Table D.15: Exercise 1 – Protest Attitudes**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | 0.010 | -0.573 | -1.168 | 0.014 | -2.593*** | -0.694** |
| | (0.919) | (0.178) | (0.600) | (0.903) | (0.005) | (0.025) |
| Protest | 1.033*** | 0.027 | 0.138 | -0.387** | -0.306* | -0.116 |
| | (0.000) | (0.886) | (0.522) | (0.050) | (0.088) | (0.710) |
| Protest * Own-Price | -0.289 | -0.887 | -3.858 | 0.138 | 2.463 | 0.007 |
| | (0.133) | (0.280) | (0.369) | (0.526) | (0.172) | (0.990) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.435) | (0.603) | (0.352) | (0.324) | (0.244) | (0.865) |
| Metered | -0.085 | -0.066 | -0.064 | 0.278*** | 0.050 | -0.110 |
| | (0.535) | (0.350) | (0.487) | (0.001) | (0.508) | (0.334) |
| Social Tariff | -0.364** | 0.273*** | -0.209* | 0.131 | 0.083 | 0.084 |
| | (0.040) | (0.003) | (0.079) | (0.217) | (0.390) | (0.566) |
| Direct Debit | -0.097 | -0.003 | 0.033 | 0.009 | 0.107 | -0.065 |
| | (0.464) | (0.966) | (0.711) | (0.907) | (0.136) | (0.552) |
| Male | 0.125 | -0.164*** | -0.095 | -0.067 | -0.159*** | 0.344*** |
| | (0.180) | (0.001) | (0.131) | (0.230) | (0.002) | (0.000) |
| Age | 0.018*** | -0.004** | -0.011*** | -0.004* | -0.011*** | 0.012*** |
| | (0.000) | (0.037) | (0.000) | (0.052) | (0.000) | (0.000) |
| ABC1 | 0.153 | -0.093 | -0.050 | -0.021 | -0.123* | 0.145 |
| | (0.190) | (0.120) | (0.521) | (0.766) | (0.053) | (0.132) |
| Constant | 2.246*** | 1.708*** | 2.185*** | 1.166*** | 1.892*** | 1.574*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.031 | 0.016 | 0.014 | 0.014 | 0.025 | 0.019 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.16: Exercise 2 – Protest Attitudes

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.908* | -2.621 | -13.050 | -0.219 | -8.169** | -3.920*** |
| | (0.072) | (0.123) | (0.175) | (0.628) | (0.024) | (0.007) |
| Protest | 2.355* | -0.124 | -0.065 | -1.205 | -0.829 | -2.140 |
| | (0.088) | (0.867) | (0.944) | (0.127) | (0.240) | (0.141) |
| Protest * Own-Price | 0.082 | -2.281 | -2.134 | 0.830 | 8.637 | 4.249 |
| | (0.933) | (0.487) | (0.909) | (0.342) | (0.224) | (0.125) |
| Bill Size | -0.002* | -0.001 | -0.000 | -0.000 | -0.000 | -0.001 |
| | (0.075) | (0.321) | (0.650) | (0.594) | (0.554) | (0.142) |
| Metered | -0.475 | -0.326 | -0.241 | 1.056*** | -0.286 | -0.811 |
| | (0.498) | (0.248) | (0.547) | (0.001) | (0.332) | (0.124) |
| Social Tariff | -2.167** | 0.709* | -0.724 | 0.237 | 0.456 | -1.099 |
| | (0.017) | (0.051) | (0.159) | (0.576) | (0.229) | (0.105) |
| Direct Debit | -0.864 | 0.587** | 0.300 | 0.297 | 0.591** | 0.094 |
| | (0.199) | (0.030) | (0.434) | (0.348) | (0.037) | (0.853) |
| Male | 0.713 | -0.544*** | -0.066 | -0.329 | -0.502** | 1.153*** |
| | (0.136) | (0.005) | (0.808) | (0.143) | (0.012) | (0.001) |
| Age | 0.078*** | -0.005 | -0.043*** | -0.012 | -0.026*** | 0.037*** |
| | (0.000) | (0.539) | (0.000) | (0.179) | (0.001) | (0.008) |
| ABC1 | 1.832*** | 0.191 | -0.152 | 0.256 | 0.419* | 0.294 |
| | (0.002) | (0.425) | (0.654) | (0.360) | (0.094) | (0.511) |
| Constant | 9.117*** | 5.009*** | 8.428*** | 3.408*** | 5.633*** | 7.646*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.021 | 0.012 | 0.009 | 0.007 | 0.020 | 0.013 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.17: Exercise 3 – Protest Attitudes

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.038 | -0.566 | -3.677 | 0.016 | -2.583*** | -0.616** |
| | (0.685) | (0.186) | (0.101) | (0.875) | (0.003) | (0.041) |
| Protest | 0.938*** | -0.066 | -0.038 | -0.375** | -0.348** | 0.076 |
| | (0.000) | (0.726) | (0.862) | (0.036) | (0.037) | (0.801) |
| Protest * Own-Price | -0.219 | -0.563 | -0.926 | 0.098 | 2.907* | -0.202 |
| | (0.224) | (0.495) | (0.830) | (0.621) | (0.084) | (0.727) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.389) | (0.512) | (0.783) | (0.874) | (0.115) | (0.618) |
| Metered | 0.063 | -0.093 | -0.119 | 0.275*** | 0.021 | -0.142 |
| | (0.625) | (0.189) | (0.200) | (0.000) | (0.759) | (0.198) |
| Social Tariff | -0.345** | 0.049 | -0.210* | 0.219** | 0.187** | 0.103 |
| | (0.038) | (0.589) | (0.080) | (0.023) | (0.038) | (0.468) |
| Direct Debit | -0.115 | 0.039 | 0.026 | -0.011 | 0.069 | -0.027 |
| | (0.353) | (0.567) | (0.771) | (0.882) | (0.302) | (0.799) |
| Male | 0.205** | -0.173*** | -0.125** | -0.076 | -0.149*** | 0.301*** |
| | (0.020) | (0.000) | (0.048) | (0.133) | (0.002) | (0.000) |
| Age | 0.018*** | -0.006*** | -0.012*** | -0.005** | -0.009*** | 0.013*** |
| | (0.000) | (0.002) | (0.000) | (0.016) | (0.000) | (0.000) |
| ABC1 | 0.167 | -0.069 | -0.126 | -0.019 | -0.106* | 0.165* |
| | (0.128) | (0.251) | (0.110) | (0.760) | (0.072) | (0.078) |
| Constant | 1.995*** | 1.900*** | 2.635*** | 1.137*** | 1.787*** | 1.451*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.038 | 0.017 | 0.015 | 0.021 | 0.024 | 0.020 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.18: Exercise 4 – Protest Attitudes

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.967** | -1.663 | -16.665* | -0.267 | -7.304** | -4.033*** |
| | (0.045) | (0.347) | (0.098) | (0.542) | (0.038) | (0.004) |
| Protest | 2.327* | -0.618 | -0.695 | -1.304* | -0.367 | -1.729 |
| | (0.078) | (0.424) | (0.476) | (0.087) | (0.594) | (0.223) |
| Protest * Own-Price | 0.163 | -0.260 | 5.031 | 0.755 | 6.978 | 3.711 |
| | (0.862) | (0.939) | (0.796) | (0.371) | (0.313) | (0.170) |
| Bill Size | -0.003** | -0.001 | 0.000 | -0.000 | 0.000 | -0.002** |
| | (0.030) | (0.189) | (0.805) | (0.458) | (0.974) | (0.019) |
| Metered | -0.296 | -0.700** | -0.599 | 0.783** | -0.314 | -0.817 |
| | (0.660) | (0.017) | (0.153) | (0.014) | (0.273) | (0.113) |
| Social Tariff | -2.129** | -0.009 | -0.822 | 0.195 | 0.570 | -0.787 |
| | (0.014) | (0.981) | (0.126) | (0.635) | (0.123) | (0.235) |
| Direct Debit | -0.756 | 0.580** | 0.309 | 0.207 | 0.699** | 0.102 |
| | (0.240) | (0.040) | (0.441) | (0.499) | (0.011) | (0.837) |
| Male | 0.673 | -0.502** | -0.132 | -0.082 | -0.564*** | 1.357*** |
| | (0.141) | (0.012) | (0.642) | (0.705) | (0.004) | (0.000) |
| Age | 0.080*** | -0.011 | -0.047*** | -0.010 | -0.021*** | 0.055*** |
| | (0.000) | (0.142) | (0.000) | (0.217) | (0.004) | (0.000) |
| ABC1 | 1.486*** | 0.229 | -0.404 | 0.206 | 0.262 | 0.979** |
| | (0.009) | (0.359) | (0.256) | (0.446) | (0.281) | (0.025) |
| Constant | 8.937*** | 6.090*** | 9.789*** | 3.739*** | 5.230*** | 6.709*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.025 | 0.012 | 0.010 | 0.005 | 0.019 | 0.021 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.19: Exercise 1 – Social Tariff

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.047 | -1.049*** | -2.939 | 0.028 | -2.128*** | -0.754*** |
| | (0.599) | (0.006) | (0.138) | (0.783) | (0.010) | (0.006) |
| Social Tariff | -0.311 | -0.515 | -0.685* | -0.076 | -0.154 | -0.365 |
| | (0.489) | (0.113) | (0.058) | (0.817) | (0.609) | (0.488) |
| Social Tariff * Own-Price | 0.003 | 3.474** | 9.969 | 0.225 | 2.434 | 0.856 |
| | (0.992) | (0.013) | (0.164) | (0.543) | (0.413) | (0.383) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.674) | (0.667) | (0.369) | (0.232) | (0.287) | (0.790) |
| Metered | -0.107 | -0.068 | -0.065 | 0.287*** | 0.048 | -0.107 |
| | (0.441) | (0.336) | (0.480) | (0.001) | (0.518) | (0.345) |
| Direct Debit | -0.092 | -0.005 | 0.030 | 0.009 | 0.109 | -0.066 |
| | (0.490) | (0.945) | (0.735) | (0.906) | (0.128) | (0.542) |
| Male | 0.178* | -0.182*** | -0.099 | -0.087 | -0.165*** | 0.337*** |
| | (0.059) | (0.000) | (0.116) | (0.122) | (0.001) | (0.000) |
| Age | 0.017*** | -0.004* | -0.011*** | -0.004* | -0.011*** | 0.012*** |
| | (0.000) | (0.054) | (0.000) | (0.096) | (0.000) | (0.000) |
| ABC1 | 0.149 | -0.096 | -0.049 | -0.022 | -0.124* | 0.146 |
| | (0.204) | (0.110) | (0.529) | (0.758) | (0.052) | (0.129) |
| Constant | 2.505*** | 1.772*** | 2.259*** | 1.069*** | 1.832*** | 1.573*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.013 | 0.015 | 0.015 | 0.007 | 0.024 | 0.019 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.20: Exercise 2 – Social Tariff

| | (1) Leakage | (2) HH Support | (3) NHH Support | (4) Smart Meters | (5) Regulation | (6) Reservoir |
|---|---|---|---|---|---|---|
| Own-Price | -0.809* | -3.463** | -12.832 | 0.004 | -6.069* | -2.873** |
| | (0.074) | (0.022) | (0.134) | (0.993) | (0.061) | (0.025) |
| Social Tariff | -1.936 | -0.248 | -0.300 | 0.334 | 0.284 | -1.774 |
| | (0.396) | (0.848) | (0.848) | (0.799) | (0.811) | (0.469) |
| Social Tariff * Own-Price | -0.053 | 4.100 | -9.112 | -0.152 | 1.851 | 1.323 |
| | (0.974) | (0.461) | (0.769) | (0.918) | (0.874) | (0.772) |
| Bill Size | -0.002 | -0.001 | -0.000 | -0.000 | -0.000 | -0.001 |
| | (0.128) | (0.263) | (0.629) | (0.555) | (0.533) | (0.134) |
| Metered | -0.542 | -0.316 | -0.234 | 1.073*** | -0.291 | -0.819 |
| | (0.442) | (0.264) | (0.558) | (0.001) | (0.324) | (0.120) |
| Direct Debit | -0.867 | 0.584** | 0.301 | 0.302 | 0.597** | 0.071 |
| | (0.200) | (0.031) | (0.432) | (0.340) | (0.035) | (0.889) |
| Male | 0.904* | -0.598*** | -0.079 | -0.365 | -0.504** | 1.140*** |
| | (0.059) | (0.002) | (0.769) | (0.103) | (0.012) | (0.001) |
| Age | 0.073*** | -0.003 | -0.043*** | -0.010 | -0.026*** | 0.036*** |
| | (0.000) | (0.656) | (0.000) | (0.231) | (0.001) | (0.009) |
| ABC1 | 1.839*** | 0.188 | -0.155 | 0.258 | 0.418* | 0.278 |
| | (0.002) | (0.434) | (0.648) | (0.357) | (0.095) | (0.534) |
| Constant | 9.725*** | 5.016*** | 8.373*** | 3.032*** | 5.445*** | 7.189*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.012 | 0.009 | 0.009 | 0.006 | 0.020 | 0.012 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.21: Exercise 3 – Social Tariff

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.066 | -0.913** | -4.562** | 0.011 | -1.874** | -0.720*** |
| | (0.429) | (0.016) | (0.022) | (0.907) | (0.015) | (0.007) |
| Social Tariff | -0.123 | -0.624* | -0.640* | -0.081 | 0.112 | -0.228 |
| | (0.770) | (0.056) | (0.078) | (0.784) | (0.689) | (0.656) |
| Social Tariff * Own-Price | -0.129 | 2.953** | 8.931 | 0.335 | 0.744 | 0.638 |
| | (0.664) | (0.035) | (0.215) | (0.318) | (0.788) | (0.504) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.628) | (0.597) | (0.833) | (0.667) | (0.144) | (0.597) |
| Metered | 0.044 | -0.094 | -0.119 | 0.284*** | 0.021 | -0.141 |
| | (0.733) | (0.187) | (0.200) | (0.000) | (0.758) | (0.200) |
| Direct Debit | -0.112 | 0.038 | 0.024 | -0.011 | 0.071 | -0.027 |
| | (0.370) | (0.579) | (0.787) | (0.878) | (0.289) | (0.797) |
| Male | 0.256*** | -0.192*** | -0.131** | -0.097* | -0.154*** | 0.301*** |
| | (0.004) | (0.000) | (0.038) | (0.056) | (0.001) | (0.000) |
| Age | 0.017*** | -0.005*** | -0.012*** | -0.004** | -0.009*** | 0.013*** |
| | (0.000) | (0.004) | (0.000) | (0.037) | (0.000) | (0.000) |
| ABC1 | 0.163 | -0.072 | -0.125 | -0.021 | -0.107* | 0.167* |
| | (0.139) | (0.235) | (0.114) | (0.747) | (0.071) | (0.075) |
| Constant | 2.221*** | 1.928*** | 2.653*** | 1.052*** | 1.703*** | 1.494*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.019 | 0.014 | 0.016 | 0.010 | 0.023 | 0.020 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.22: Exercise 4 – Social Tariff

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.887** | -2.035 | -15.398* | -0.124 | -4.944 | -2.960** |
| | (0.040) | (0.196) | (0.086) | (0.750) | (0.117) | (0.018) |
| Social Tariff | -2.620 | -1.213 | -1.067 | -0.350 | 1.349 | -0.280 |
| | (0.230) | (0.369) | (0.514) | (0.782) | (0.243) | (0.907) |
| Social Tariff * Own-Price | 0.504 | 5.167 | 4.430 | 0.599 | -7.829 | -0.953 |
| | (0.744) | (0.372) | (0.891) | (0.675) | (0.492) | (0.831) |
| Bill Size | -0.002* | -0.001 | 0.000 | -0.001 | 0.000 | -0.002** |
| | (0.059) | (0.146) | (0.868) | (0.394) | (0.937) | (0.019) |
| Metered | -0.372 | -0.692** | -0.588 | 0.807** | -0.318 | -0.827 |
| | (0.582) | (0.019) | (0.160) | (0.012) | (0.267) | (0.109) |
| Direct Debit | -0.757 | 0.580** | 0.310 | 0.209 | 0.699** | 0.086 |
| | (0.242) | (0.040) | (0.439) | (0.495) | (0.011) | (0.863) |
| Male | 0.876* | -0.562*** | -0.167 | -0.129 | -0.543*** | 1.352*** |
| | (0.056) | (0.005) | (0.557) | (0.552) | (0.005) | (0.000) |
| Age | 0.075*** | -0.010 | -0.046*** | -0.009 | -0.022*** | 0.054*** |
| | (0.000) | (0.194) | (0.000) | (0.294) | (0.003) | (0.000) |
| ABC1 | 1.498*** | 0.224 | -0.403 | 0.205 | 0.263 | 0.962** |
| | (0.009) | (0.371) | (0.257) | (0.448) | (0.281) | (0.028) |
| Constant | 9.585*** | 5.985*** | 9.586*** | 3.390*** | 5.096*** | 6.265*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 | 2,228 |
| Adj. R-squared | 0.015 | 0.009 | 0.010 | 0.002 | 0.018 | 0.021 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.23: Exercise 1 – Struggle to Pay Bills

| | (1) Leakage | (2) HH Support | (3) NHH Support | (4) Smart Meters | (5) Regulation | (6) Reservoir |
|---|---|---|---|---|---|---|
| Own-Price | -0.017 | -0.970** | -3.440* | 0.052 | -2.166*** | -0.564** |
| | (0.849) | (0.012) | (0.086) | (0.609) | (0.010) | (0.044) |
| Struggle Pay Bills | -0.092 | -0.085 | -0.780** | 0.273 | -0.364 | -0.068 |
| | (0.852) | (0.809) | (0.043) | (0.440) | (0.302) | (0.903) |
| Struggle Pay Bills * Own-Price | 0.100 | 0.512 | 13.330* | -0.200 | 6.220* | -0.359 |
| | (0.770) | (0.729) | (0.075) | (0.607) | (0.081) | (0.725) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.736) | (0.989) | (0.350) | (0.291) | (0.339) | (0.881) |
| Metered | -0.138 | -0.055 | -0.066 | 0.294*** | 0.079 | -0.117 |
| | (0.328) | (0.451) | (0.484) | (0.000) | (0.305) | (0.311) |
| Social Tariff | -0.264 | 0.296*** | -0.186 | 0.041 | -0.017 | 0.137 |
| | (0.177) | (0.003) | (0.152) | (0.723) | (0.874) | (0.392) |
| Direct Debit | -0.108 | -0.002 | 0.010 | 0.045 | 0.169** | -0.128 |
| | (0.441) | (0.974) | (0.913) | (0.590) | (0.027) | (0.261) |
| Male | 0.175* | -0.169*** | -0.085 | -0.083 | -0.164*** | 0.316*** |
| | (0.068) | (0.001) | (0.179) | (0.147) | (0.002) | (0.000) |
| Age | 0.017*** | -0.003* | -0.011*** | -0.004 | -0.011*** | 0.012*** |
| | (0.000) | (0.097) | (0.000) | (0.103) | (0.000) | (0.000) |
| ABC1 | 0.169 | -0.092 | -0.065 | -0.035 | -0.125* | 0.147 |
| | (0.161) | (0.135) | (0.417) | (0.625) | (0.056) | (0.135) |
| Constant | 2.496*** | 1.733*** | 2.330*** | 1.006*** | 1.752*** | 1.545*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,133 | 2,133 | 2,133 | 2,133 | 2,133 | 2,133 |
| Adj. R-squared | 0.012 | 0.012 | 0.016 | 0.006 | 0.026 | 0.018 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.24: Exercise 2 – Struggle to Pay Bills

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulatio n** | **Reservoi r** |
| Own-Price | -0.771* | -2.799* | -17.489** | 0.092 | -7.648** | -2.282* |
| | (0.094) | (0.070) | (0.046) | (0.819) | (0.021) | (0.082) |
| Struggle Pay Bills | 1.419 | 1.351 | -1.615 | 1.897 | -2.692* | -0.273 |
| | (0.575) | (0.334) | (0.336) | (0.175) | (0.054) | (0.916) |
| Struggle Pay Bills * Own-Price | 0.207 | -4.939 | 30.188 | -2.136 | 33.199** | -0.540 |
| | (0.906) | (0.404) | (0.355) | (0.165) | (0.019) | (0.910) |
| Bill Size | -0.002* | -0.001 | -0.001 | -0.000 | -0.000 | -0.001 |
| | (0.085) | (0.102) | (0.488) | (0.566) | (0.403) | (0.153) |
| Metered | -0.630 | -0.304 | -0.183 | 1.014*** | -0.222 | -0.844 |
| | (0.383) | (0.294) | (0.656) | (0.002) | (0.465) | (0.118) |
| Social Tariff | -2.312** | 0.349 | -1.048* | 0.068 | 0.104 | -0.962 |
| | (0.021) | (0.383) | (0.064) | (0.883) | (0.805) | (0.198) |
| Direct Debit | -0.825 | 0.629** | 0.193 | 0.371 | 0.672** | -0.200 |
| | (0.248) | (0.028) | (0.632) | (0.259) | (0.026) | (0.708) |
| Male | 1.017** | -0.579*** | 0.011 | -0.349 | -0.489** | 1.161*** |
| | (0.038) | (0.003) | (0.968) | (0.122) | (0.018) | (0.002) |
| Age | 0.070*** | -0.006 | -0.049*** | -0.011 | -0.027*** | 0.037*** |
| | (0.000) | (0.467) | (0.000) | (0.224) | (0.001) | (0.009) |
| ABC1 | 1.870*** | 0.141 | -0.206 | 0.223 | 0.410 | 0.313 |
| | (0.002) | (0.568) | (0.555) | (0.430) | (0.114) | (0.497) |
| Constant | 9.965*** | 5.121*** | 9.083*** | 2.971*** | 5.637*** | 7.113*** |
| | (0.000) | (0.000) | (0.000) | (0.001) | (0.000) | (0.000) |
| Observations | 2,133 | 2,133 | 2,133 | 2,133 | 2,133 | 2,133 |
| Adj. R-squared | 0.012 | 0.008 | 0.012 | 0.005 | 0.023 | 0.012 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.25: Exercise 3 – Struggle to Pay Bills

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Leakage | HH Support | NHH Support | Smart Meters | Regulatio n | Reservoi r |
| Own-Price | -0.054 | -0.825** | -4.921** | 0.021 | -2.403*** | -0.541** |
| | (0.523) | (0.034) | (0.015) | (0.823) | (0.002) | (0.048) |
| Struggle Pay Bills | -0.124 | -0.470 | -0.648* | 0.062 | -0.873*** | 0.506 |
| | (0.789) | (0.183) | (0.094) | (0.847) | (0.008) | (0.347) |
| Struggle Pay Bills * Own-Price | 0.087 | 1.824 | 9.268 | 0.092 | 10.639*** | -0.970 |
| | (0.786) | (0.222) | (0.218) | (0.793) | (0.001) | (0.329) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.696) | (0.842) | (0.698) | (0.837) | (0.208) | (0.551) |
| Metered | 0.030 | -0.088 | -0.121 | 0.292*** | 0.049 | -0.162 |
| | (0.824) | (0.229) | (0.202) | (0.000) | (0.491) | (0.151) |
| Social Tariff | -0.268 | 0.098 | -0.140 | 0.114 | 0.121 | 0.071 |
| | (0.144) | (0.332) | (0.284) | (0.277) | (0.220) | (0.650) |
| Direct Debit | -0.110 | 0.038 | -0.009 | 0.014 | 0.112 | -0.065 |
| | (0.404) | (0.596) | (0.922) | (0.849) | (0.115) | (0.561) |
| Male | 0.251*** | -0.200*** | -0.113* | -0.079 | -0.154*** | 0.282*** |
| | (0.005) | (0.000) | (0.078) | (0.126) | (0.002) | (0.000) |
| Age | 0.017*** | -0.005*** | -0.012*** | -0.004* | -0.009*** | 0.013*** |
| | (0.000) | (0.009) | (0.000) | (0.065) | (0.000) | (0.000) |
| ABC1 | 0.178 | -0.062 | -0.134* | -0.026 | -0.109* | 0.153 |
| | (0.117) | (0.323) | (0.095) | (0.687) | (0.074) | (0.111) |
| Constant | 2.222*** | 1.900*** | 2.711*** | 0.968*** | 1.687*** | 1.499*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,133 | 2,133 | 2,133 | 2,133 | 2,133 | 2,133 |
| Adj. R-squared | 0.016 | 0.012 | 0.016 | 0.008 | 0.026 | 0.018 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

### Table D.26: Exercise 4 – Struggle to Pay Bills

| | (1) Leakage | (2) HH Support | (3) NHH Support | (4) Smart Meters | (5) Regulation | (6) Reservoir |
|---|---|---|---|---|---|---|
| Own-Price | -0.832* | -1.763 | -16.581* | 0.004 | -7.554** | -2.431* |
| | (0.059) | (0.274) | (0.072) | (0.991) | (0.019) | (0.059) |
| Struggle Pay Bills | 0.773 | -0.752 | -1.005 | 1.292 | -3.453** | 0.799 |
| | (0.749) | (0.607) | (0.569) | (0.344) | (0.011) | (0.752) |
| Struggle Pay Bills * Own-Price | 0.502 | 4.880 | 8.112 | -1.632 | 39.616*** | -2.465 |
| | (0.763) | (0.429) | (0.813) | (0.277) | (0.004) | (0.598) |
| Bill Size | -0.003** | -0.001** | -0.000 | -0.000 | 0.000 | -0.002** |
| | (0.040) | (0.040) | (0.913) | (0.468) | (0.993) | (0.021) |
| Metered | -0.463 | -0.632** | -0.467 | 0.752** | -0.271 | -0.877* |
| | (0.503) | (0.037) | (0.278) | (0.021) | (0.359) | (0.098) |
| Social Tariff | -2.335** | -0.326 | -0.815 | -0.043 | 0.258 | -0.651 |
| | (0.014) | (0.436) | (0.171) | (0.924) | (0.528) | (0.374) |
| Direct Debit | -0.713 | 0.680** | 0.192 | 0.199 | 0.711** | -0.145 |
| | (0.296) | (0.023) | (0.651) | (0.535) | (0.015) | (0.782) |
| Male | 0.967** | -0.562*** | -0.080 | -0.112 | -0.521*** | 1.368*** |
| | (0.039) | (0.006) | (0.785) | (0.611) | (0.009) | (0.000) |
| Age | 0.071*** | -0.012 | -0.052*** | -0.008 | -0.025*** | 0.055*** |
| | (0.000) | (0.139) | (0.000) | (0.322) | (0.001) | (0.000) |
| ABC1 | 1.488** | 0.197 | -0.503 | 0.152 | 0.185 | 1.045** |
| | (0.012) | (0.446) | (0.170) | (0.583) | (0.462) | (0.021) |
| Constant | 9.876*** | 6.088*** | 10.177*** | 3.354*** | 5.517*** | 6.249*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,133 | 2,133 | 2,133 | 2,133 | 2,133 | 2,133 |
| Adj. R-squared | 0.014 | 0.009 | 0.011 | 0.001 | 0.020 | 0.020 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.27: Exercise 1 – Health Issues

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | 0.012 | -0.624 | -3.936* | 0.125 | -1.855* | -0.616* |
| | (0.910) | (0.155) | (0.077) | (0.279) | (0.052) | (0.052) |
| Health Issue | 0.207 | -0.020 | -0.356 | 0.194 | 0.217 | 0.101 |
| | (0.449) | (0.917) | (0.103) | (0.344) | (0.233) | (0.745) |
| Health Issue * Own-Price | -0.170 | -0.093 | 5.739 | -0.273 | -0.451 | -0.219 |
| | (0.390) | (0.910) | (0.183) | (0.229) | (0.804) | (0.714) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.738) | (0.685) | (0.502) | (0.297) | (0.294) | (0.788) |
| Metered | -0.078 | -0.081 | -0.079 | 0.278*** | 0.062 | -0.100 |
| | (0.583) | (0.262) | (0.397) | (0.001) | (0.419) | (0.388) |
| Social Tariff | -0.289 | 0.261*** | -0.235* | 0.102 | 0.055 | 0.110 |
| | (0.119) | (0.006) | (0.054) | (0.358) | (0.585) | (0.468) |
| Direct Debit | -0.146 | 0.008 | 0.071 | 0.011 | 0.112 | -0.066 |
| | (0.279) | (0.908) | (0.422) | (0.889) | (0.130) | (0.549) |
| Male | 0.186* | -0.165*** | -0.112* | -0.090 | -0.160*** | 0.328*** |
| | (0.053) | (0.001) | (0.076) | (0.118) | (0.002) | (0.000) |
| Age | 0.017*** | -0.004** | -0.010*** | -0.003 | -0.011*** | 0.011*** |
| | (0.000) | (0.037) | (0.000) | (0.145) | (0.000) | (0.000) |
| ABC1 | 0.139 | -0.094 | -0.050 | -0.017 | -0.104 | 0.132 |
| | (0.247) | (0.126) | (0.528) | (0.813) | (0.111) | (0.179) |
| Constant | 2.448*** | 1.699*** | 2.272*** | 0.977*** | 1.758*** | 1.523*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,151 | 2,151 | 2,151 | 2,151 | 2,151 | 2,151 |
| Adj. R-squared | 0.013 | 0.010 | 0.015 | 0.006 | 0.028 | 0.018 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

**Table D.28: Exercise 2 – Health Issues**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.748 | -2.050 | -15.153 | 0.392 | -7.717** | -2.324 |
| | (0.150) | (0.243) | (0.115) | (0.396) | (0.040) | (0.115) |
| Health Issue | 0.742 | 0.585 | -0.651 | 1.271 | -0.343 | 0.676 |
| | (0.595) | (0.442) | (0.489) | (0.122) | (0.633) | (0.641) |
| Health Issue * Own-Price | 0.045 | -3.492 | 5.808 | -1.414 | 6.455 | -1.099 |
| | (0.964) | (0.293) | (0.755) | (0.120) | (0.368) | (0.692) |
| Bill Size | -0.002 | -0.001 | -0.001 | -0.000 | -0.000 | -0.002* |
| | (0.116) | (0.228) | (0.383) | (0.524) | (0.549) | (0.086) |
| Metered | -0.210 | -0.319 | -0.189 | 1.075*** | -0.205 | -0.689 |
| | (0.771) | (0.270) | (0.637) | (0.002) | (0.499) | (0.199) |
| Social Tariff | -2.225** | 0.773** | -0.491 | 0.204 | 0.442 | -0.914 |
| | (0.019) | (0.042) | (0.350) | (0.647) | (0.267) | (0.195) |
| Direct Debit | -1.108 | 0.554** | 0.496 | 0.265 | 0.603** | -0.052 |
| | (0.109) | (0.046) | (0.196) | (0.413) | (0.038) | (0.919) |
| Male | 0.913* | -0.571*** | -0.168 | -0.390* | -0.518** | 1.107*** |
| | (0.063) | (0.004) | (0.535) | (0.090) | (0.012) | (0.002) |
| Age | 0.071*** | -0.006 | -0.042*** | -0.011 | -0.027*** | 0.035** |
| | (0.000) | (0.435) | (0.000) | (0.224) | (0.001) | (0.014) |
| ABC1 | 1.939*** | 0.137 | -0.164 | 0.260 | 0.459* | 0.348 |
| | (0.002) | (0.578) | (0.630) | (0.367) | (0.075) | (0.444) |
| Constant | 9.487*** | 4.986*** | 8.454*** | 2.804*** | 5.535*** | 7.024*** |
| | (0.000) | (0.000) | (0.000) | (0.002) | (0.000) | (0.000) |
| Observations | 2,151 | 2,151 | 2,151 | 2,151 | 2,151 | 2,151 |
| Adj. R-squared | 0.012 | 0.008 | 0.010 | 0.006 | 0.021 | 0.010 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.29: Exercise 3 – Health Issues

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | **Leakage** | **HH Support** | **NHH Support** | **Smart Meters** | **Regulation** | **Reservoir** |
| Own-Price | -0.005 | -0.771* | -5.606** | 0.110 | -1.930** | -0.609** |
| | (0.957) | (0.081) | (0.012) | (0.293) | (0.030) | (0.048) |
| Health Issue | 0.306 | -0.224 | -0.345 | 0.139 | 0.143 | 0.140 |
| | (0.234) | (0.241) | (0.116) | (0.455) | (0.400) | (0.644) |
| Health Issue * Own-Price | -0.226 | 0.735 | 5.124 | -0.187 | -0.237 | -0.196 |
| | (0.223) | (0.379) | (0.237) | (0.365) | (0.889) | (0.735) |
| Bill Size | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.000 |
| | (0.681) | (0.496) | (0.976) | (0.885) | (0.195) | (0.524) |
| Metered | 0.063 | -0.105 | -0.125 | 0.276*** | 0.021 | -0.124 |
| | (0.633) | (0.148) | (0.180) | (0.000) | (0.768) | (0.268) |
| Social Tariff | -0.283 | 0.058 | -0.258** | 0.192* | 0.156* | 0.140 |
| | (0.105) | (0.546) | (0.035) | (0.057) | (0.097) | (0.343) |
| Direct Debit | -0.149 | 0.047 | 0.061 | -0.016 | 0.073 | -0.027 |
| | (0.241) | (0.503) | (0.494) | (0.823) | (0.289) | (0.799) |
| Male | 0.263*** | -0.177*** | -0.144** | -0.097* | -0.150*** | 0.295*** |
| | (0.004) | (0.000) | (0.023) | (0.063) | (0.002) | (0.000) |
| Age | 0.017*** | -0.006*** | -0.011*** | -0.004** | -0.009*** | 0.013*** |
| | (0.000) | (0.002) | (0.000) | (0.043) | (0.000) | (0.000) |
| ABC1 | 0.166 | -0.076 | -0.136* | -0.017 | -0.096 | 0.167* |
| | (0.142) | (0.220) | (0.086) | (0.796) | (0.116) | (0.080) |
| Constant | 2.134*** | 1.922*** | 2.669*** | 0.971*** | 1.690*** | 1.433*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,151 | 2,151 | 2,151 | 2,151 | 2,151 | 2,151 |
| Adj. R-squared | 0.019 | 0.012 | 0.016 | 0.009 | 0.025 | 0.019 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

## Table D.30: Exercise 4 – Health Issues

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Leakage | HH Support | NHH Support | Smart Meters | Regulation | Reservoir |
| Own-Price | -0.828* | -1.647 | -10.253 | 0.294 | -7.176** | -2.521* |
| | (0.096) | (0.368) | (0.310) | (0.510) | (0.050) | (0.079) |
| Health Issue | 0.466 | -0.396 | 0.477 | 1.060 | -0.411 | 1.253 |
| | (0.727) | (0.617) | (0.629) | (0.182) | (0.556) | (0.375) |
| Health Issue * Own-Price | 0.183 | 0.607 | -17.668 | -1.292 | 6.360 | -2.214 |
| | (0.849) | (0.861) | (0.366) | (0.141) | (0.362) | (0.412) |
| Bill Size | -0.003** | -0.001 | -0.000 | -0.000 | 0.000 | -0.003*** |
| | (0.048) | (0.135) | (0.847) | (0.423) | (0.923) | (0.010) |
| Metered | -0.110 | -0.700** | -0.547 | 0.826** | -0.247 | -0.674 |
| | (0.873) | (0.020) | (0.194) | (0.012) | (0.403) | (0.196) |
| Social Tariff | -1.934** | 0.083 | -0.691 | 0.094 | 0.606 | -0.555 |
| | (0.033) | (0.833) | (0.212) | (0.827) | (0.118) | (0.418) |
| Direct Debit | -0.955 | 0.542* | 0.547 | 0.164 | 0.710** | -0.069 |
| | (0.149) | (0.060) | (0.175) | (0.601) | (0.012) | (0.890) |
| Male | 0.934** | -0.525** | -0.243 | -0.155 | -0.559*** | 1.277*** |
| | (0.046) | (0.010) | (0.395) | (0.486) | (0.005) | (0.000) |
| Age | 0.072*** | -0.013* | -0.046*** | -0.010 | -0.023*** | 0.053*** |
| | (0.000) | (0.094) | (0.000) | (0.255) | (0.003) | (0.000) |
| ABC1 | 1.571*** | 0.140 | -0.448 | 0.214 | 0.297 | 1.024** |
| | (0.007) | (0.586) | (0.210) | (0.442) | (0.236) | (0.021) |
| Constant | 9.494*** | 6.258*** | 9.388*** | 3.159*** | 5.236*** | 6.169*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Observations | 2,151 | 2,151 | 2,151 | 2,151 | 2,151 | 2,151 |
| Adj. R-squared | 0.014 | 0.008 | 0.011 | 0.002 | 0.018 | 0.019 |

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1.*
*Source: NERA analysis of WTP survey data.*

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