

## Extended Abstract

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<b>Paper/Poster Title</b>	<b>Valuing water quality – exploring the impact of a hypothetical baseline</b>
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**Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.**

<b>Abstract</b>	<i>200 words max</i>
<p>A Discrete Choice Experiment (DCE) was undertaken to estimate the value of attaining good water quality across the rivers and lakes of Northern Ireland. This study recognised the importance of including an opt-out alternative and focused on the issue of how it should be defined. Rather than adopting a ‘poor’ opt-out as is frequently used with DCEs, this study used an opt-opt based on each respondents’ own perception of the current water quality with bespoke choice cards containing an opt-out reflecting their perception of water quality and inferior choices removed.</p> <p>The study found that there was no agreed baseline for water quality in Northern Ireland. If a ‘poor’ opt-out had been used, 92% of the respondents would have faced a hypothetical baseline. This would have posed cognitive challenges to respondents with implications for the valuation estimation and subsequent policy recommendations.</p> <p>To assess the impact of mis-specifying the baseline, simulated datasets were created for the data from this survey, imposing a ‘poor’ and ‘moderate’ opt-outs. This determined that using a mis-specified opt-out would have resulted in WTP being underestimated. Furthermore, this finding could explain the frequent disproportionate selection of the opt-out within DCE which introduces bias into the estimation procedure.</p>	
<b>Keywords</b>	water quality; willingness-to-pay; hypothetical baseline; stated preference; choice experiments
<b>JEL Code</b>	C180, C130, Q260
<b>Introduction</b>	<i>100 – 250 words</i>
While agriculture has the potential to deliver many economic goods and services, many have no market price. Non-market valuation methods are well established	



methods which have been developed to estimate the value of these goods. To enhance the realism of the choices facing respondents within Discrete Choice Experiments (DCE), an 'opt-out' alternative is used. However, respondents have been found to choose the opt-out disproportionately often, impacting the accuracy of the estimated values.

Many DCEs for environmental goods use unrealistic opt-outs where all attributes set as 'poor', irrespective of the actual situation or how it is perceived by each respondent. This results in a 'hypothetical baseline' where the opt-out does not reflect the actual situation and poses cognitive challenges to respondents (Whittington and Adamowicz, 2010). Furthermore, using simulated datasets Campbell and Erden (2019) showed that the incidence of status quo choices is reduced when an actual baseline is used rather than setting the level of each attribute to zero.

This study explored the impact of using alternative baselines in a DCE for improving water quality in Northern Ireland. The study used opt-outs based on each respondents' own perception of the current water quality to estimate the value of achieving good water status. These welfare estimates were then compared to those obtained by specifying the opt-out as being 'poor' or 'moderate' using simulated datasets. This showed that if a researcher assumes that the water quality is worse than that perceived by the respondent, the value of improving water quality will be underestimated.

### **Methodology**

*100 – 250 words*

A discrete choice experiment was employed in March 2021 to value improving water quality across the rivers and lakes of Northern Ireland. Water quality was defined using the water classification of the Water Framework Directive as 'Poor' (including the WFDs poor and bad classes), 'Moderate' or 'Good' (including the WFDs good and high classes). The focus of the valuation was on improving the water quality in (i) their local area, (ii) their favourite recreational area, and (iii) the rest of Northern Ireland.

The opt-out used within the DCE was the respondents own perceived water quality. To cover all potential opt-out scenarios, a set of choice cards was created based on an 'poor' opt-out. Each respondent received a bespoke set of choice cards with their self-defined baseline forming the opt-out. All inferior choices were removed as it was assumed that respondents would not choose them.

In the analysis to explore the impact of a mis-specified opt-out, simulated datasets were created using the respondents' actual responses to model the effect of a researcher adopting an incorrect opt-out. This assumed that respondents when faced with an incorrect opt-out would compare the offered choice cards to their own perception of the current water quality, ignoring the given opt-out. Therefore, in the

simulated datasets, each response was re-recorded as the difference between the assumed opt-out and the level offered in the choice card, rather than the difference between the respondent's perceived water quality and the choice card. This was undertaken for 'poor' and 'moderate' opt-outs.

## Results

100 – 250 words

The results from this study showed:

- 1) **Baselines:** Of the 27 possible baselines for water quality (three areas and three quality classes), there was no dominant baseline.
  - a) 14% of respondents thought water quality was good in all areas.
  - b) 8% thought that water quality was poor in all areas.
  - c) 22% thought that water quality was moderate in all areas (the highest share of the sample).

This finding demonstrates that for 92% of the sample, the use of a 'poor' opt-out would be incorrect. As 57% of water in Northern Ireland was classified as moderate (31% being good or high and 12% being poor or bad), using an evidence-based 'moderate' opt-opt would only be valid for 22% of the sample. Any generic opt-opt selected for water quality in Northern Ireland would be mis-specified for a minimum of 78% of respondents.

## 2) Value of improving water quality:

- a) Respondents valued water quality improvements equally across the three geographical areas.
- b) Using the respondents' own water quality as the opt-out within the DCE, the marginal WTP to attain good water quality was estimated to be:
  - Local areas: £33.99.
  - Favourite recreational area: £30.83.
  - Rest of Northern Ireland: £27.78.
- c) Using the simulated datasets, adopting a 'poor' ('moderate') opt-out within the model, the marginal WTP were:
  - Local areas: £9.32 (£25.69).
  - Favourite recreational area: £10.39 (£22.18).
  - Rest of Northern Ireland: £12.93 (£22.14).

## Discussion and Conclusion

100 – 250 words

This study estimated the willingness to pay of improving water quality in Northern Ireland using respondent-defined opt-outs. It explored the issue of defining the opt-out used within Discrete Choice Experiments (DCE) as this study identified that there was no agreed baseline for current water quality across Northern Ireland. The absence of an agreed baseline known *a priori* by the researcher poses challenges for selecting an appropriate opt-out for a DCE, as it may result in respondents being presented with an incorrect opt-out. This double hypothetical: a hypothetical baseline as well as a hypothetical improvement to water quality, introduces the risk of cognitive dissonance into the DCE with implications for the valuation estimation and subsequent policy recommendations (Whittington and Adamowicz, 2010). For a double hypothetical to deliver unbiased estimates of value, all respondents must accept the proffered opt-out as fact and suffer no cognitive dissonance affecting their responses which would introduce bias to the estimated WTP.

In this study, simulated datasets were created based on assuming that respondents will base their decisions using their own perceived baseline, ignoring an opt-out which differs from their own perceptions. This demonstrated that using either a 'poor' or a 'moderate' opt-out will underestimate WTP. If respondents were found to adopt this approach in DCEs with a mis-specified opt-out, this could explain the frequent disproportionate selection of the opt-out within DCE.

Further work: this study has identified the need to explore the reactions of respondents to a mis-specified opt-out within both DCE and contingent valuation (CV).