The Value of the Met Office Public Weather Service to the General Public

Final report

LE London Economics

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About London Economics

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Table of Contents

Page

Report at a glance ii

Executive Summary iii

1 Introduction 1

2 Overall value of the Met Office Public Weather Service 2

3 Value of different elements of weather forecasts 6

Index of Tables, Figures and Boxes 9

ANNEXES 10

Annex 1 Stated preference survey methodology 11

Report at a glance

Aim and methodology

- The aim of this study is to estimate the value that the UK public places on the Met Office's Public Weather Service (PWS). The overall value is explored, as well as the value of different aspects of weather forecasts.
- The study conducted a survey of a representative sample of the UK population. The key elements of the survey were a contingent valuation question to elicit how much the public is willing to pay (WTP) for the current Met Office PWS, and a choice experiment to elicit valuations for specific attributes of the PWS (such as forecast accuracy).

Key findings

- On average, individuals are willing to pay **between £19.67** and **£22.99 per year**[1] (with a central estimate of **21.33 per year**) for the Met Office PWS. Based on this, the total annual value of the Met Office PWS to the UK public in 2024 is estimated to be between **£1.10 billion** and **£1.28 billion**.
- The valuation results were mainly driven by young people (18–34-year-olds), people from higher socioeconomic groups, respondents who reported a higher level of trust in weather forecasts, and respondents who reported that they find severe weather warnings useful.
- The results of the choice experiment reveal that, on average, respondents would be willing to pay £0.35 for a 1-percentage point improvement in rainfall forecast accuracy, £0.33 for a 1-day increase in the number of days ahead a forecast is available, and £0.32 for an hourly improvement in the interval at which a forecast is available. On average, respondents would also be willing to pay £3.82 for a pollen forecast to be provided.
- The value of these different aspects of the weather forecast were not found to vary across different groups of users.

[1] This range is based on the 95% confidence interval.

Executive Summary

London Economics were commissioned by the Met Office to assess the value the public place on the Met Office's Public Weather Service (PWS). A survey of the UK general population was conducted between 26th January and 2nd February 2024 and gathered responses from a representative sample of 1,002 UK adults.

The key elements of the survey were a stated preference valuation (willingness-to-pay) question, which focused on estimating the overall value of the PWS, and a discrete choice experiment, which focused on the value of different elements of weather forecasts. Alongside these questions, respondents were asked about their use and experience of weather forecasts to provide further qualitative information regarding consumers' value of the PWS and to validate the responses to the valuation questions.

Overall value of the PWS to the public

The PWS is responsible for providing accurate and reliable weather information to empower individuals to make better decisions in their daily lives. There are a very large number of micro-decisions that individuals might make in response to weather information, all of which derive a benefit that has some value to the public. A bottom-up approach that evaluates the impact of each of these micro-decisions would not be feasible due to the large number and wide variety of decisions that could be influenced by the weather forecast. Instead, this study used a contingent valuation technique to ascertain the average amount individuals would be willing to pay annually for the current PWS.

The main result of the study, the average willingness to pay (WTP) per individual for the Met Office PWS, is estimated to be between **£19.67** and **£22.99 per year**[2] (with a central estimate of **21.33 per year**). By scaling this up for the UK adult population, the total annual value of the Met Office PWS in 2024 is estimated to be between **£1.10 billion** and **£1.28 billion**.

Younger individuals (aged 18-34) and those from higher socioeconomic groups have a higher valuation of the PWS compared to the average. Valuations are also higher amongst respondents who reported to have a greater usage of and trust in weather forecasts.

Value of different elements of weather forecasts

A discrete choice experiment was used to understand the value of specific aspects of the public weather service available to members of the public. The aspects that were valued were (i) the accuracy of rain forecasts, (ii) how many days ahead a forecast is available, (iii) the interval at which the forecast is available, (iv) the locality of the forecast, and (v) inclusion of a pollen forecast.

Respondents were presented with hypothetical options (two per choice) representing alternative versions of the PWS that would be available to them and asked to choose between these options. The aim of the choice experiment was to estimate the public's WTP for different aspects of weather forecasts. Any choice experiment that aims to estimate WTP must have a price associated with each option and different 'payment vehicles' (i.e. ways to frame the price) can be used for this. When the subject of the survey is a public service, like the PWS, a tax is a natural and common choice for the

[2] This range is based on the 95% confidence interval.

payment vehicle. Thus, in the survey, the aspects of the PWS being valued were varied, as was the amount of tax the respondent would need to pay to support the public weather service in each scenario.

The results of the choice experiment reveal that respondents are willing to pay for improvements in rainfall accuracy, the number of days ahead they can get the forecast, the interval at which the forecast is available, and for a pollen forecast.

On average, respondents would be willing to pay £0.35 for a 1-percentage point improvement in rainfall forecast accuracy, £0.33 for a 1-day increase in the number of days ahead a forecast is available, and £0.32 for an hourly improvement in the interval at which a forecast is available. On average, respondents would also be willing to pay £3.82 for a pollen forecast.

1 Introduction

London Economics were commissioned by the Met Office to assess the value the public place on the Met Office's Public Weather Service (PWS). This study employed stated preference non-market valuation techniques in a survey of the UK general population to estimate the willingness-to-pay (WTP) for the PWS.

As the UK's national weather service, the Met Office is responsible for the provision of accurate, timely and digestible weather information to the public. The Met Office PWS disseminates weather forecasts and information through various channels. Weather information from the Met Office is directly published on their website and app, as well as indirectly through other channels. For example, the Met Office also supply their forecasts and other weather information to ITV, Channel 4, and Sky, who in turn publish them on their channels. Furthermore, Met Office data is used by other forecasting organisations, such as The Weather Channel, Apple Weather and Meteogroup, as inputs to their own forecasting products and services.

The PWS is also responsible for the National Severe Weather Warning Service, which issues warnings for severe weather events, including storms, heavy rain, snow, ice, and extreme heat. This also feeds into the Met Office's role in supporting civil contingencies by helping them to prepare for extreme weather events and mitigate against the potential impacts. Furthermore, the Met Office provide seasonal forecasts, which are used by the government for emergency planning (e.g., for energy and transport). The PWS also provide specialist forecasts for pollen, air pollution, and UV levels, which are published alongside other publicly available weather information. In certain coastal and mountain areas, the Met Office also provide extra forecast detail on tidal activity and wave heights, as well as more granular detail on temperatures and wind speeds at different altitudes in mountainous areas.

Accurate and reliable weather information helps individuals make better decisions in their daily lives. This includes day-to-day decision-making such as whether to take an umbrella, put a raincoat on, or choose between indoor and outdoor activities. Individuals might also be influenced by the weather when making more important decisions related to health and safety, such as when to take medication, or whether to implement flood protection measures at their property. The Met Office impacts daily decision-making directly through their own published forecasts, and indirectly through forecasts published by other organisations. Met Office observational data improves the accuracy of all UK forecasts, which means that benefits are also derived, to some extent, from all forecasts that are consumed in the UK. Each decision that is made in response to consuming weather information is associated with a public benefit, and this study aims to capture the sum of these benefits by estimating an overall value associated with the PWS.

The PWS also has a range of benefits to businesses, ranging from small businesses whose activities are, to some extent, weather dependent (e.g., gardening) to large industries such as aviation. Evaluating the benefits to businesses is beyond the scope of this study, which focuses on the value of the PWS to the public. A different approach would be needed to estimate the value of the PWS to businesses.

1.1 Survey methodology

The value of the PWS to the public was estimated by conducting a willingness-to-pay (WTP) survey. The survey employed stated preference non-market valuation techniques and gathered responses from a representative sample of 1,002 UK adults. The fieldwork was conducted by YouGov between

26th January and 2nd February 2024. The use of this methodology is in line HM Treasury guidance for evaluation techniques in the public sector, which states that "if robust revealed preference data is not available, surveys that use willingness to pay and willingness to accept are an established alternative method known as stated preference techniques."[3]

Prior to the fieldwork, ten semi-structured cognitive interviews were conducted to test the survey by assessing respondents' understanding of it, particularly their understanding of the valuation task and payment vehicle. The findings from these interviews informed adjustments to finetune the survey. The survey was also piloted prior to launching the main fieldwork.

The key elements of the survey were a stated preference valuation (willingness-to-pay) question, which focused on the value of the PWS as a whole, and a discrete choice experiment, which focused on the value of different elements of weather forecasts.

Alongside these questions, respondents were asked about their use and experience of weather forecasts. These questions looked at topics including how often respondents check the weather, how much they trust the weather forecast, how weather forecasts influence their daily decisions, and awareness of different elements of forecasts. These questions were asked to provide further qualitative information regarding consumers' value of the PWS, and to validate the responses to the valuation questions.

2 Overall value of the Met Office Public Weather Service

The aim of this study is to assess the overall value the public places on the Met Office PWS. There are a very large number of micro-decisions that individuals might make in response to weather information. For example, the weather forecast might affect an individual's decision to:

- bring an umbrella;
- apply suncream;
- pack certain clothes;
- take medication for a health condition that is affected by the weather;
- take shelter from the sun or heat;
- salt or clear driveways; or,
- buy flood protection products.

All of these derive a benefit that has some value to the public.

A bottom-up approach that evaluates the impact of each of these micro-decisions would not be feasible due to the large number and wide variety of decisions that could be influenced by the weather forecast and the many assumptions that would need to be made, affecting the robustness of such an approach. Instead, this study used a contingent valuation technique to ascertain the average amount individuals would be willing to pay annually for the current PWS. This was captured by deriving the value respondents would be willing to pay in order to maintain the current Met Office PWS, compared to a situation where the Met Office would no longer provide the PWS.

[3]The Green Book 2022, HM Treasury, https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government/the-green-book-2020

In collaboration with the Met Office, the contingent valuation questions were designed to accurately and concisely convey the role of the PWS and what UK weather services would look like if the Met Office did not provide this service. In the survey, respondents were presented with a short text that explained what the PWS is, its overarching purpose, and the main services that the PWS provides. This included an explanation of the Met Office's role in producing weather forecasts for broadcasters such as ITV and Channel 4, who publish the Met Office's forecasts on their channels, as well as the Met Office's role in providing data to other forecasting organisations such as Meteogroup (who supply forecasts to the BBC) and the Weather Channel. The text also described the Met Office's provision of Severe Weather Warnings (SWW), seasonal forecasts, specialised forecasts (UV, Pollen and air pollution), and additional detail for beach and mountain areas. This description underwent cognitive testing to ensure clear understanding of the Met Office's roles. The feedback from cognitive testing was that this text was straightforward and informative, and no issues were raised with respect to cognitive understanding.

Respondents were then provided with a description of what UK weather forecasts would look like in a hypothetical scenario in which the Met Office no longer provided the PWS. The scenario outlined that, while forecasts would still be available for the UK, they would be less accurate due to the loss of access to the Met Office's observational data. The scenario deliberately did not say how much less accurate forecasts would be because a) to do so would have given a false sense of precision (as the exact degree to which forecast accuracy would differ without the PWS is uncertain) and b) providing a description of how forecast accuracy would change if the Met Office did not provide the PWS would have made the survey too long and complex.[4] The text also described other Met Office services that would no longer be available including SWW and Met Office forecasts via the Met Office app, website or social media channels.

The hypothetical scenario was also tested in cognitive interviews. Participants were asked if any aspects of the scenario were unclear and to identity the most important elements of the Met Office's role that would be impacted. Feedback from the cognitive interviews revealed that the scenario was clear and easy to understand. The participants highlighted accuracy of forecasts, provision of severe weather warnings, and the contribution to emergency services as the most important aspects of the Met Office's role that would be impacted.

This suggests that the specific impact of the Met Office, compared to weather forecasts in general, was well understood by respondents and therefore the scenario specifically isolates the value of the PWS to the public.

As the PWS is predominately publicly funded, the chosen payment vehicle for the WTP questions was a tax contribution, which is common practice in stated preference methodologies for valuing public goods. Respondents were asked how much they would be willing to pay, through a tax contribution, to maintain the PWS as it currently is, compared to a scenario in which they contribute nothing and the Met Office no longer provides the PWS. A double-bounded dichotomous choice with follow-up method was used. Please see Annex 1 for further details on the methodology.

[4] For information on how individuals value changes in the accuracy of rainfall forecasts, see the results of the choice experiment in Section 3.

2.1 Willingness-to-pay results

The main result of the study, the average WTP per individual for the Met Office PWS, is estimated to be between **£19.67** and **£22.99 per year**[5] (with a central estimate of **21.33 per year**). By scaling this up for whole the UK adult population[6], the total annual value of the Met Office PWS in 2024 is estimated to be between **£1.10 billion** and **£1.28 billion**.

In terms of the distribution of responses, many individuals (39%) gave a relatively low valuation (between £0 and £10), and more than half (52%) gave a valuation of £20 or less. However, 18% of individuals gave a much larger valuation of £60 or more.

This result was found to vary across different age groups. On average, young people (aged 18-34) are willing to pay more than those aged 35-54 (£24.65 compared to £18.83). One key driver of this is that young people were less likely to give a valuation of zero specifically because they do not believe that they should pay tax to support the PWS. This suggests that young people are, in general, more willing to support public services, and therefore more likely to state a higher valuation on average. Another explanation could be based on the finding that young people were more likely to say that the weather forecast affects their decisions about flexible leisure time, sporting activities, and health and wellbeing either 'a little' or 'a lot', potentially prompting higher valuations.

WTP was also higher for respondents from higher socioeconomic groups (AB and C1), who are willing to pay £24.64, compared to £17.86 for those from lower groups (C2, D and E).[7] This is in line with prior expectations because higher socioeconomic groups tend to have higher incomes and therefore can afford to pay more. There were no significant differences between other demographic groups, for example, men compared to women or those who live in urban areas compared to rural areas.[8]

2.1.1 Willingness-to-pay depending on individuals' perceptions and use of weather forecasts

Other survey questions allowed for an analysis of the average WTP across different subgroups of respondents. For example, respondents can be grouped based on how often they check the weather, how often they take action in response to the forecast, level of trust in forecasts, and awareness of different elements of forecasts. This allowed for the validation of the WTP results by testing hypotheses such as whether individuals who use weather forecasts more should place a higher value on them.

One key element of the PWS explored in the survey was the awareness and importance of severe weather warnings (SWW). The majority of respondents (79%) said they had seen a SWW in the last six months, and of those people, 85% said that they either found it 'fairly useful' or 'very useful'. The WTP results indicate that a higher valuation for the Met Office PWS was driven by those respondents who said that they find SWW useful, compared those who do not find SWW useful (£23.63 compared to £15.17).

[5] This range is based on the 95% confidence interval.

[6] Based on ONS population estimates for the UK adult population.

[7] More detail on social grade categories can be found here

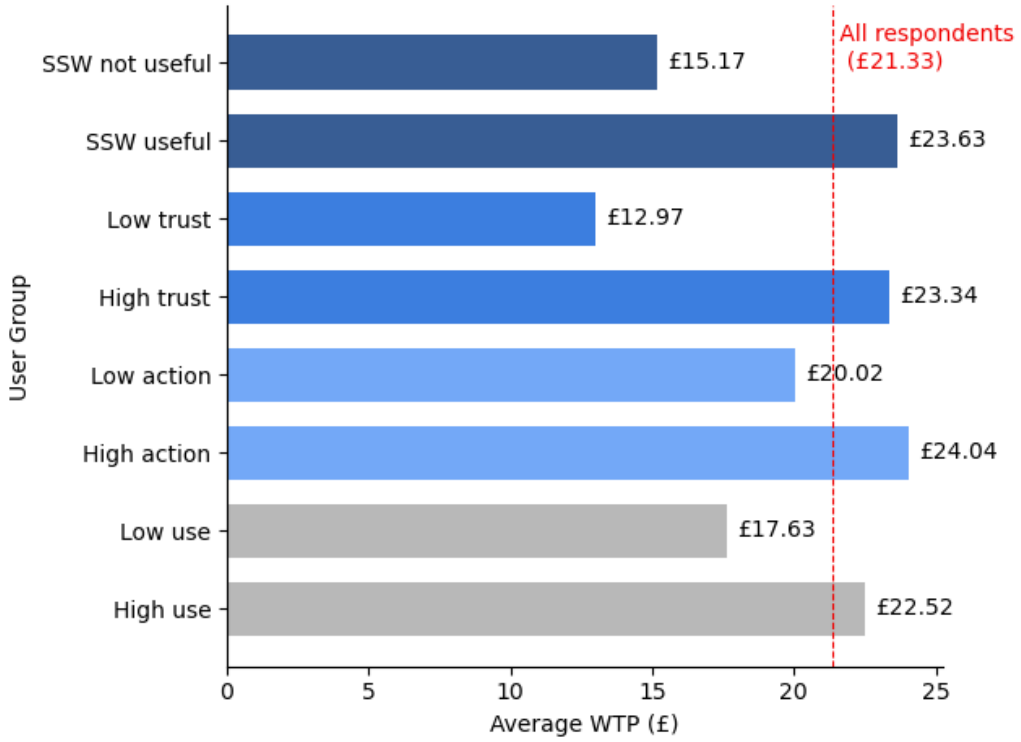
[8] The WTP estimates were not statistically significantly different from each other at the 5% level.

Another survey question asked respondents how much they trust that the weather forecast they see is indicative of the actual weather they experience. The majority of respondents (85%) either said that they trust weather forecasts 'a little' or said that they trust them 'a lot'.[9] These 'high trust' users were also key drivers in the average WTP results. 'High trust' users value the PWS at £23.34 per year, compared to £12.97 for 'low trust' users.

Survey responses were also used to identify subgroups based on their frequency in which they looked at (or listened to) weather forecasts ('high use' and 'low use'), and how often they take actions in response to weather forecasts ('high action' and 'low action'). The majority of respondents were found to be 'high action' users (71%), which is defined as those who said they take an action at least once a week in response to seeing the weather forecast. Similarly, 80% of respondents were identified as 'high use' weather users, defined as respondents who look at weather forecasts at least 2 to 3 days a week. The average WTP was higher for both high use and high action users. 'High use' weather users have an average WTP of £22.52, compared to £17.63 for 'low use' users. 'High action' users have an average WTP of £24.04, compared to £20.02 for 'low action' users.

The average WTP results for different subgroups are summarised in Figure 1. The key takeaway is that 'high trust', 'high action', and 'high use' users, as well as those who think that SWW are useful, on average demonstrated a higher WTP for weather forecasts. The consistency of these results with prior expectations implies that participants understood the WTP task and helps to validate the methodology.

Figure 1 Average willingness-to-pay by user group



[9] Respondents could choose between: 'I trust them a lot', 'I trust them a little', 'I have no feelings either way', 'I do not trust them at all', and 'Don't know'.

3 Value of different elements of weather forecasts

The purpose of the final part of the survey was to understand the value of specific aspects of the public weather service available to members of the public. The aspects that were valued were (i) the accuracy of rain forecasts, (ii) how many days ahead a forecast is available and (iii) the interval at which a forecast is available, (iv) the locality of a forecast, and (v) inclusion of a pollen forecast.

To estimate the value of these aspects, a choice experiment was used where respondents were presented with hypothetical options (two per choice) representing alternative versions of the public weather service that would be available to them and asked to choose between these options. The attributes of the options (i.e., the aspects of the PWS being valued) were varied, as was the amount of tax the respondent would need to pay to support the public weather service in each scenario. Details of the attributes and the range of values used in the choice experiment are provided in Table 1 below. The attributes were chosen based on desk research of various forecasts and discussions with the Met Office regarding aspects of forecasts that are important to the public. Further desk research was conducted to inform the range of values across which the attributes were varied in the choice experiment.

Table 1 Attributes in the choice experiment

Attribute	Definition	Range
Rainfall accuracy	The proportion of rain forecasts that are correct (i.e., it does actually rain when it is forecast to)	65% to 99%
Days ahead	The number of days ahead you can get the forecast	1 day ahead to 14 days ahead
Forecast interval	The interval at which the forecast is available e.g., hourly, or 2-hourly forecast	Every half an hour to once a day
Locality	The size of the area that the forecast covers	$10km^2$ (large town) to $0.5km^2$ (street)
Pollen	Whether or not the pollen forecast is included	Not included or included
Price	The annual tax contribution for the forecast available in that scenario	£5 to £25

The choices made by respondents across varying combinations of these attributes and levels were used to estimate the WTP for improvements in the level of each attribute individually. For example, this includes estimating the WTP for an increase in rainfall accuracy or the WTP for the provision of a pollen forecast compared to not providing one. Note that respondents are not directly asked their WTP for a change in each attribute, rather the method of analysis means that WTP for each attribute can be estimated based on the combination of attributes that is preferred, given the price of each. Please see Annex 1 for further details on the methodology.

3.1 Choice experiment results

The results of the choice experiment reveal that respondents are willing to pay for improvements in rainfall accuracy, the number of days ahead they can get the forecast, the interval at which the

forecast is available, and for a pollen forecast. Respondents are not found to be willing to pay for forecasts that are more local.[10]

Table 2 shows the WTP results for a unit change in each of the attributes (excluding locality). When comparing the results, note that the relevant unit changes are very different across the attributes (e.g., 1-percentage point for rainfall accuracy, 1 day for how far ahead forecasts are available, and available vs. not available for the pollen forecast). Hence the results should be compared with care.

Respondents would be willing to pay £0.35 for a 1 percentage-point improvement in rainfall forecast accuracy, £0.33 for a 1-day increase in the number of days ahead a forecast is available, and £0.32 for an hourly improvement in the interval at which the forecast is available. On average, respondents would also be willing to pay £3.82 for a pollen forecast.

While the WTP estimate for the pollen forecast may seem large compared to other aspects, this is due to the 'unit change' for this attribute (which is that it is available as opposed to unavailable). A 10-percentage point increase in rainfall accuracy has a similar valuation (£3.49) to the pollen forecast being available.[11]

Table 2 WTP by attribute

Unit change in the attribute	WTP
1%-point increase in rainfall accuracy (e.g., 75% to 76%)	£0.35
1-day increase in the number of days ahead the forecast is available for (e.g., 3 days ahead instead of 2 days ahead)	£0.33
1-hour increase in the interval at which the forecast is described (e.g., hourly instead of 2-hourly)	£0.32
Inclusion of a pollen forecast	£3.82

The average WTP for different attributes was found to vary across age groups. For example, the findings indicate that a higher valuation for rainfall accuracy was driven by 18–34 year olds, who are willing to pay £0.67 for a 1-precentage point increase, compared to £0.28 for 35–54 year olds. Younger people (18-34 year olds), however, are not willing to pay for increases in days ahead, forecast interval, locality, or the inclusion of a pollen forecast. There were no statistically significant differences in the WTP of men compared to women across any of the attributes, or those who live in urban areas compared to rural areas.

3.1.1 Willingness-to-pay depending on individuals' perceptions of different elements of forecasts

The other questions included in the survey allowed for an analysis of the average WTP for different attributes across different subgroups of respondents. These questions explored respondents' awareness of rain and pollen forecasts, and the importance they placed on these aspects of a forecast.

[10] The WTP estimate for locality was not statistically significantly different from zero at the 5% level.

[11] This is assuming that the relationship between rainfall accuracy and WTP is linear.

One survey question asked respondents whether they had seen 'probability of rain' when looking at or listening to the weather forecast. The majority of respondents (89%) said that they had seen probability of rain forecasts and, of those, 95% said that it was either 'very important' or 'somewhat important' to them. There was no significant difference in the average WTP for higher rainfall accuracy between those who thought that probability of rain was important and those who did not. This is likely due to the small number of respondents who did not think that probability of rain was an important element of a weather forecast.

The survey questions also found that 62% of people were aware of the pollen forecast. Of those who had seen a pollen forecast, 64% said that it was either 'very important' or 'somewhat important' to them. The findings from the choice experiment, however, suggested that there is no difference in average WTP for a pollen forecast between those who indicated that pollen is important to them and those who did not.

Index of Tables, Figures and Boxes

Tables

Table 1	Attributes in the choice experiment	6
Table 2	WTP by attribute	7
Table 3	Willingness-to-pay for the PWS	12
Table 4	Attributes in the choice experiment	13
Table 5	Interpretation of WTP for attribute in the choice experiment	13

Figures

Figure 1	Average willingness-to-pay by user group	5
Figure 2	Example choice card	12

ANNEXES

Annex 1 Stated preference survey methodology

In order to measure the value of the Met Office Public Weather Service (PWS), a representative survey of 1,002 consumers was undertaken by YouGov between 26th January and 2nd February 2024. The key elements of the survey were a stated preference valuation (willingness-to-pay) question, which focused on the overall value of the PWS, and a discrete choice experiment, which focused on the value of different elements of weather forecasts.

Alongside these questions, respondents were asked about their use and experience of weather forecasts. These questions looked at topics including where respondents get their weather information, how often they check the weather, how the weather forecast influences daily decisions, and awareness of different elements of forecasts. These questions were asked to provide further qualitative information regarding consumers' value of the PWS, and to validate the responses to the valuation questions.

A1.1 Overall value of the Met Office Public Weather Service

The contingent valuation section of the survey aimed to ascertain the average amount an individual would be willing to pay per year in order to maintain the current Met Office PWS, compared to a situation in which the Met Office does not provide the PWS. The payment vehicle used in the questions was a tax, as is common in studies that use contingent valuation methodologies to value public goods. The format of the contingent valuation was in 3 parts:

1) **Single-bounded dichotomous choice (SBDC)**. First respondents were asked whether they would accept a given annual tax to maintain the PWS, or contribute none of their taxes to the Met Office, resulting in the Met Office no longer providing the PWS. The tax contribution was randomised across respondents, over four different levels: £8, £16, £26, and £36. This question alone is referred to as 'single-bounded dichotomous choice' (SBDC).
2) **Double-bounded dichotomous choice (DBDC)**. After answering the first question, respondents were presented with a second amount and asked whether they would pay that to maintain the PWS. The second amount was based on their answer to the first question: if they indicated they would be willing to pay the first amount, the second amount they were presented with was higher, and if not, the second amount was lower. For example, those who rejected £8 were then offered £2, and those who accepted £8 were offered £16. The first and second questions combined are referred to as 'double-bounded dichotomous choice' (DBDC).
3) **Bounded open-ended contingent valuation (CV)**. After the dichotomous choice questions, respondents were asked an open-response question, in which they stated the maximum tax they would be willing to pay to maintain the PWS. Possible response ranges were bounded based on respondents' answers to the previous dichotomous choice questions. For example, if a respondent's previous answers implied that their valuation was in the range £16 to £26, they were asked to specify a value *within this range*.

The format of these questions allows for the average WTP to be calculated in three ways: from the SBDC data alone, from the DBDC data (combining the two dichotomous choice responses), and from the bounded open-ended responses.

The estimation from the DBDC data is preferred to using just the SBDC because it uses more information (i.e., both dichotomous choice responses). DBDC data can be used to estimate the average WTP with a likelihood function, as is common in the literature. From the bounded open-

ended data, average WTP can be calculated by taking the mean of the responses. Table 3 shows that the WTP results are stable across the DBDC and bounded open-ended models.

Table 3 Willingness-to-pay for the PWS

Model	Annual tax per individual	Annual value to the UK
Double-bounded dichotomous choice	£21.06	£1.17 billion
Bounded open-ended contingent valuation	£21.33	£1.19 billion

The valuation estimated using the bounded open-ended method is used as the main result as it makes the most use of the available information. That is, it uses responses to the dichotomous choice questions indirectly in order to establish the bounds to the open responses, and then uses individual respondents' precise valuation within those bounds. The bounded open-ended method is therefore our primary method used to estimate the value of the PWS.

All valuation estimates derived from responses to the consumer survey were weighted using individual weights, as all questions were asked on an individual basis.

A1.2 Value of different elements of weather forecasts

To explore the value of different aspects of a weather forecast, a choice experiment methodology was used. Five aspects of forecasts were valued: (i) the accuracy of rain forecasts, (ii) how many days ahead a forecast is available, (iii) the interval at which a forecast is available, (iv) the locality of a forecast, and (v) inclusion of a pollen forecast.

The survey asked respondents to make a series of choices between two options that varied based on the attributes (or aspects) of the public weather service available to them. The amount of tax the respondent would need to pay to support the public weather service in each scenario was also varied. See Figure 2 for an example choice card, as it was presented to respondents.

Figure 2 Example choice card

	Option 1	**Option 2**
Rainfall accuracy	65%	85%
Number of days ahead you can get the forecast	7 days	3 days
Forecast interval available	30 minutes	3 hours
Detail of the forecast provided	$10km^2$ (Large town)	$5km^2$ (Small town)
Pollen forecast is included	No	Yes
Your contribution per year	£10	£20

○ Choose option 1 ○ Choose option 2

○ I don't know which option I would choose

In each choice, each attribute was varied across a range of values. Except for the pollen forecast, which was a binary variable (i.e., it is either provided or not), all attributes could take five possible values (or 'levels') which are listed in Table 4. Respondents were asked to make six choices in total (i.e., they were shown six different choice cards), and these choices were allocated randomly based on 10 possible choice sets.

Table 4 Attributes in the choice experiment

Attribute	Definition	Levels
Rainfall accuracy	The proportion of rain forecasts that are correct	65%, 75%, 85%, 95%, or 99%
Days ahead	The number of days ahead you can get the forecast	1 day, 3 days, 7 days, 10 days, or 14 days ahead
Forecast interval	The interval at which the forecast is available e.g., hourly, or 2-hourly	24 hours, 12 hours, 3 hours, 1 hour, or 30 minutes
Locality	The size of the area that the forecast covers	10km^2 (large town), 5km^2 (small town), 2km^2 (village), 1km^2 (neighbourhood), or 0.5km^2 (street)
Pollen	Whether or not the pollen forecast is included	Not included or included
Price	The tax contribution for the forecast available in that scenario	£5, £10, £15, £20, or £25

Based on the data from the choices made in the choice experiment, a conditional logit model was estimated, in which the six attributes were the explanatory variables. The pollen attribute was binary, taking the value of 1 if the service is provided and 0 otherwise. All other variables took one of the levels from Table 4. Following the standard procedure for estimating WTP from choice experiment data, the average WTP to maintain a specific attribute value, in terms of annual tax contribution, was determined by calculating the ratio of coefficients of each service variable to the price (i.e. tax) variable.

The average estimated valuation represents WTP for a unit change in each of the attributes. Note that the relevant unit changes are very different across the attributes (e.g., 1-percentage point for rainfall accuracy, 1 day for how far ahead forecasts are available, and available vs. not available for the pollen forecast). Hence the results should be compared with care. The interpretation of the WTP for each attribute is explained in Table 5.

Table 5 Interpretation of WTP for attribute in the choice experiment

Attribute	Unit change in the attribute
Rainfall accuracy	1%-point increase in rainfall accuracy (e.g., 75% to 76%)
Days ahead	1-day increase in the number of days ahead the forecast is available for (e.g., 3 days ahead instead of 2 days ahead)
Forecast interval	1-hour increase in the interval at which the forecast is available (e.g., hourly instead of 2-hourly)
Locality	1 km^2 increase in size of the area that the forecast covers (e.g., 2km^2 instead of 1km^2)
Pollen	Inclusion of a pollen forecast

A1.3 Subgroup analysis

The analysis for the contingent valuation exercise and the choice experiment were first conducted on the whole sample. The analysis was then repeated on a number of subgroups of the whole sample. These subgroups included breakdowns by the following characteristics:

- Age
- Gender
- Urbanity
- Region
- Social grade
- How often respondents look at weather forecasts
- How often respondents take actions in response to weather forecasts
- Trust in weather forecasts
- Awareness and perceived importance of Severe Weather Warnings
- Awareness and perceived importance of 'probability of rainfall' as part of the weather forecast
- Awareness and perceived importance of pollen as part of the weather forecast

Results were only reported where the difference between different subgroups was statistically significant at the 5% level.

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