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The Economic Value of Heritage: A Benefit Transfer Study

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Executive Summary

Historic buildings form an important part of how people perceive and value their local area. This is recognised in the planning regime, where they receive protection through the designation of listed building and conservation area status. Some public-sector funding exists in the form of grants in support of historic buildings, while certain institutions that are housed in historic buildings, such as museums, may receive public funding for their activities. However, most historic buildings are held in private hands and receive no public funding.

Cathedrals are among the most striking and most visited historic buildings. Aside from their religious significance, they are often important tourist attractions and landmark buildings for local areas. However, due to their age, size and complexity, cathedrals are also particularly expensive and challenging to maintain. They are self-funded, with the addition of some funds from the Church Commissioners to cover a small number of staff salaries.

Given the public benefit that these buildings generate, there is a direct societal interest in better understanding the value that they create for the people that use/visit them and for non-users. In Bakhshi et. al. (2015), we demonstrated for two leading cultural institutions (The Natural History Museum and Tate Liverpool) how the economic valuation techniques of contingent valuation can be used to quantify this value.[1] Building on that research, we subsequently studied whether it was possible to obtain consistent valuation findings on a class of similar cultural assets, large regional museums in England.[2] The consistency of values found across the museums in that study supports the idea that it is possible to transfer economic values obtained through contingent valuation to similar sites, so called *benefit transfer*, avoiding the need for costly primary data collection.

In this paper we use contingent valuation methods to estimate values for four historic cities and their four cathedrals, using the best practice survey procedures developed in our two earlier studies and the methods applied in a recent EU-wide benefit transfer study.[3] Contingent valuation is an established economic valuation approach that is recognised by HM Treasury as an accepted method for estimating the value of use and non-use value of goods and services (HM Treasury 2011). In this methodology, people who use a good/asset or service (in this study historic cityscapes and cathedrals) and those who have not used them are asked their willingness to pay (WTP) to maintain and preserve them.

WTP estimates were obtained from individuals who had visited (or lived), or not visited, one of four historic cities: Canterbury, York, Winchester and Lincoln and their cathedrals.[4] These sites were selected on the basis that they are historic cities with cathedrals that receive significant numbers of visitors and are broadly comparable in terms of size.

We confirm the findings in Bakhshi et. al. (2015 and 2018) that contingent valuation delivers plausible estimates of use and non-use value, whereby the WTP values vary with observed individual socio-demographic (and other) characteristics in a way that is consistent with economic theory. We also demonstrate that, as in our earlier museums study, it is possible to transfer valuation estimates for use and non-use values between sites. For the four historic cities and their associated cathedrals in our study, the average 'transfer error' we find is substantially lower than the threshold for validity suggested in the literature for acceptable value transfer.

For the transfer of use and non-use values, we found that the transfer errors between sites were minimised by using the average valuations of multiple sites to proxy the value of another site.[5] Although low transfer errors were obtained, the robustness of this type of transfer to new sites does depend on such sites being similar to those studied here. Adjusting

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[1] Bakhshi, H., Fujiwara, D., Lawton, R. N., Mourato, S., & Dolan, P. (2015). *Measuring Economic Value in Cultural Institutions,* UK: Arts and Humanities Research Council.
[2] DCMS, pending publication.
[3] Mourato, S., Fimereli, E., Contu, D., Gaskell, C., & Boniatti-Pavese, C. (2014). *The Economic Benefits of Cultural Built Heritage Interiors Conservation from Climate Change Damages in Europe* (No. WP6 Final Report) (p. 94). London, UK: Grantham Research Institute on Climate Change and the Environment.
[4] In the UK, city status has traditionally been granted to places that have a cathedral, although in size terms none of the cities studied has a population over 250,000 people.
[5] Acceptable transfer errors are set around 20—40%: Morrison, M., & Bergland, O. (2006). Prospects for the use of choice modelling for benefit transfer. *Ecological Economics*, *60*(2), 420–428

the value transfer further by controlling for income or other variables using regression analysis was not found to improve performance, indeed in some cases the valuation transfer errors were increased.

How the research was undertaken

The valuation estimates in the study were collected through an online survey of two groups:

1. Historic city users: People who had visited or lived in the relevant historic city in the past three years. As cathedral visitors must all have visited the historic city this group contains the full sample of **cathedral visitors/users,** and part of the sample of cathedral non-users where a cathedral visit also must have occurred in the past three years.

2. Historic city non-users: Members of the public who had not visited or lived in the relevant historic city in the past three years. This group, by definition, cannot have visited the cathedrals of these cities.

The sample was taken from English residents aged 16 and over. Socio-demographic information on survey participants and background information on their attitudes to culture and participation was also obtained to validate the WTP values against economic theory and for use in the benefit transfer models.

To obtain valuation estimates, **users (residents and visitors)** and **non-users of** the historic city were asked to consider a hypothetical scenario of a threat of damage from climate change and a short-fall in funding. The effect of the scenario being that some historic buildings in the city (the city being inclusive of the cathedral) were likely to be obscured from view due to repair work and that buildings currently open to the public were likely to close for a period of over a year. To prevent this happening an independent, not-for-profit, fund would be set up which would undertake a series of preventative measures. Users and non-users were asked if they would be prepared to make a one-off donation to the historic city fund.

Valuations for the cathedral were obtained in two ways. Those asked to assess the valuation of the historic city (users and non-users), were asked to allocate a proportion of their historic city donation to the cathedral. If they indicated that they were not prepared to make any donation to the historic city, they were also asked a specific question on their willingness to donate to protect the cathedral.

The non-use values of the non-visitors to historic cities and cathedrals in the survey were **weighted** to reflect the known characteristics of the general population. The values of historic city visitors were weighted to adjust for the demographics of visitors to historic cities. As no systematic information on cathedral visitors was available the survey sample was taken as being representative of cathedral visitors.

Stated preference survey data collection is subject to a number of **potential biases**.[6] In particular, the hypothetical nature of the survey questions means that respondents may provide unrealistic or inaccurate answers, or responses be influenced by the order in which questions are asked. To address this we employed several strategies, such as the use of follow-up questions to check the consistency of previous answers and explicitly reminding respondents that people answering surveys have a tendency to overstate their valuations and that they should aim to be realistic. Formal tests for potential biases were also undertaken on the data collected, and the biases were not found to significantly affect WTP values.

[6] Carson, R. T. (2012). Contingent valuation: a practical alternative when prices aren't available. *Journal of Economic Perspectives*, *26*(4), 27–42; Champ, P. A., & Bishop, R. C. (2001). Donation payment mechanisms and contingent valuation: an empirical study of hypothetical bias. *Environmental and Resource Economics*, *19*(4), 383–402

To assess the extent to which the estimated values are transferrable across sites we used three methods:[7]

i) *Simple unit transfer*, which involves transferring the average WTP from three of the other cathedrals/historic cities (the pooled 'study sites') to the remaining cathedral/historic city (the 'policy site');
ii) *Adjusted unit transfer*, where the average WTP from the pooled study sites is adjusted for income differences between the policy and study sites, and;
iii) *Function transfer:* where the average WTP at the pooled study sites is adjusted for a richer set of socio-demographic variables (including income) and other measured differences between users and non-user groups.

Historic city and Cathedrals valuation estimates

We report the average use and non-use values obtained from visitors and non-visitors for each of the four historic cities and their associated cathedrals.

Table 1 shows the average use value and non-use values as measured by the WTP for the four historic cities and their cathedrals. Average use values for historic city visitors/residents ranged from £9.18 (York) to £9.96 (Winchester). Average non-use values for historic cities were lower ranging from £5.32 (Canterbury) to £7.30 (York). In both cases the median[8] use and non-use values tended to be significantly below the average indicating that a small proportion of the sample have high valuations for the historic cities.

Average use values for cathedral visitors ranged from £8.05 (Winchester and Lincoln cathedral) to £6.66 (York Minister). Average non-use values for cathedrals were lower ranging from £4.20 (York Minster) to £3.27 (Lincoln Cathedral). In both cases the median values tended to be significantly below the average indicating that there are a group of people, who are a small proportion of the sample, but have high valuations for the cathedrals.

Average WTP values can be obtained from the pooled sample in each cultural category and user group:

- **Historic cities Resident/Visitor (use value): Mean WTP = £9.63**
- **Non-visitors (non-use value): Mean WTP = £6.14**
- **Cathedrals visitor: Mean WTP = £7.42**
- **Cathedrals non-visitor: Mean WTP = £3.75**

Table 1 Summary of Cathedral and Historic city use and non-use Willingness to Pay values

City user WTP or Use value	Canterbury	Lincoln	Winchester	York	Pooled average
Mean (standard error)	£9.74 (£1.01)	£9.64 (£1.19)	£9.96 (£1.31)	£9.18 (£0.83)	£9.63 (£0.55)
Median	£5.50	£5.50	£5.50	£5.50	£5.50
City non-user WTP or Non-use value	Canterbury	Lincoln	Winchester	York	Pooled average

[7] See Mourato, S., Fimereli, E., Contu, D., Gaskell, C., & Boniatti-Pavese, C. (2014). The Economic Benefits of Cultural Built Heritage Interiors Conservation from Climate Change Damages in Europe (No. WP6 Final Report) (p. 94). London, UK: Grantham Research Institute on Climate Change and the Environment; Johnston, R., Rolfe, J., Rosenberger, R. S., & Brouwer, R. (2015). Benefit Transfer of Environmental and Resource Values - A Guide for Researchers and Practitioners. London, UK: Springer. http://www.springer.com/gb/book/9789401799294. Accessed 26 April 2017

[8] The median is the centred value in an ordered list of numbers, such that an equal number of values are smaller and higher than the median. Median values are less sensitive to extreme values than the mean.

Mean (standard error)	£5.32 (£0.61)	£5.96 (£0.75)	£5.97 (£0.59)	£7.30 (£1.11)	£6.14 (£0.40)
Median	£1.25	£1.25	£4.50	£1.25	£1.25
Cathedral user WTP or Use value	**Canterbury Cathedral**	**Lincoln Cathedral**	**Winchester Cathedral**	**York Minster**	**Pooled average**
Mean (standard error)	£7.00 (£0.76)	£8.05 (£1.05)	£7.98 (£1.48)	£6.66 (£1.08)	£7.42 (£0.56)
Median	£3.30	£3.33	£3.66	£2.81	£3.30
Cathedral non-user WTP or Non-use value	**Canterbury Cathedral**	**Lincoln Cathedral**	**Winchester Cathedral**	**York Minster**	**Pooled average**
Mean (standard error)	£3.63 (£0.38)	£3.27 (£0.35)	£3.89 (£0.40)	£4.20 (£0.51)	£3.75 (£0.21)
Median	£1.13	£0.55	£1.10	£1.38	£1.10

Sample weighted. All WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except for £0). Summary statistics calculated with inclusion of 'No' at payment principle (coded £0).

WTP values of historic city users and non-users are not significantly higher than the individual museums evaluated in the earlier DCMS museums benefit transfer study (£6.01-£7.79 for users and £2.79-£4.06 for non-users), despite survey respondents in the current study valuing the maintenance and conservation of the historic character of an entire city. These numbers should not be considered directly comparable with those in the earlier study as the scenario is not equivalent. This may also suggest limited sensitivity to scope of WTP i.e. that respondents are not fully considering the extent of the heritage good being valued. Assumptions made by respondents about the funding model may also be affecting the results. For instance, in contrast to museums, private historic buildings are not typically funded from public taxation or charitable donation, and people may therefore consider that they should not have to make contributions to support history cityscapes.

The mean WTP of cathedral users was between £6.66 and £8.05 across the four cathedrals. This is similar to the use values obtained for individual cultural sites in the earlier museums study, and comparable to use values estimated in previous studies.[9] Cathedrals are funded by, among other things, donations, however it is possible that a high proportion of these are from the congregation, and visitors for secular purposes will, in the case of the sites we study, incur an entry charge which perhaps makes them less likely to donate relative to museums which are typically free. The mean WTP of Non-user WTP values ranged between £3.27 for Lincoln Cathedral and £4.20 for York Minster, which is slightly higher than for individual museums in the previous DCMS study.

Validity analysis: factors affecting use and non-use values

We assessed the validity of the valuation estimates using multivariate regression analysis. Theory suggests that higher values should be associated with certain demographic characteristics (especially income), attitudes to culture and prior usage of the institution being valued.[10]

Factors associated with higher use values among cathedral visitors and historic city visitors/residents

+ **Income:** There was a positive and statistically significant association between household income and use values for both the historic city and the cathedral, controlling for other factors across all users surveyed. However, this was not found to hold consistently at the level of the individual historic city or cathedral where sample sizes are smaller; in some cases there was a positive statistically significant relationship, but not all.
+ **Attitudes to Heritage:** Selecting heritage, arts, or environment as being a Top 5 public spending priority was found to be positively and significantly associated with higher use values for both cathedrals and historic cities, controlling

[9] Bakhshi et al. 2015

[10] Bateman, I. J., Carson, R. T., Day, B., Hanemann, M., Hanley, N., Hett, T., et al. (2002). *Economic Valuation with Stated Preference Techniques: A Manual*. Cheltenham, UK: Edward Elgar.

for other factors across all users surveyed. However, as with income, this was not found to hold consistently across all individual historic city or cathedral sites where sample sizes are smaller. Agreeing that 'Visiting heritage sites increases one's wellbeing (happiness)' was found to increase valuations for both historic city and cathedral users in the overall sample of users, but this result was not found consistently at the level of individual cities and cathedrals.

+ **Family:** Having dependent children was found to be associated positively with willingness to pay for the cathedral across cathedral users, but this was not a consistent finding at the level of the individual cathedral where the sample sizes are smaller. This was also found with historic city users overall, although there was less evidence of the statistical significance of this effect at the individual city level.
+ **Living closer to cathedral:** This was found to be positively related to the historic city valuation in the overall sample of users, but was not found to affect the valuation of cathedral users. It is possible that this is due to the estimates capturing the effect of being a resident in the city, while this effect is less strong in the cathedrals sample as there are fewer residents in that sample. However, this effect is not found consistently in the individual historic city and cathedral sub-samples.

Factors associated with higher non-use values among those who had not visited (or lived in) the historic city or the cathedral

+ **Income:** There was a positive and statistically significant association between higher incomes and higher value among non-users of both the historic city and the cathedral, controlling for other factors across all non-users surveyed. However, this was not found consistently when the analysis was at the level of the individual historic cities or cathedrals where sample sizes are smaller.
+ **Cultural engagement:** Being a member of a cultural, conservation or environmental organization was in general positively and significantly associated with higher values of willingness to pay among the sample of all non-users of cathedrals and historic cities. However, this was not found consistently at the level of individual historic cities or cathedrals where the sample sizes are smaller.
+ **Attitudes to heritage** Agreeing that 'There are more important things to spend money on than preserving heritage' was found to be negatively and statistically significantly associated with higher values among non-users, although not consistently at the level of individual historic cities and cathedrals.
+ **Age** In the total sample of cathedral non-users age was found to be positively related to willingness to pay, but strong evidence of an effect from age was not found elsewhere.

B**enefit transfer**

We tested whether it was possible to transfer values within the sample to proxy values using the three methods outlined. The benefit transfer literature suggests that an acceptable transfer error – the % difference between study site and policy site – is around 40%.[11] We found that:

- *Simple unit transfer:* gave the lowest average transfer error for both use and non-use values (and for both cathedrals and historic cities), well within the transfer threshold window. We would recommend that this approach therefore be adopted to benefits transfer for historic cities and cathedrals. It is suitable for transferring use WTP values from the four historic cities/cathedrals provided we are studying policy sites which are sufficiently similar in characteristics and visitor numbers to those studied.
- A*djusted unit transfer:* produced low transfer errors, but not consistently so and requires more data to implement as it requires information on the income differential between the study and the policy site. We therefore would not recommend its application in this instance.
- Transfer of *benefit functions:* We found that this performed poorly with high levels of error and do not recommend using as it was only possible to explain a small percentage of the variation in respondents' willingness to pay.

[11] Ready, R., & Navrud, S. (2006). International benefit transfer: Methods and validity tests. Ecological economics, 60(2), 429–434.

Table 2 summarises the WTP values elicited from historic cities and cathedrals visitors and non-visitors. It also shows the transfer errors we obtained on average and the largest transfer error we obtained using the simple unit transfer approach.

Table 2 Use and non-use Willingness to Pay for benefit transfer: average WTP value across four study sites.

Population	Use/non-use value	Valuation variable	Study site mean WTP (4 sites)	Mean transfer error	Max transfer error
Historic cities					
Resident/Visitor	Use	One-off donation on behalf of their household to reduce the damage caused by climate change, improve the maintenance and conservation of the historic buildings in the city, and reduce the risk of irreparable damage and closure of those buildings currently open to the public	£9.63	3.2%	6.6%
Non-resident/visitor	Non-use		£6.14	12.5%	21.4%
Cathedrals					
Visitor	Use	One-off donation for their household to reduce the damage caused by climate change, improve the maintenance and conservation of the respective cathedral, and reduce the risk of irreparable damage and closure	£7.42	10.8%	15.3%
Non-visitor	Non-use		£3.75	10.7%	19.3%

Going forward, this research provides a bank of use and non-use values for historic towns and cathedral which can be transferred to other sites in the UK. This can be used by local residents, NGOs and government to build the evidence base behind local planning decisions, economic business cases, and applications for further funding.

1 Introduction

1.1 Background

Historic buildings and historic places receive millions of visitors each year – VisitEngland estimates that in 2016, there were 71.5 million visits to historic properties in England.[12] However, this only gives a partial indication of the value that historic buildings and places provide to the public: both to the visitors and those who view them from the outside, as well as 'non-use' aspects of value, such as their willingness to pay to preserve cultural heritage for future generations.[13] Under welfare economic assumptions, contingent valuation (CV) techniques that are recognised in HM Treasury's Green Book of valuation guidance, can be used to estimate such use and non-use values.[14] In an earlier study of regional museums for the Department for Digital, Culture, Media and Sport (DCMS), we showed how contingent valuation estimates could be transferred between sites of the same type. The aim of the present study is to extend this approach to cathedrals and historic cities in England.

Non-market values refer to the benefits provided by goods or services which are not traded in the market, i.e. are available to the public free of charge (and therefore have no market price).[15] An understanding of the value of non-market goods and services to the public is required for public investment decisions, policy appraisal and evaluation in existing and future heritage sites. Failing to adequately value the benefits risks an under-appreciation of the social value of heritage investments.[16]

To this end, in this report we:

a) estimate the economic benefits associated with the maintenance and conservation of two types of heritage site - historic cityscapes and of cathedrals;
b) test the transferability of the estimated values between sites to investigate the potential of applying the values to additional historic cities/cathedrals without the need to conduct new primary valuation studies.

To estimate the economic benefits, we used CV surveys to elicit from people who use the good or service how much value they place in accessing the good or service in question, and from those in the general population who do not use it what value they place on its continued existence.[17]

To assess transferability, we applied a technique known as value transfer or benefit transfer (BT).[18] BT involves transposing 'primary' research valuation estimates from one site to another. Where valid, it offers policy relevant values in a fast and cost-effective way as it means the valuation estimates can be used in other contexts.

The study only includes the benefits to residents in England, excluding the rest of the UK and foreign visitors (in compliance with the HM Treasury Green Book). While in some exceptional cases, the Treasury recognises the benefits to foreign visitors in government cost-benefit analysis, this is not relevant for the present study, insofar as we are exploring the transferability of value estimates which might be used to inform the allocation of funds raised by domestic taxes to heritage investment.[19]

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[12] https://content.historicengland.org.uk/content/heritage-counts/pub/2017/heritage-indicators-2017.pdf
[13] Willis 2014
[14] Bakhshi et al. 2015; HM Treasury 2018
[15] Arrow et al. 1993; Bateman et al. 2002
[16] Crossick and Kaszynska 2016
[17] Bateman et al. 2002
[18] Brouwer 2000
[19] Note that this study does not include an assessment of the wider economic benefits of cultural institutions such as increased business for local shops caused by the visitors attracted to a city.

1.2 Valuation

At the heart of the CV approach is the design of surveys asking respondents directly to report their maximum willingness to pay (WTP) (for positive outcomes or to avoid negative outcomes) or minimum willingness to accept (WTA) compensation (for negative outcomes or to forego positive outcomes). The CV methodology has developed over a number of decades, developing a range of best practice techniques to improve the robustness and welfare consistency of the values elicited.[20] The advantage of CV over other approaches, such as revealed preferences, where existing market prices are used as a proxy for the non-market good, is its wide applicability and flexibility: CV can estimate both use and non-use values, as well as being applicable to a wide range of goods and services, including values associated with future changes.[21] The principle disadvantage of CV is that asking individuals about their WTP or WTA is subject to a number of well-known biases, which even best practice survey design cannot entirely eradicate.[22]

We refer to the widely used total economic value (TEV) framework, when considering the economic value of cultural institutions. The TEV categorises values into two main categories, use values, and non-use values:[23]

- **Use values**: These are subdivided into direct and indirect use. Direct use benefits could include recreational, leisure, and entertainment activities, as well as education, inspiration and knowledge. Indirect use benefits could arise in the form of enhanced community image, sense of place, and social interaction. A so-called option value can also be attached to potential future use of the services that heritage sites provide.[24]
- **Non-use values:** We can identify a primary categorisation of non-use values associated with heritage sites. Non-use values can be described as: altruistic values – welfare increases from knowing that others living will benefit from a site; bequest values – welfare increases associated with knowing that future generations will benefit from a site; and existence values – associated with welfare enhancements from knowing that a heritage site, its services and collections, exists even if an individual does not experience a use benefit now or in the future. Users of a particular historic site may also hold non-use values for historic cities and cathedrals that they have not visited.

Many of the multiple benefits listed here are by their nature bundled together. When asking individuals to consider the value of a visit to a heritage site, for example, it is difficult to meaningfully disentangle the value attached to recreation, to education, to visual amenity, to inspiration, etc. Partial separate identification of some of the broader benefits categories (e.g. use and non-use) may however be possible, with careful sample selection and survey design, but even in these cases use and non-use values are commonly conflated.[25]

1.3 Terminology

For ease of understanding, we use the following terminology throughout the report.

Users refers to those respondents who have visited the city or cathedral in the last three years. For city users, this is further divided into *residents* (current resident or resident in the last three years) and *visitors* (visitors in the last three years).

Non-users refer to those respondents who have not visited the city and/or cathedral in the last three years (note that a respondent can be a city user but a cathedral non-user, but not vice versa).

With reference to the TEV Framework (Section 1.2), use value within this study for historic cities and cathedrals refers exclusively to the WTP values held respectively by historic city users (residents and visitors) and cathedral visitors to

[20] Arrow et al. 1993; Bakhshi et al. 2015; Bateman et al. 2002
[21] Bateman et al. 2002
[22] Bakhshi et al. 2015
[23] Pearce et al. 2006; Eftec 2005; Mourato and Mazzanti 2002
[24] Mourato and Mazzanti 2002
[25] Bakhshi et al. 2015

reduce the damage caused by climate change, improve the maintenance and conservation of the historic buildings in the city/cathedral, and reduce the risk of irreparable damage and closure of those buildings currently open to the public. While these are expected to be primarily use values, we acknowledge that visitors may also hold non-use values for the preservation and maintenance of aspects of the historic city which they have not visited, and for collections held within historic buildings.

Non-use value within this study refers to, for the historic city and cathedrals, the WTP values held by those who have not visited the historic cities and those who have not visited the cathedrals (non-users) to reduce the damage caused by climate change, improve the maintenance and conservation of the historic buildings in the city/cathedral, and reduce the risk of irreparable damage and closure of those buildings currently open to the public. While these are expected to be primarily non-use values, we acknowledge that non-users may hold elements of use value, such as the option value to visit the historic city or cathedral in the future or having used it online for research or recreational reasons.

1.4 Site selection

We selected four historic cities in England based on the following criteria:

- Presence of a cathedral in city: is there a cathedral in the city?
- Historic character: is the city historic, in that it contains a significant number of Roman, Medieval, Early Modern, or Industrial period buildings?
- User population: Does a clear and identifiable visitor population exist for surveying use values?
- The provision of the good or service: Is the institution/site excludable, i.e. can a hypothetical scenario be designed in which access to the site can be withdrawn if certain conditions are not met (e.g. can access be restricted via an entry fee)?
- Homogeneity across time: Has the site changed significantly over the past three years (e.g. through large-scale refurbishment), which would create substantive differences in the experiences of visitors at different points in the visitor sample timeframe?
- Homogeneity across the category of site: Are the sites in each category a coherent group to permit benefit transfer? Is there free entry to all the sites? Are they commensurate in importance (e.g. architectural sites of local, national, or international significance)?
- Payment mechanism: Is it possible to design convincing hypothetical scenarios that elicit use and non-use values:
- Use value: Can, for example, access to the institution be made contingent on a hypothetical visitor entry fee? If entry fees already exist (e.g. as they do for many cathedrals) can an additional hypothetical donation be credibly levied on top of existing access fees?
- Non-use value: Can the maintenance of the site credibly be made conditional on receiving donations? Can a donation mechanism be made contingent on a 'provision point mechanism' (where preservation of the sites against hypothetical loss will only be achieved once a certain amount of funding has been raised)?

Compulsory mechanisms like entry fees or taxes are generally preferable to voluntary mechanisms like donations because they are, in principle, incentive compatible within the axioms of welfare economics, i.e. they incentivise truth-telling.[26] However, for non-use values the mechanism of an entrance fee becomes problematic. In the case of historic cities, no entry fee could be envisioned for access. For cathedrals, a large number of cathedrals already have existing entry fee structures or have a strong emphasis on donations at the point of entry. In these cases, a voluntary payment mechanism, such as a donation to maintain the site against some enhanced external threat, such as climate change, is arguably the most credible means of eliciting values for both users and non-users (we expand on the design of hypothetical scenarios in full in Section 2.2.2).[27]

[26] Bateman et al. 2002
[27] Mourato et al. 2014

Based on combinations of the criteria outlined above, a final set of four historic cities was selected: Canterbury, Lincoln, Winchester and York. All of these cities have historic buildings and conservation areas of national relevance. They all contain cathedrals built in the Medieval period.

1.5 Literature review

1.5.1 Contingent valuation in the cultural and heritage sector

Empirical research eliciting economic values or benefits associated with access, preservation or restoration of cultural and heritage assets dates back to the 1980s when the first contingent valuation studies in the field were conducted, focusing on the theatre, historical sites, museums, galleries, libraries and broadcasting.[28] Since then, many studies have been conducted worldwide investigating a variety of benefits, both tangible and intangible.[29]

Bakhshi et al. (2015), as part of the AHRC Cultural Value Project, performed a large-scale contingent valuation in the context of the UK's cultural sector, eliciting visitor and general population willingness to pay for the use and non-use aspects of two cultural institutions - The Natural History Museum (NHM) in London and Tate Liverpool (TL) gallery - through face-to-face visitor and online general population surveys. The study also applied subjective wellbeing analysis testing for associations between activities performed in the past hour and levels of self-reported happiness and sense of purpose. Visitor use values were estimated as £6.65 on average for the NHM (as a hypothetical entry fee) and £10.83 for TL (as an annual donation to support the work inside the gallery). These figures are of a plausible magnitude compared to prices charged for paid exhibitions in UK museums. Average visitor non-use value to support the research and conservation work of the NHM was elicited as a voluntary top up donation (average £2.78), while visitor non-use value of the work of TL in the wider community, elicited as a donation, averaged £8.00. The online survey captured non-use and option values for the general UK population (excluding Northern Ireland) as an annual donation. In the NHM study, the online survey valued the research and conservation work of the NHM, while the TL study valued the work of TL inside and outside the gallery. The survey design developed for that study is used as the basis of the present survey, meaning that the survey design and wording has been extensively tested in the field prior to the present study.

1.5.1.1 Historic cities

We reviewed the existing literature on willingness to pay for heritage landscapes, and in particular historic cities. We were interested in understanding what types of hypothetical scenarios had been used previously to value a non-excludable good like a historic city.

Garrod et. al (1996) carried out a survey of 217 council tax payers in Newcastle-upon-Tyne to elicit WTP values for buildings in Grainger Town, the historic centre of Newcastle. The respondents were introduced to the hypothetical "Grainger Town Initiative" which would seek to restore and renovate Grainger Town and would be part-funded by council tax. A two-stage bidding game was used to derive WTP values, in which respondents were first asked if they would be willing to pay additional tax for the renovation of Grainger Town. 69% of Respondents had a positive WTP and were then asked to give their maximum annual WTP in an open-ended format. The sample mean WTP was £13.76 (£24.66, uprated to 2017 prices), which fell to £10.11 (£18.05 in 2017 prices) if the top and bottom 10% were removed. Separate analysis where respondents were asked to allocate 100 points to different restoration areas showed that respondent's preferences for budget allocation were aligned with the actual level of investment needed in each respective area.

Pagiola (2001) elicited WTP values for tourists and residents for the historic core of the city of Split, Croatia. Separate CV surveys were carried out in-person for 400 tourists from Western and Central Europe and 100 residents living in the historic centre. The survey contained information on a hypothetical project to make targeted improvements to the historic core. WTP values for tourists were elicited by asking if they were willing to pay an increased tourist tax. Residents were asked in a referendum format if they would be willing to pay an annual tax set at a specified level. A so-called double-bounded dichotomous choice question was designed, where four pre-determined bid values were assigned randomly to tourists and residents, followed by a second question asking the respondent if they would consider doubling

[28] Noonan 2003; Pearce and Ozdemiroglu 2002

[29] For a detailed literature review of stated preference heritage valuation studies, see Bakhshi et al. 2015

their payment conditional on a yes response to the first question. The mean WTP per tourist was $44, whereas residents were willing to pay $168 per annum on average. The higher result for residents is only to be expected as it is residents' own cultural heritage which is being preserved. The authors note that this figure would in principle incorporate perceived income gains to residents from the improvements, given that some residents derived part of their income from the tourism industry. The aggregate WTP of residents for the whole of Split was weighted under the additional assumption that residents of Split who did not live in the historic core had a WTP of 10% of the value of 'core residents'[30]. This yields a per annum figure of $1.7 million (£1.71 million).

Santagata and Signorello (2000) conducted a survey of 468 randomly selected local respondents to value a network of cultural and historic monuments making up the 'Napoli Musei Aperti' in the city centre of Naples, Italy. The hypothetical scenario was that public funds would be replaced with a not-for-profit operator relying on charitable contributions. The authors reported mean WTP values for citizens of Naples of 17,000 lire (£10.5) and 30,000 lire (£18.53) from the open-ended and single-bounded dichotomous-choice questions (where a monetary figure is randomly presented to the survey respondent), respectively. Users (people who had visited at least once) had WTP values three times as large as non-users.

As an alternative to contingent valuation, Lazrak et. al. (2014) applied a spatial hedonic pricing model (a revealed preference method valuing heritage via its effect on property prices) to value the Dutch urban area of Zaanstad, which has a rich history and diverse cultural built heritage. The authors also looked at the impact of an area being designated as a 'protected historic landscape' on real estate values. They combined information on the location of listed buildings with data on 20,000 transactions over the course of 22 years. Houses sold within protected historic landscapes were worth 27.9% more than similar houses not located in such designated areas. In addition, each additional listed heritage building within a 50-m radius raised house prices by 0.28%.

In sum, there are a number of examples where contingent valuation has been used previously to value historic cities, even though they are non-excludable. Valuation strategies include: a hypothetical scenario for restoration and renovation of historic sites within the city; use of either compulsory (council tax) or voluntary (donation) payment mechanisms (council tax is only applicable where the population of interest is local, not national); the use of allocation methods to assign part of the WTP for the whole city to individual sites within it; and the use of separate user and non-user samples to elicit use and non-use values. One study used the payment vehicle of donation to a not-for-profit operator charged with maintaining the network of historic monuments.

1.5.1.2 Cathedrals

We also reviewed the previous CV literature on cathedral sites to inform the design of our survey. Pollicino & Maddison (2001) elicited the WTP of 306 residents of Lincoln and its surrounding areas for aesthetic improvements to Lincoln Cathedral, financed by an increase in annual council tax. Individuals were shown photos, with descriptions of the damage inflicted by air pollution at different stages of the cleaning cycle and asked their WTP for the Cathedral to be cleaned more frequently (a hypothetical shift from a 40-year cleaning cycle to a 10 year one). Hence, individuals were asked to value an average change in the appearance of Lincoln Cathedral. The WTP of individuals was elicited using a double-bounded dichotomous choice approach. Mean WTP was £25-£38 depending on the model assumptions. Aggregate WTP for Lincoln and the surrounding areas was calculated by assuming that WTP decreases linearly in residential distance from the cathedral, which tends to be a strong feature of previous CV studies more generally.

Mourato et. al. (2002) estimated average WTP for Bulgarian monasteries in the context of a conservation programme based on a representative sample of 483 individuals interviewed in person at 17 different sampling points across Bulgaria. The payment vehicle for the programme was increased taxation to fund a program to protect and preserve Bulgarian monasteries, given that a significant number were in a worsening state of repair. The average WTP for the

[30] Residents of Split who do not live in the historic core are assumed to benefit given that the historic core remains a commercial and recreational centre for city inhabitants. In light of this, the 10% assumption is viewed as a conservative additional benefit to the residents of Split who live outside of the historic core, though the authors acknowledge that it remains somewhat arbitrary.

programme was BGL2062 (£48.18). Furthermore, those who felt a sense of responsibility to preserve heritage buildings, and those with a higher number of monastery visits, tended to have a significantly larger WTP.

Navrud & Strand (2002) studied the willingness to pay of 163 visitors to the Nidaros Cathedral in Norway, the oldest medieval building in Scandinavia. Information was presented demonstrating the damage to the cathedral from local air pollution. WTP estimates were obtained for two scenarios. Scenario 1 (preserve) involved a reduction of air pollution in the surrounding area to preserve the Cathedral as it was. Scenario 2 (restore) involved increased maintenance and restoration after a period of deterioration from air pollution to return the Cathedral to its then current state. The question used to elicit WTP in this study was open-ended. The payment vehicle used was randomised in two ways: a voluntary donation to a fund and an increased tax for all cultural buildings in Norway, of which a portion could be set aside for the Nidaros Cathedral. The mean WTP for the preserve scenario was NOK 318 (£51), and NOK 278 (£45) for the restore scenario, though the difference between the two was not significant. The differences between responses based on payment vehicles were also insignificant.

Willis (1994) used contingent valuation to estimate the WTP of 92 visitors to Durham Cathedral. The WTP of visitors was elicited by using payment cards and asking visitors for the maximum amount of money they would be willing to pay as an entry fee to the cathedral. Visitors were also asked, having just visited the Cathedral, for the amount they had donated (as the status quo was voluntary donation). The mean donation observed was £0.44 (£0.87 in 2017 prices), whereas the mean WTP an entry fee was £0.78 (£1.53), or £1.21 (£2.38).[31]

Freyer & Behrens (2013) estimated the WTP of 297 visitors to the Cathedrals of Dresden and Freiberg, Germany. Visitors were asked first if they would be willing to pay a sum for the preservation of the respective cathedral. Respondents answering positively were then asked in an open-ended format for their maximum contribution. At Dresden Cathedral, where an entrance fee was not charged, visitors were also asked about how much they would pay to enter the Cathedral should a fee be levied. Visitors to Freiberg were asked their WTP a donation in addition to the entry fee. The mean WTP to enter Dresden Cathedral among respondents with a positive WTP turned out to be similar to the actual amount paid in Freiberg. The mean WTP of all respondents for contributions to preserve the cathedrals was €2.18 (£2.25) in the case of Dresden, and €2.92 (£3.01) in the case of Freiberg.

Using an alternative method, Bedate et. al. (2004) applied the travel cost revealed preference method to measure the consumer surplus value of the Palencia Cathedral, Spain. The Cathedral was free to enter, meaning that a market valuation approach was not possible. The visitor demand curve was instead estimated by calculating the average cost of travel for visitors in different zones and the visitor rate as a proportion of the total population. The total surplus for the 190 Cathedral visitors, from whom data was collected, was estimated at €712 (£774). This was equivalent to a mean WTP of approximately €3.75 (£4.08). This estimate should be considered a direct use value, that does not incorporate passive use values.

In sum, there are several previous examples of where CV has been used to value cathedrals. Key features include the presentation of detailed information on the risk to the cathedral, commonly through air pollution, which represents the hypothetical context under which payment must be made to preserve, restore, or improve the cathedral building, and the payment vehicle typically being a compulsory increase in local or national taxation. Where cathedrals are free to enter, a hypothetical entry fee is often levied, but where entry fees already exist a donation payment mechanism is used. A range of elicitation methods have been previously used in cathedrals, including dichotomous choice, payment card, and open-ended questions.

1.5.2 Benefit transfer: Literature review and applicability

Benefit transfer (BT) is the exercise of transposing 'primary' research findings from one study site to another. It offers a means to providing policy-useful values in a fast and cost-effective way, by taking the estimated average WTP values from sites (study sites) and applying them to another site (policy site) (unit estimate transfer) or transferring the information from the study site to the policy site regarding the relationship between WTP and a number of explanatory

[31] Based on Authors' calculations from Table 2 of Willis (1994)

variables (function transfer).[32] Desvousges, Johnson and Banzhaf developed the first set of tests for analysis of the validity of benefit transfer.[33] Over the last decade there has been a growing consensus around methods for reducing error in benefit transfer.[34] The key challenge for benefit transfer methods is to avoid errors that lead to improper inferences regarding welfare effects and thereby misguided policy decisions. These include errors transferred from the original primary studies (measurement errors) and errors generated by the transfer process itself (generalization errors). The larger the set of study sites, the lower the risk of measurement error related to the possible selection of a single inaccurate or inappropriate source study.

There are three broad approaches to benefit transfer in the literature.[35] The first is based on a transfer of a known benefit (or another aggregate of benefits) from a study site(s) to a policy site. The second is based on the transfer of a valuation function, that calibrates the value being transferred using the physical and demographics characteristics of the policy site. This can be done through an adjustment of the unit value by income or through a more advanced model using a set of predictors. Finally, a third approach known as meta-analytic value function transfer uses a value function estimated from multiple study results, together with information on parameter values for the policy site, to estimate policy site values. The value function therefore does not come from a single study but from a collection of studies. This allows the value function to include greater variation in both site characteristics (e.g. socio-economic and physical attributes) and study characteristics (e.g. valuation method) that cannot be generated from a single primary valuation study.[36] However, this approach requires more extensive data and more pre-existing studies. We do not expand on the meta-analytic method further as it is not applied in this paper.

A growing consensus exists on the advantages and disadvantages of the unit value and function transfer approaches.[37]

Table 1-1 Advantages and disadvantages of unit and function benefit transfer approach (from Johnston et al. 2015)

Unit value transfer	Adjusted unit/Benefit function transfer
Advantages	Advantages
Involves little or no modelling	Increased flexibility and capacity to adjust welfare measures
Less sensitive to modelling assumptions	
Disadvantages	Disadvantages
Unable to adjust welfare measures according to characteristics of the policy site	Over-parameterisation of model can introduce measurement error
Least accurate transfer method on average, although performs acceptably when policy and study sites (including population characteristics) are very similar.	Matching of characteristics of study and policy sites still required

Boyle et al. outline two primary 'rules' in the benefit transfer literature. First transfer errors are reduced where study sites and policy sites are similar in terms of physical site and population characteristics.[38] The transfer of benefits is expected to be more accurate when the researcher can control for as many factors as possible.[39] In particular, criteria for reliable

[32] Brouwer 2000; Eftec 2000
[33] Desvousges, Johnson, Banzhaf, et al. 1998
[34] Brouwer 2000; Bateman et al. 2011; Johnston et al. 2015
[35] Brouwer 2000
[36] Johnston et al. 2015
[37] Johnston et al. 2015
[38] Boyle et al. 2010
[39] Bergland et al. 2002

transfers (i.e. low transfer errors – either *ex post*, once data on the policy site becomes available, or when assessing transfer errors *ex ant*e in a study which uses a proxy on which data is available for an unknown policy site) include:

(i) using the same survey instrument across study sites;
(ii) valuing the same type of policy change and sharing similar property rights;
(iii) conducting surveys at the same point in time, and
(iv) having samples of respondents with similar cultural and social characteristics.

Our proposed benefit transfers broadly meet these criteria: the same survey instrument is used; the same policy change is valued; the surveys are administered at similar points in time, and the user and general populations are similar. However, the limited information we have on the actual visitors to the cathedrals as compared with the respondents to our survey of who visited the cathedrals limits what we can do.

Second, function transfers can in principle lead to more accurate transfer estimates because of the ability to adjust the estimates according to observable differences between the sites.[40] However, although the function transfer approach has the potential to be more robust and to provide less error, this is not always the case.[41] Previous meta-review studies have in fact failed to find consistent evidence that function transfer outperforms unit transfer, while others have even found that unit value transfer outperforms benefit function value transfer.[42] There are other examples from the literature where comparison of unit and function transfer approaches have seen the value function transfer to increase transfer errors.[43] We review the recommended tests for benefit transfer in Section 4 .

There are important examples of the benefit transfer approach being applied in policy in the UK, the EU[44], and the US.[45] In the UK, Eftec produced detailed BT guidance on the use of value transfer in policy and project appraisal for Defra.[46]

Benefit transfer is used in the valuation of health impacts through Value of Statistical Life (VSL) unit values established as part of the European Commission ExternE project.[47] The European Commission also initiated a review of valuation studies of transportation noise to establish unit values per decibel (dBA) for amenity loss due to traffic noise.[48] Brink et al. applied unit values from a meta-analytic value function to estimate the TEV of implementing the EU's network of nature protection areas.[49] More recently, the UK National Ecosystem Assessment developed a meta-analytic value function to evaluate the TEV of the identified flows of ecosystem services.[50] Internationally, the benefit transfer approach was applied in the recent OECD report on health costs of air pollution.[51] Finally, the Environmental Valuation Reference Inventory (EVRI)[52] is supported by a number of OECD governments to maintain a data base of benefit estimates.

While benefit transfer has been widely used in the environmental and health valuation fields,[53] applications of BT to the valuation of cultural and heritage assets are rare.[54] Arguably, a principal reason for this is the belief that some such assets are unique in terms of their characteristics, such as historic context, or national and international significance, which

[40] Johnston et al. 2015
[41] Rosenberger and Loomis 2003
[42] Kaul et al. 2013; Whitehead et al. 2015; Bergland et al. 2002; Brouwer and Spaninks 1999; Ready and Navrud 2006
[43] Kristofersson and Navrud 2007, Fujwara et al. 2018, 'The economic value of culture: a benefit transfer study'.
[44] see Brouwer and Navrud 2015 for review
[45] see Loomis 2015 for review
[46] Eftec 2009
[47] www.externe.info
[48] Navrud 2002
[49] Brink et al. 2011
[50] Bateman et al. 2011
[51] OECD 2014
[52] https://www.evri.ca
[53] Detailed reviews of BT can be found in Navrud and Ready 2007 and Desvousges, Johnson, and Banzhaf 1998
[54] Eftec 2005; Mourato et al. 2014

reduces the potential for transferring their values to other contexts.[55] However, BT is worth exploring as a potentially useful alternative to an original valuation where the cultural or heritage good or service and the respective policy change are arguably of similar nature and significance (e.g. historic buildings with similar architecture, exterior and interior decorations; indoor collections sharing similar types of objects/collections) or where the range of services/benefits provided in the public's eyes are similar.

In this study, we have chosen four sites in each cultural category which are homogenous with respect to a number of characteristics (see section 1.4) and can be argued to provide similar types of services, thereby increasing the scope for transferability and for subsequent use in project appraisal.

There have been previous attempts to assess the scope of BT techniques in the heritage sector.[56] For example, the consultancy Eftec undertook contingent valuation studies of a number of built heritage sites[57] in the UK for the purposes of BT, aiming to build a bank of values that could be applied to similar heritage sites in the UK. Each case study set out a description of the heritage asset in question, a description of the action that was being appraised (e.g. restoration work), and the hypothetical scenarios around closure of sites to the public and deterioration of heritage assets and collections. Use and non-use values were elicited from visitors and the general public. However, this study was limited in that it only provided one site for each cultural category, which reduces the ability to perform transfer error testing within cultural categories.

Mourato et al. (2014) performed the most comprehensive analysis using benefit transfer methods ever undertaken of the economic benefits associated with reducing climate change damage to built heritage interiors in Europe.[58] The study considered ten heritage sites grouped by heritage categories (including historic houses, museums and churches) with multiple sites within each category, across five countries (UK, Sweden, Germany, Romania and Italy), testing for transfer errors within categories of heritage sites using three transfer tests: simple unit transfer; adjusted (income differential) unit transfer; and function transfer. Transfer tests were performed for both use and non-use values, based on surveys of users of the case study sites and of general population surveys for non-use value. Of note, several of the case study sites investigated in Mourato et al. were churches, cathedrals and monasteries: St Joseph and the English Martyrs RC Church (UK), Black Church (Romania), Gotland churches (Sweden) and Bronncak Monastery (Germany). In the case of Gotland churches, respondents were first asked how much they would be willing to pay for the conservation of all church interiors in the island. They were then asked to allocate a proportion of that amount to the last church they had visited in Gotland.

The authors found evidence of considerable economic benefits for both visitors and the general population, associated with the protection of built heritage interiors from climate change damage, across all countries and case study sites. They also concluded that heritage conservation values could be successfully predicted via value transfer approaches.[59] In the case of the general population surveys, unit value benefit transfers performed better than function transfers. Excluding Romania, where valuations were very different, unadjusted unit transfer errors were found to vary between 13% and 53%, similar to previous studies involving international transfers. In the case of visitor surveys, for nine of the ten sites, median WTP values per visit were found to be strikingly similar, not just between the same country and/or the same type of heritage (palace, museum or church), but across all sites, varying from €1 to €2. This led to only low and moderate transfer errors for use values, with unit value transfers also performing better than function transfers. This comprehensive study of different categories of cultural institution across a number of countries strongly informs the design of the current study.

In sum, there is broad agreement in the literature on the transfer methods available for BT and the statistical tests that should be applied to assess the reliability of transfer from a study site(s) to a policy site. Benefit transfer has been applied extensively in the field of environmental valuation, as well as the heritage sector more generally, but to date has not been applied to cathedrals and historic cities specifically.

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[55] Provins et al. 2008
[56] Eftec 2005
[57] Denbigh Townscape, Kennet & Avon Canal, Battersea Park, Lincoln Cathedral, Sandal Castle
[58] Mourato et al. 2014
[59] Mourato et al. 2014

In the remainder of this paper, Section 2 details the data collection process and our research methodology and sets out the steps we take for dealing with potential sources of bias introduced by our survey design. Section 3 presents the main CV findings, describes our robustness checks and assesses our success in mitigating against biases. Section 4 tests the transferability of the WTP estimates from the sites surveyed in this study to potential policy sites and makes recommendations for benefit transfer in the heritage sector.

2 Data Collection and Research Methodology

This section sets out the methodology used in this study. We start with a description of the target population and our sampling strategy, followed by the survey instrument, an explanation of the data and units of analysis, an outline of the steps in the analysis, and finally a discussion of the potential biases (and measures taken to mitigate against them). We also include a brief description of the methods used to assess the transferability of values (developed in full in Section 4).

2.1 Target population and sampling strategy

As outlined in Section 1.4, we selected four historic cities in England containing medieval cathedrals, to estimate use and non-use value for each city and cathedral. The population of interest comprised of four target groups for each of the four cities: **city users** (who we define as having lived in or visited the city in the last three years) and **city non-users,** as well as **cathedral users** (who we define by their having visited the cathedral in the last three years) and **cathedral non-users**.

2.1.1 Online panel

One of the contributions of this study is the design of an online survey instrument which can be used to efficiently collect responses from **users** and **non-users** for each of the four selected **cities** and **cathedrals**. We consider that an online survey is the most cost-effective way to collect primary data for multiple cities and cathedrals, compared with separate online or face-to-face visitor surveys at individual sites. Online surveys also arguably reduce the bias which occurs in surveys where respondents provide 'socially acceptable' responses that they think an interviewer wants to hear. Bakhshi et al. 2015 discuss the pros and cons of online and other surveys in CV studies.[60]

The survey used was an online panel conducted by the survey company, Toluna.[61] Online survey panels do not provide a true random probability sample, but permit quotas to be set on a range of relevant attributes, such as gender, age, location and socio-economic group. The benefit of quota sampling is that quotas can be set to mimic population demographics to make the survey representative of those chosen characteristics, or they can be set so as to over-sample groups of particular interest. For the Toluna panel, sample selection is made randomly using the profile criteria specified by the authors. When doing this, Toluna takes account of predicted response rates by target demographic and region to avoid over-contacting panellists and to ensure that they do not introduce a bias in their responses. Historical propensity to answer surveys is not used to select a sample. Instead, respondents are randomly selected for surveys that they have a likelihood of qualifying for. In addition, in order to mitigate category overuse and other forms of awareness bias, Toluna can exclude any panellist from a client's survey by topic of survey recently taken, frequency of participation, or for tracking studies participants from prior waves.

Multiple data validation processes and checks are embedded within the design of each survey and the data cleaning process. These processes help to ensure the data collected is of high quality and can be used to its full extent. Those checks identify possible inconsistencies or problematic responses to be excluded from analysis, such as city residents selecting a different region of residence than the city's region, or cathedral visitors who did not visit the city in the past three years, etc.[62] We also tested the surveys internally to ascertain a realistic time required to give meaningful responses.

[60] Bakhshi et al. 2015
[61] https://uk.toluna.com/#/
[62] A more detailed report of these exclusions can be found in Annex 6.1.

[63] If respondents spent less than 6 minutes on the survey, they were excluded from the analysis on the basis that they were 'speedster' responses.[64]

2.1.2 Survey targeting

Given that the residents and visitors of our cities under investigation, as well as the visitors to our cathedrals of interest, are a very small share of the population, standard sampling procedures would be unable to capture a sufficient number of these city and cathedral users. Additionally, we aim to reduce the possibility of 'yea-saying' effects, whereby respondents acquiesce to the survey question, for instance by responding that they have visited a city in the past three years because it is the expected or easiest answer to give. We therefore designed three surveys which allowed us to target specific categories of respondents based on their current and past usage of the historic city and cathedral. First, we launched a 'Non-user survey' targeted at people who are both city non-users and cathedral non-users. We then launched a 'City booster survey' targeted at city users only (but capturing cathedral users and non-users in the process), and a final 'Cathedral booster survey' targeted at cathedral users. This provided the most cost-effective way of collecting a minimum sample of users and non-users for each of the cathedrals, while enabling a survey design in which the cathedral being valued was randomised (to prevent the respondent from valuing only their most preferred of the cathedrals they had/had not visited).

For each of these three surveys we designed the appropriate set of target screener questions which we describe below.

1. Non-user survey - randomly presented one of the four historic cities to respondents. Respondents in the first section were asked a series of questions about the city. Respondents were screened out if they stated any of the following:

- That they were currently resident in the city;
- That they had been resident in the city in the past three years (since 01/01/2015); or
- That they had visited the city in the past three years (since 01/01/2015).

This ensured that this survey sample was composed of those who had not directly experienced the historic city in the past three years and could therefore be classed as a representative sample of **city non-users**. Note that by definition as one cannot visit the cathedral without visiting the city it is located in, these respondents were also **cathedral non-users**.

This survey was administered to the nationally representative online panel to ensure that all non-user samples were representative of the adult English population. Quotas were set for region and age/gender groups in line with national averages for England. Survey responses were screened to exclude people not residing in England and those under sixteen years old. However, the online mode of the survey and the presence of financial incentives may still have caused some degree of selection bias by favouring people who were frequent internet users or economically inactive, so we applied weighting procedures to address this (see Annex 6.2 for details).

2. City booster survey - targeted residents and visitors to one of the four historic cities in the past three years. To reduce the risk of 'yea-saying', we allowed respondents in the first section to select if they currently lived, had lived or had visited any of the cities among a list of choices. The multiple-choice list comprised of the four cities that are the subject of this study, but also contained a 'never visited any' or 'never lived in any' option.[65] Based on their choices in this first section, respondents were screened out if they stated all of the following:

- That they did not currently reside in any of the four cities;
- That they had not resided in any of the four cities in the past three years (since 01/01/2015) or
- That they had not visited any of the four cities in the past three years (since 01/01/2015).

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[63] Termed 'speedsters' in the CV literature, for further discussion, see Campbell, Mørkbak, and Olsen 2017
[64] Note that respondents are prevented to spend less than a minute on the page containing contingent valuation scenarios and willingness-to-pay questions.
[65] Blamey et al. 1999

Those who selected multiple cities in which they had lived or visited within the past three years were randomly assigned one of their choices. Random assignment ensured that respondents were not self-selecting to value the city which they personally valued more, which would have led to an overestimation of average user value. For those who had visited the city in the past three years, we asked a follow-up verification question, asking respondents to manually enter the year they had last visited. This allowed us to screen inconsistent responses (those who subsequently reported that they visited prior to 2015), in order to reduce the potential recollection biases that have been identified as affecting previous online contingent valuation surveys.[66]

This survey sample was solely composed of city residents and visitors within the past three years, which we defined as **city users**. Note that some city users will also have self-reported as **cathedral users** (visitors in the past three years), while some will have self-reported as **cathedral non-users** (non-visitors in the past three years).

As above, the city user information was weighted to be representative of the city user population (which was comprised of both city residents and visitors).

3. Cathedral booster survey - targeted visitors to one of the four cathedrals in the past three years. Following the same approach as the City Booster survey, respondents were asked to select which of the cathedrals they had visited in the past three years from a multiple-choice list. Those who selected multiple cathedrals were randomly assigned one. Based on their choices in this first section, respondents were screened out if:

- They had not visited any of the four cathedrals in the past three years (since 01/01/2015).

As with the cities, we also asked respondents how many times they had visited the cathedral in the past three years, including a 'never' option, dropping those who selected this option. We asked the respondent to manually enter in what year they had last visited, in order to minimise recollection bias.

This survey sample, solely composed of visitors to the cathedrals within the past three years, only contained **cathedral users**. By extension, they were also **city users**.

2.2 Survey

2.2.1 Survey instrument

The survey was divided into four sections.

2.2.1.1 Screener section

The first section contained screener questions designed to elicit consent and exclude respondents who did not qualify. Any respondents who did not explicitly give consent, provided an inappropriate age (below 16 or Don't know/rather not say), were not residents in England or did not provide us with their region of residence were excluded from the survey.

2.2.1.2 Visits and attitudes

The second section of the survey contained background questions of relevance to respondents' opinions, attitudes and, in the case of users, usage questions of relevance to the historic city and cathedral being valued. In particular, we asked about respondents' membership of heritage, conservation or environmental organisations, their recent use of other heritage and cultural sites (past twelve months), and a set of questions on cultural engagement, developed from DCMS's Taking Part survey.

[66] Bakhshi et al. 2015

We also asked a set of follow-up questions for selected city and cathedral users. For a city user, these included questions on when their visit had taken place or how long they had lived in the city (including an option to revise their previous answer if they had not in fact visited). For a cathedral user, they included questions on the details of their visit (i.e. who they had visited with, which parts they had visited and any entry fees they had paid) and if they had any personal connections with the cathedral.

A set of statements about the value of cultural heritage was presented on a five-point Likert scale (1, strongly disagree; 5, strongly agree) and respondents were asked about their views on priorities for public spending. The responses to these questions were used to assess the theoretical validity of the WTP values.

2.2.1.3 Contingent scenario and valuation questions

The third section included the contingent scenario and the valuation (WTP) questions (see full details in Section 2.2.2).

Respondents were presented with information (text and images) about the risks to historic buildings posed by climate change. Respondents were then presented with information about the historic city and cathedral, in the form of text, images, and a video of around 1-2 minutes containing images, text, and voice-over.

Historic city information was designed to be consistent for all four sites and included when the city had been founded, the number of listed buildings (defined for the respondent as "buildings which are officially recognised as being of historic or architectural interest, and which are subject to protection through the planning system", numbers of Grade I and II listed buildings (the two highest categories of listing), some examples of listed buildings, including the cathedral, and the number of conservation areas.

Cathedral information included the date the cathedral was built and any significant additions, architectural features of the building and the interior, and collections of historical artefacts. We presented the exact current entry charge, plus details of those groups who were able to enter for free. We explained that "cathedrals in England are responsible for their own finances" and provided details of the approximate daily cost of maintaining each cathedral, and also the proportion of this that was funded from visitor income.

Respondents were asked about their familiarity with this information on a five-point Likert scale (1, not at all familiar; 5, extremely familiar). The WTP scenarios, payment mechanisms, and elicitation methods differed between the visitor and non-visitor questionnaires as outlined in Section 2.2.2.

2.2.1.4 Demographics

The fourth section of the survey asked a set of standard questions on socio-demographic status, such as income, marital status etc, for use in regression analysis to investigate the drivers of WTP and thus help validate the valuation estimates. They were also used in the BT analysis.

2.2.2 Contingent valuation scenarios design

The survey instrument contained two CV questions: one to assess use or non-use value of the historic city and a second one to assess the use or non-use value of the cathedral located within the city. We present the CV questions in full below.

2.2.2.1 Historic city hypothetical scenario

We explored potential hypothetical scenarios for both the historic cities and cathedrals while scoping the study (recall Section 1.4). The challenge in relation to historic cities was that their use is not excludable, since the presence of historic buildings within a townscape can be enjoyed from street level and does not require entry to the interiors of any of the buildings. We therefore designed a scenario in which the continued enjoyment of the historic character of the city would be put under threat due to closure of those buildings currently open to the public, and the erection of scaffolding to cover the exterior of buildings.

We presented all respondents with the scenario that environmental impacts on historic buildings - involving extreme weather events such as flooding and storms, as well as gradual changes caused by raised temperatures and changes in humidity and rainfall – would be subject to increasing occurrence and magnitude due to climate change. We presented information relating to scientific climate predictions up to 2100 on the risk of increased frequency of extreme events, gradual temperature and rainfall changes, and interior infestation and humidity changes.[67]

Specifically, respondents were informed that given the current financial conditions and short-fall in public funding to provide increased levels of conservation, "*It is likely that this will lead to more large-scale damage in historic buildings in [City], from both gradual changes and extreme weather events, and the subsequent need for large and lengthy emergency repair works. This might result in having large amounts of scaffolding for a year or more, blocking the view of the buildings from the street. Those buildings affected which are currently open to the public would likely be required to close for over a year.*"

This introduced a scenario which would exclude individuals from the continued use and enjoyment of the buildings, allowing its effect to be evaluated:

"*The alternative is to undertake more frequent preventative measures to improve the resilience of historic buildings in [City] to the risks outlined above. By undertaking preventative work early, it would reduce the amount and incidence of scaffolding caused by emergency repairs, reduce the risk of irreparable damage and the long-term closure of buildings which are currently open to the public. These measures would include the strengthening of roofs and gutters, internal flood defences, and air conditioning to prevent mould and infestation.*"

The same hypothetical scenario was used as the basis for the user and non-user valuation scenarios, since the non-use value held for the city or cathedral by the general public would also be driven by the risk of irreparable damage and the long-term closure of buildings. Note that the historic city WTP questions stated clearly that the cathedral made up part of the city's historic character and would therefore also be protected via this donation. The historic city WTP values should therefore be seen as inclusive of any value for the cathedral.

2.2.2.2 Historic city contingent valuation question

Respondents were then presented with the payment mechanism of:

"*An independent group 'Friends of [City]' established to provide the more frequent preventative measures required to help reduce the damage caused by climate change and improve the maintenance and conservation of the historic buildings of [City], including [Cathedral]. This group would raise funds to increase the resilience of [City]'s historic buildings to serious climate damage, in a way that requires less construction work covering the exterior of buildings for long periods of time and reduces the risk of irreparable damage and extended closure to the public.*"

The cathedral was included within the list of buildings to be supported by the Friends of [City] group, and it was included in the information text and images about the historic city. Cathedrals are often the oldest and most architecturally significant of cities' historic buildings, and cathedrals are particularly susceptible to the risks posed by climate change. Respondents were presented with a hypothetical scenario in which The Friends of [City] group would need to find alternative sources of funding to help preserve the historic buildings. They were asked if they would be willing in principle to pay a one-off donation to help support The Friends of [City] group under these circumstances. Those who answered positively ("yes" or "maybe") were asked to state the maximum they would be willing to pay as one-off donation on behalf of their household to help preserve the historic buildings of their allocated city (see

[67] Adapted from Mourato et al. 2014

Box 2.1). The use of this hypothetical organisation was designed to isolate the value of the building(s) from the effect of the organisation that owns or is associated with it/them. We did not use a local tax as the payment mechanism as this would not apply to non-resident visitors and the general population (and as such, would be subject to free-riding behaviour). A national tax was also not suitable, as visitors and the general population could plausibly have protested that their taxes should be used for historic cities near them or have led respondents to mistakenly conflate the good or service being valued as *all* historic cities, not just the city in question. We further sought to avoid potential protest responses by emphasising the independence and non-profit nature of the organisation as follows[68]:

"*The organisation would be operated on a not-for-profit basis and supported through donations from the general public. All funding would be used for management and preservation of historic buildings in [City] (Note that this is a hypothetical scenario and there are no plans to change the funding of heritage conservation).*"

Voluntary payment mechanisms like donations have lower incentive compatibility than compulsory payment mechanisms like entry fees and taxes. However, the benefit of a voluntary payment mechanism is that it avoids potential protest bias responses, and can be applied to goods and services which are non-excludable. The preferred approach to reduce hypothetical bias and free-riding in the literature tends to be to introduce a "provision point mechanism', whereby the continued provision of the good or service is made contingent upon a threshold of total funding being achieved. We developed this figure in consultation with domain experts, and applied it in both the city and cathedral hypothetical scenarios:

"*The Friends of [City] group would require a minimum amount of funding to provide the preventative measures outlined above (estimated at upwards of £10 million). We would like you to imagine that you were asked to help support the Friends of [City] to reach this target. If the target is not reached then all donations would be returned.*"

The WTP values were elicited using a payment card with values ranging from £0 to £500, with the smallest non-zero value being £0.01, and an option to state another amount. As in our previous studies[69], we applied best-practice measures to reduce hypothetical biases, including the use of oath scripts, which encourage honesty by asking respondents if they intend to answer truthfully to the WTP question, and cheap talk, which reminds respondents of their budget constraint and asks them to answer realistically:

"*Studies have shown that many people answering surveys such as this one say they are willing to pay more than they would actually pay in reality. So please think about this question as if it were a real decision and you were actually making a payment for real.*"

---

[68] Báez-Montenegro et al. 2012
[69] Bakhshi et al. 2015; Fujiwara et al. forthcoming

Box 2.1. City willingness to pay question: one-off donation

Would you be prepared to pay a one-off donation, even if only a very small amount, to reduce the damage caused by climate change, improve the maintenance and conservation of historic buildings in [City], and reduce the risk of irreparable damage and closure of those buildings currently open to the public?

If Yes/Maybe

What is the maximum you would be willing to pay, on behalf of your household, as a one-off donation to reduce the damage caused by climate change, improve the maintenance and conservation of the historic buildings in [City], and reduce the risk of irreparable damage and closure of those buildings currently open to the public, as described above?

Studies have shown that many people answering surveys such as this one say they are willing to pay more than they would actually pay in reality. So please think about this question as if it were a real decision and you were actually making a payment for real.

In answering this question, please focus solely on how much the historic character of [City] is worth to you and your household, if anything. Please do not consider the value to you and your household of other aspects of the city, or the economic benefits associated with things like tourism.

In this question, we are just interested in how much benefit you get from the historic character of the city. Please be realistic – consider your household budget and remember that there may be other things you could spend your money on, including conserving other historic, cultural, and environmental sites.

2.2.2.3 Historic cathedral hypothetical scenario

The same respondents were also asked a CV question related to the historic cathedral located in their allocated city. This CV question was presented to cathedral users and non-users alike. Respondents were first shown information related to the specific cathedral (i.e. relating to its history, artefacts and running costs) and the risks to the cathedral posed by climate change.

For the hypothetical scenario we informed them that:

"*Cathedrals are particularly susceptible to the risks posed by climate change, both from extreme events and gradual temperature and humidity changes. This is because they are commonly home to some of the oldest and most important architectural and heritage features in a city, and present challenging building types, specialist architectural styles, and difficult maintenance challenges (for instance, interior temperature regulation). Cathedrals are also home to rare, delicate and antique furniture, wooden objects, textiles, books, carvings, and images that could be significantly affected by the changes described.*"

2.2.2.4 Historic cathedral contingent valuation questions

Respondents were asked different WTP elicitation questions depending on whether they gave a positive response to the city WTP question:

i) **Those who expressed a positive WTP for the historic city** were asked whether they would be willing to allocate a percentage of this donation specifically towards the preservation of the cathedral. The WTP values were elicited with a sliding scale (0-100%) on which the respondents indicated the maximum proportion of their one-off donation they would allocate to the cathedral (see Box 2.2).

ii) **Those who expressed no value for preservation of the historic city** were asked a fresh question to elicit their WTP a donation to help preserve the cathedral independently of their WTP a donation to help preserve the city (see

iii) Box 2.3). The independent WTP values were elicited using a payment card with values ranging from £0 to £500, with the smallest non-zero value being £0.01 (same as for the city). We added a control variable to account for this difference in survey mode in WTP validity testing (Section 3.3.5 and Section 3.4.4).

Box 2.2 Cathedral willingness to pay question (as an allocation of the city donation)

Imagine that you were able to allocate a certain amount of your one-off donation specifically to [Cathedral]. This would allow you to 'ring-fence' a proportion of your donation to reduce the damage caused by climate change, improve the maintenance and conservation of [Cathedral], and reduce the risk of irreparable damage and closure. This payment would support the cathedral only, as one of the oldest and largest historic buildings in the city.

Would you like to allocate a proportion of your one-off donation to the 'Friends of [City]' group to reduce the damage caused by climate change, improve the maintenance and conservation of [Cathedral], and reduce the risk of irreparable damage and closure of the building?

If Yes/Maybe

What is the maximum proportion of your one-off donation of [Amount in £ stated] to the 'Friends of [City]' group that you would be willing to pay, on behalf of your household, to reduce the damage caused by climate change, improve the maintenance and conservation of [Cathedral], and reduce the risk of irreparable damage and closure of the building, as described above?

Please indicate as a percentage on the slider below, where 0% is 'allocate none of my donation to the cathedral' and 100% is 'allocate all of my donation to the cathedral'. Studies have shown that many people answering surveys such as this one say they are willing to pay more than they would actually pay in reality. So please think about this question as if it were a real decision and you were actually making a payment for real.

In answering this question, please focus solely on how much [Cathedral] is worth to you and your household, if anything. In this question, we are just interested in how much benefit you and your household get from the cathedral. Please be realistic – consider your household budget and remember that there may be other historic aspects of the city that the 'Friends of [City]' group donation could be used for.

Box 2.3 Cathedral willingness to pay question (independent of the city value): one-off donation

Would you be prepared to pay a one-off donation, even if only a very small amount, to reduce the damage caused by climate change, improve the maintenance and conservation of [Cathedral], and reduce the risk of irreparable damage and closure of the building? If Yes/Maybe

What is the maximum you would be willing to pay, on behalf of your household, as a one-off donation to reduce the damage caused by climate change, improve the maintenance and conservation of [Cathedral], and reduce the risk of irreparable damage and closure of the building, as described above?

Studies have shown that many people answering surveys such as this one say they are willing to pay more than they would actually pay in reality. So please think about this question as if it were a real decision and you were actually making a payment for real.

In answering this question, please focus solely on how much [Cathedral] is worth to you and your household, if anything. Remember, under this scenario, you would no longer be asked to pay to support the Friends of [City].

In this question, we are just interested in how much benefit you and your household get from the cathedral. Please be realistic – consider your household budget and remember that there may be other things you could spend your money on, including other cathedrals and historic buildings.

In all cases we applied a provision point mechanism. This reduces the risk of hypothetical bias (and free-riding in particular) commonly associated with voluntary payment mechanisms like donations. Respondents were informed that there was a minimum amount of funding to provide the preventative measures outlined above (estimated at upwards of £10 million).

Again, we applied best-practice measures to reduce hypothetical bias.

Both sets of valuation questions were followed by a certainty question: respondents were asked a sliding certainty scale (0-100%) on the amount that they had stated.

Respondents were also asked to select from a list of reasons for their willingness, or not, to pay. Again, these were used to assess the consistency of the responses. For instance, respondents who selected that they gave their stated WTP because "I don't believe that I would really have to pay" were excluded from the set of values used to estimate mean WTP for that cathedral.

2.3 Collecting the data

2.3.1 Pilot survey

We implemented a pilot survey on 9th February 2018 using a quota-based sample of 40 online panel respondents. These respondents were asked follow-up questions to identify potential problem areas in understanding or in the survey design prior to the final field work. The pilot survey also allowed the authors to test the range of WTP values provided in the payment cards and amend payment card options if required. In all other respects, the pilot survey was performed under identical conditions to the final survey.

The majority of pilot respondents indicated that the survey length was 'okay or short' (78%), that they 'did not find the survey difficult' (95%), and that they had enough information on the purpose and aims of the survey' (95%). The pilot responses did not point to any obvious payment range bias: 85% found the valuation scenarios to be realistic in follow up questions and 80% found the WTP range they were presented to be adequate. However, 15% reported that they would have liked more values of a lower amount to choose from. In response, in the survey we added a £0.25 option to the payment ladder, between £0.01 and £0.50.

The pilot survey was also used to test the independence of the WTP values elicited for the historic city and the cathedral. We initially tested an independent nested design, where respondents were asked to treat each valuation question as separate (i.e. to treat the second cathedral valuation question as if they had not paid anything for the historic city). However, it was found that 40% considered the two WTP payment to be connected, and that the WTP for the city influenced their subsequent WTP for the cathedral. We also found that a high proportion of respondents gave identical WTP values for the cathedral as the city, demonstrating insensitivity to scope. In response, we redesigned the cathedral valuation question as willingness to allocate part of the payment towards the historic city specifically for the cathedral (as described in Section 2.2.2.3). This forced sensitivity to scope, by placing the cathedral within the overall fund for protection of the historic character of the city. We retained follow-up questions related to independence and scope, such as "*My willingness to pay is not just for conservation of [Cathedral] but also for the conservation of historic buildings elsewhere*", to allow us to remove potential invalid responses ex post.

A full report on the pilot survey is available in Annex 6.2.

2.3.2 Full implementation

We collected a total sample of 2,936 respondents between 13th February – 22nd March 2018 inclusive. We ensured the sample split by users and non-users of each of the city and cathedral sites was above a minimum of 250 per site per user type to ensure sufficiently large sample sizes (Table 2-1).

2.3.3 Target groups

As explained in Section 2.2.1, our surveys were designed to elicit WTP from four study groups: city users, city non-users, cathedral users and cathedral non-users.[70] This provides us with three combinations across the four cities of city and cathedral status. We present in Table 2-1 the sample size obtained for each case.

Table 2-1 Survey sample groups

City status	Cathedral status	Canterbury	Lincoln	Winchester	York	Total
City users 	Cathedral users 	295	246	268	304	1113
City users 	Cathedral non-users 	75	84	79	122	360
City non-users 	Cathedral non-users 	341	324	347	245	1257

2.4 Analysis

2.4.1 Calculation of WTP

All WTP values for historic cities and cathedrals (for both users and non-users) were elicited as a donation through a payment card elicitation mechanism (the allocation question is a sliding scale but based on their previous payment card response to the city WTP question). This means that respondents' stated values are a lower bound of their actual willingness to pay because the actual amount they are willing to pay will lie somewhere between the amount they choose and the next amount on the payment card.

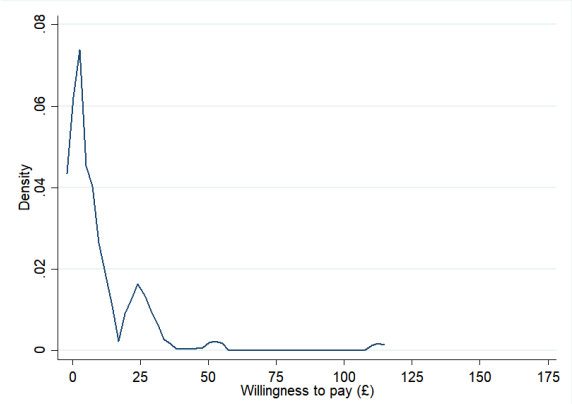
For each respondent we therefore used the mid-point between the amount chosen on the card and the next amount up. For the historic city WTP question, following standard practice, all those who responded that they were not willing to pay in principle were coded as £0 bids.[71] For the cathedral allocation WTP question, respondents were first asked if they would like to allocate part of their city WTP specifically for the cathedral. Those who answered no to this question might not necessarily have a zero value for the cathedral (they may simply be happy with the automatic allocation of funds to the cathedral from the overall city-wide preservation measures). In the absence of clear data on their preferences for funding of cathedral conservation measures, these individuals were excluded (n=175, 72 cathedral users and 103 non-users) from the analysis (in other words, 'no' responses to the cathedral allocation in principle question were coded as missing WTP for the cathedral). Those who were not willing to pay for the city-wide measures were asked an independent cathedral WTP question. If they repeated their answer that they were not willing to pay in principle, they were coded as £0 bids for both the city and the cathedral WTP.

[70] Recall that a cathedral user must also be a city user, as one cannot visit the cathedral without visiting the city it is located in.
[71] Bateman et al. 2002

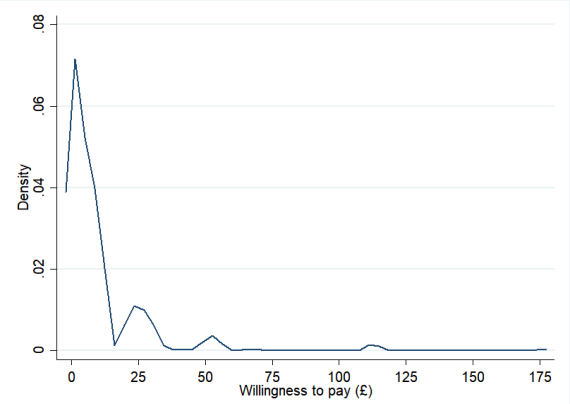
Figure 2-1 - Figure 2-4 show the distribution of willingness to pay values. WTP bids at £200 or higher were excluded from the city user sample (there were 11 such values). By extension these individuals were excluded from the cathedral allocation question. No respondents gave a zero bid to the historic city WTP question and then gave a bid equal or above £200 for the independent cathedral WTP question, so these did not require further exclusions.

Figure 2-1 Distribution of willingness to pay: City user sample

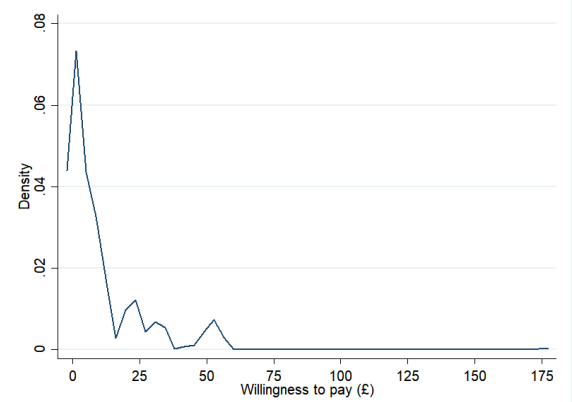
2.4.1.1 Canterbury



2.4.1.2 Lincoln



2.4.1.3 Winchester



2.4.1.4 York

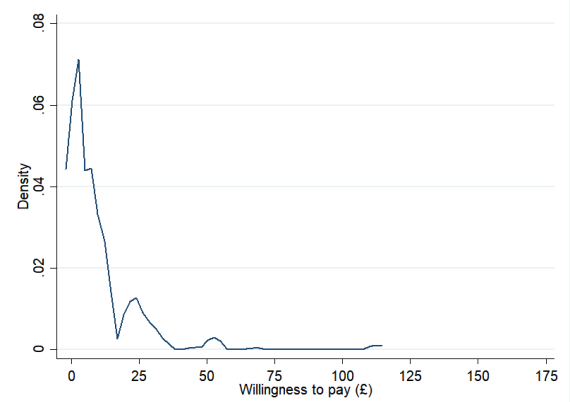
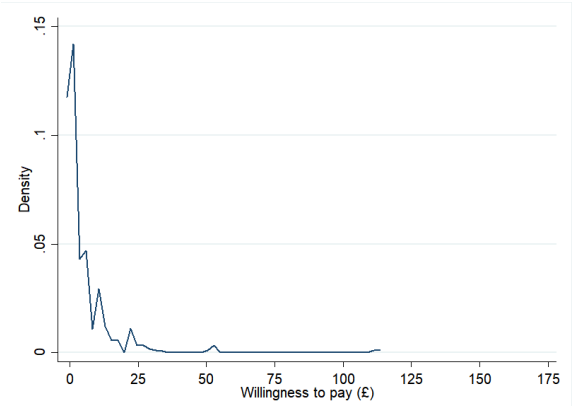
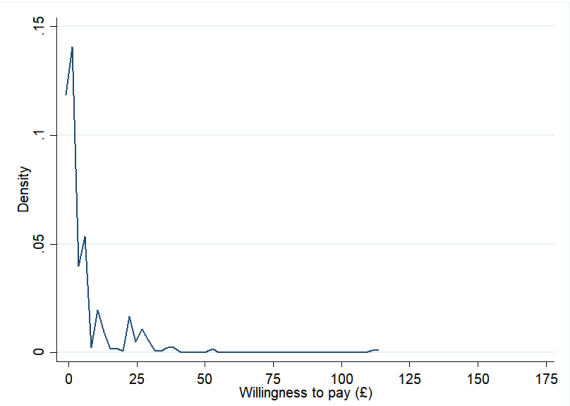


Figure 2-2 Distribution of willingness to pay: City non-user sample

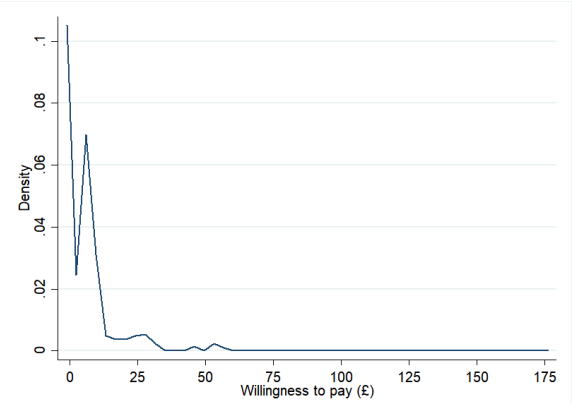
2.4.1.5 Canterbury



2.4.1.6 Lincoln



2.4.1.7 Winchester



2.4.1.8 York

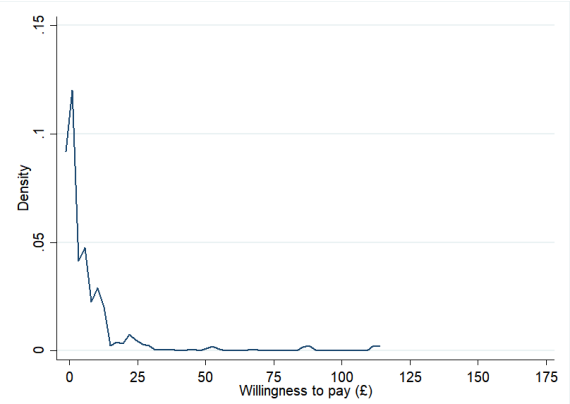
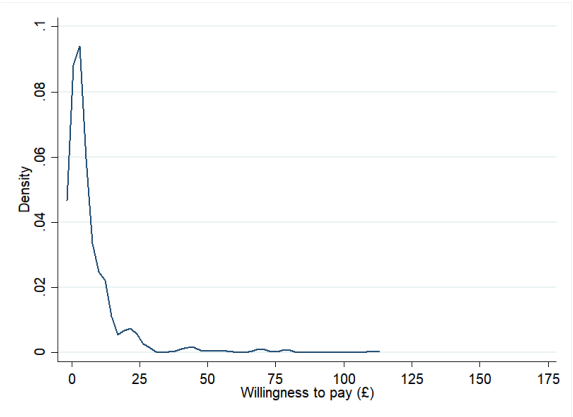
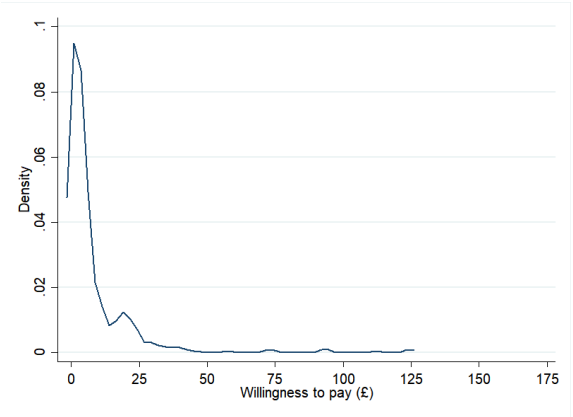


Figure 2-3 Distribution of willingness to pay: Cathedral user sample

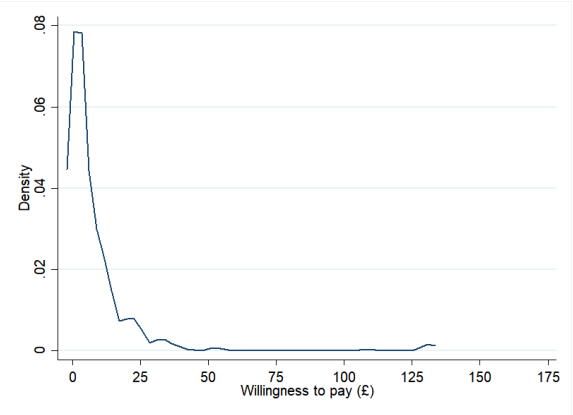
2.4.1.9 Canterbury Cathedral



2.4.1.10 Lincoln Cathedral



2.4.1.11 Winchester Cathedral



2.4.1.12 York Minster

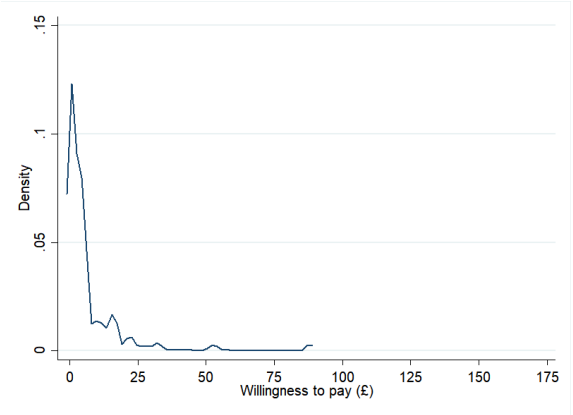
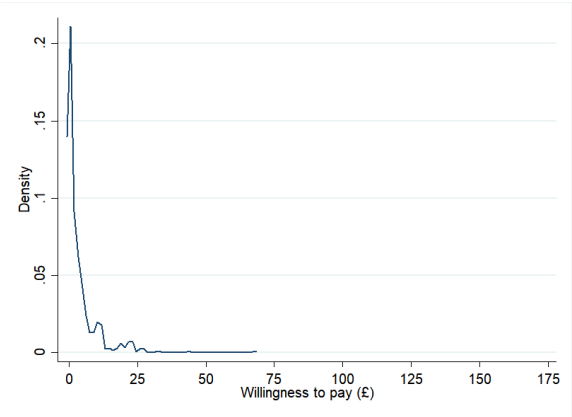
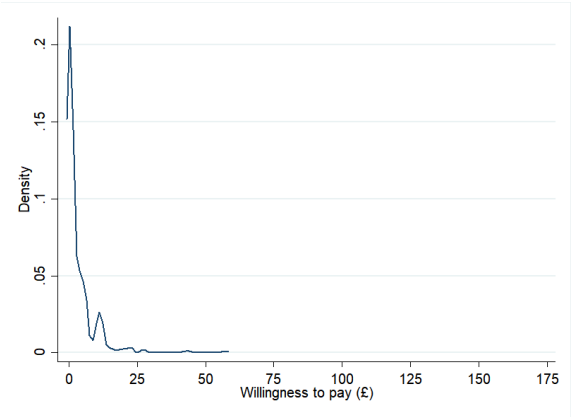


Figure 2-4 Distribution of willingness to pay: Cathedral non-user sample

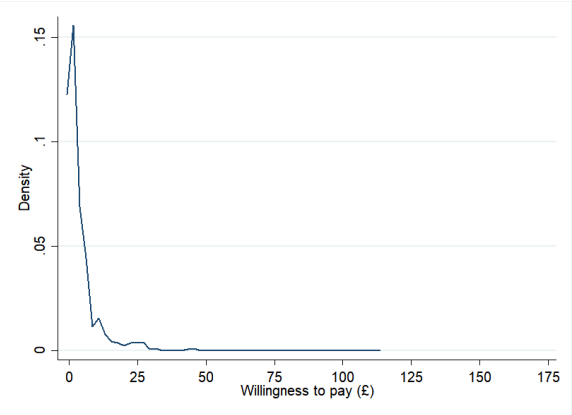
2.4.1.13 Canterbury Cathedral



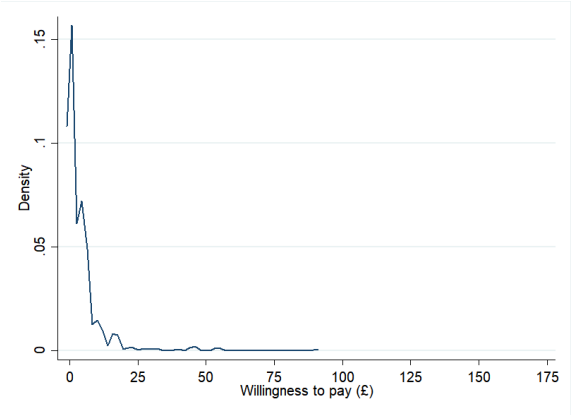
2.4.1.14 Lincoln Cathedral



2.4.1.15 Winchester Cathedral



2.4.1.16 York Minster



Willingness to pay was calculated using city user and cathedral user weights (respectively for city and cathedral user WTP) and nationally representative non-user weights (for city and cathedral non-user WTP) (recall Section 6.2).

We report mean and median WTP, 95% confidence intervals, maximum values and the proportion of respondents giving a zero response. Following best practice in CV studies, we developed benefit transfer testing using mean WTP only.[72] The mean is relevant if the context of the valuation exercise is to aggregate values to the national level, because it represents an average WTP for the population which can be aggregated (by taking a population size-weighted average) to derive the total WTP across the population.

We removed from the sample individuals who gave inconsistent reasons for their stated willingness to pay. For example, we classified as invalid responses from those who stated they didn't 'believe [they] would have to pay' as an indicator of severe hypothetical bias. We assessed the impact of this removal on the WTP value in the sensitivity analysis. We find no significant difference in mean WTP with and without inconsistent responses across any city/cathedrals.

2.4.2 Assessment of the validity of the WTP values

Following the calculation of mean and median WTP values, we conducted best practice validity tests to assess whether the main drivers of WTP match the existing theoretical context[73] and prior expectations around cultural engagement and past usage. For example, individuals with higher income and those with an interest in culture would be expected to have on average higher WTP.

The following regression model[74] was used as the base for the analysis of the validity of the WTP results:

Equation 1

$$\log(WTP_i + 1) = \alpha + \beta X_i + \varepsilon_i$$

where $\log(WTP_i + 1)$ is the natural logarithm of amount the individual i has stated they are willing to pay. The logarithmic transformation makes the regression less sensitive to the few outliers with higher WTP values and more sensitive to the variation in the smaller WTP values (recall

Figure 2-1 - Figure 2-4). 1 is added to the WTP because log(0) is undefined and this avoids excluding those who are not willing to pay in principle from the analysis. α is a constant and ε is the error term containing unobserved factors that determine willingness to pay.

The X_i are the variables we used to control for the observed determinants of WTP.[75] These include those that are theoretically expected to affect WTP (such as income), sociodemographic variables, as well as other factors that are known from the literature to have an effect e.g. positive attitudes towards culture and conservation:[76] variables capturing experience of the site (in the case of a use value), attitudes, opinions, and proxy variables for cultural engagement (in all cases). We estimated Equation 3 for use and non-use WTP measures for each city and cathedral separately, as well as for pooled use (visitor) and non-use (non-visitor) city and cathedral samples, which combine the responses from all cities (or all cathedrals) together and thus provide greater sample size for the purposes of analysis.

[72] Vaughan et al. 2000
[73] Including the wide literature, e.g. Bateman et al. 2002
[74] Bakhshi et al. 2015
[75] Bateman et al. 2002
[76] Bakhshi et al. 2015

We applied a number of tests on the validity of our results,[77] including testing the distribution of residuals for heteroskedasticity using robust standard errors and for normality using kernel density estimates. We highlight any results which may indicate that the WTP values are not valid within the sensitivity analysis.

2.5 Bias correction measures

In designing the contingent valuation scenarios, we implemented best practice to attempt to deal with the known biases in CV and with the order effects specific to this study. The measures used address biases which commonly occur in CV studies, with specific attention to order effects.[78] We discuss each in turn.

2.5.1 Test for certainty

One subset of validity tests are tests for the certainty which respondents express when asked how certain they are that they would pay the stated amount.[79] In Annex 6.5 show the tests for the association between certainty (measured as a percentage, where 100% is completely certain) and WTP. Specifically, we estimated the following model:

Equation 2

$$WTP_i = \alpha + \beta_1 Cert_i + \beta_2 X_i + \varepsilon_i$$

where WTP_i is the amount the individual i states they are willing to pay, $Cert_i$ is the individual's stated certainty to pay that value on a scale of 0-100%, X_i controls for standard socio-demographic determinants of WTP, α is the deterministic factor and ε_i is the error term containing unobserved factors that influence WTP.

We explored possible protest bids by analysing the reasons given by respondents for being willing or not willing to pay (Annex 6.6). Given that the estimated number of protests is small, all responses are retained in the analysis.

2.5.2 Hypothetical bias

Hypothetical bias occurs when the hypothetical nature of the CV survey leads to respondents overstating what they would pay in reality.[80] A range of counteractive approaches can be made to address hypothetical bias. Counteractive (i.e. *ex ante*) treatments are often employed through so-called entreaties in the survey text. Respondents are presented with entreaty scripts designed to reduce hypothetical bias and make the survey incentive compatible with standard welfare theory.[81] They are asked if they promise to answer the WTP question truthfully[82], and are provided with cheap talk scripts asking them to be realistic, reminding them of the household budgetary constraints, and the existence of other cultural institutions that they may wish to spend their money on.[83] Respondents are also informed that "studies have shown that many people answering surveys such as this one, say they are willing to pay more than they would actually pay in reality".[84] Our earlier study for the DCMS and AHRC effectively used both types of entreaties and these were employed in this study.[85]

[77] For more detail on validity tests see Shadish et al. 2002
[78] Arrow and Solow 1993; Bateman et al. 2002; Carson 2012
[79] Bedate et al. 2009
[80] Cummings and Taylor 1999; Landry and List 2007; Mahieu et al. 2012
[81] Carlsson et al. 2013; Cummings and Taylor 1999
[82] Jacquemet et al. 2013
[83] Cummings and Taylor 1999
[84] Champ and Bishop 2001; Cummings and Taylor 1999
[85] Bakhshi et al. 2015

We also applied a provision point mechanism (whereby the preservation of the good/service being valued is contingent on a target total donation amount being reached) to overcome the risk of hypothetical bias due to free-riding associated with voluntary payment mechanisms (recall Section 2.2.2).[86]

2.5.3 Starting point bias

Another important bias which can occur in stated preference studies is starting point bias. This bias means that the stated WTP may differ depending on the value at which the respondent starts to consider how much they would be willing to pay.[87] We applied best practice to the payment card we used for the valuation by starting at £0 and moving up the payment ladder in small steps (£0.01, £0.25 and £0.5) up to a reasonable level of £500. The use of a payment card, compared to asking individual values (e.g. Would you be willing to pay more or less than £5?) removes the starting point bias as the respondents see a variety of values at the same time.[88] However, payment cards can introduce range bias arising from the lower and upper monetary level on the card. We used the pilot phase (see pilot report in Section 2.3.1) to test the range of payment options and address any potential range bias.

2.5.4 Embedding effect and insensitivity to scope

Insensitivity to scope bias occurs where WTP is insensitive to the extent of the proposed change, such that stated welfare measures do not vary proportionally with the scope of the provided benefit. Similarly, inconsistency in WTP values has been observed where respondents are willing to pay the same amount for a set of goods (such as the historic city as a whole) as for separate components (individual historic buildings) or are willing to pay the same amount for very different quantities of the same good.[89] Termed the embedding effect, or part-whole bias, this has considerable policy implications where evaluations are sensitive to the composition and quantity of goods employed in the analysis. We addressed this concern in the study by forcing sensitivity to scope through the allocation mechanism. This meant that the WTP for the cathedral (a component of the historic city) had to be given as a proportion of the overall payment made for the city.

However, this approach has the disadvantage that we have to account for those respondents who have no defined preferences for the allocation, are indifferent to different allocation levels, or think experts should decide how to best allocate. These individuals will respond No to the allocation in principle question, but we cannot state for certain whether they have a specific positive value for the cathedral. This left us with the choice of assigning a zero value to these individuals (which would lead to an underestimation of mean WTP) or to assign an arbitrary allocation of the city-level donation (which would require additional judgements on the part of the analyst beyond those provided for in the hypothetical scenario). We therefore selected the option of recoding these responses as missing. This excludes these individuals from analysis of mean WTP, to avoid either over or underestimation of cathedral WTP.

2.5.5 Recollection bias

Recollection bias, refers to a systematic error caused by differences in the accuracy of the recollections of participants, regarding their experience at the sites. We minimised this bias by using follow-up questions that asked respondents to verify exactly when they visited the city/cathedral, excluding those who fall outside of the 3-year period (recall Section 2.2.1).

2.6 Benefit transfer tests

In this section we discuss the two approaches to BT described in Section 1.5.2. The first is based on a transfer of a known benefit to another site (unit estimate transfer), the second on the transfer of a function containing characteristics of the users and non-users of a site, as well as the characteristics of the site and possibly the study methodology, and how much these characteristics are associated with the valuation for cultural and heritage goods (function transfer). The

[86] Poe et al. 2002
[87] Bateman et al. 2002
[88] Bateman et al. 2002; Maddison and Foster 2003; Maddison and Mourato 2001
[89] Bateman and Langford 1997; Hausman 2012; Kahneman and Knetsch 1992

first approach can be split further into two sub-approaches, a straightforward value transfer (simple unit transfer) and a transfer weighted by the relative incomes at the study and policy sites (adjusted unit transfer).

We tested these approaches to assess the accuracy of BT within our four case study institutions. The key element of the BT test is an analysis of the transfer error, i.e. the difference between the transferred value, and the value this transfer is meant to estimate. To do this we used one of the sites in the study as a "policy site" (the site we are trying to value via BT) and the others as the "study" sites (sites that we transfer the values from). In this section, we summarise these approaches. Section 4 sets out the results of this analysis.

2.6.1 Transfer WTP on an institution by institution basis: unit value transfer and adjusted unit value transfer

This method is based on single point transfer estimates, that is, we transfer the WTP of the study site and assume it also applies to the policy site. Checking the effectiveness of this transfer method therefore implies testing the equality of mean WTP values at the policy site and the study site. Unit value transfer can be further subdivided into:

(i) Simple unit value transfer, where a single point estimate of benefit (e.g. mean WTP) is taken from one or more study sites and applied to the new policy site under the implicit assumption that the good and the socio-economic characteristics and preferences of the population are homogeneous between the study sites and the policy site. Note that we consider each of the historic cities (cathedrals) as a policy site, one at a time. In each case, the pooled set of responses for the other three historic cities (cathedrals) constitutes the study site. Equation 3 below shows the hypothesis we want to test to see if this benefit transfer methods is valid:

Equation 3

$$\widehat{\mathrm{WTP}_p} = \overline{\mathrm{WTP}_s}$$

(ii) Adjusted unit value transfer, where the transfer adjusts for differences in one variable between the policy and study sites. This method usually focuses on differences in respondents' income, which could affect WTP estimates between two sites, and generates a predicted value for the policy site according to Equation 4. This formula also forms the basis for the calculation of transfer errors.

Equation 4

$$\widehat{\mathrm{WTP}_p} = \left(\frac{\overline{Y}_p}{\overline{Y}_s}\right)^e \overline{\mathrm{WTP}_s}$$

Here $\overline{Y}_p, \overline{Y}_s$ is the average household income at policy and study sites, respectively, and e is the elasticity of the marginal utility of income. We assume, as per the Green Book, that this equals 1 (i.e. e = 1) i.e. that a 1% increase in the ratio of the income of the policy site to the study site corresponds to an increase of 1% in the willingness to pay for the policy site.[90]

2.6.2 Value Function Transfer: Transfer adjusted WTP from pooled data

The function transfer method is based on modelling the relationship between WTP and a number of explanatory variables.[91] The parameters of the model are then estimated using econometric methods such as regression. Our model specification is described by Equation 5. The researcher then applies the benefit function estimated at the study site(s) to

[90] Alternatively, the elasticity of the marginal utility of income could be estimated using data from the study site – this would be more in the spirit of the function transfer approach discussed below in the text.
[91] Desvouges et al. 1992; Kaul et al. 2013; Loomis 1992

predict benefits at the policy site, where it is adapted to fit the characteristics of the policy site (such as socio-economic characteristics and other measurable characteristics that systematically differ between the policy and study sites):[92]

Equation 5

$$\widehat{lWTP_{ip}} = b_0 + b_1 Q_p + b_2 C_p + b_3 A_p + b_4 S_{ip}$$

Here $lWTP_{ip} = \log(WTP_{ip} + 1)$ is the log-transformation of individual i's willingness to pay for policy site p; $\widehat{lWTP_{ip}}$ is the predicted value of that transformed willingness to pay; Q_p is the change in provision of the cultural good/service at site p; C_p is the characteristics of the good at site p; A_p is the availability of substitute sites for site p; and S_{ip} are the socio-economic characteristics of individual i at site p. The coefficients b_0,…, b_4 are obtained from the WTP function estimated at the study site (Equation 5 is estimated for the study sites whereby the subscripts p become subscripts s). Our prior expectations are that under this approach, more information about the site and population can be transferred and so the transfer errors are likely to be lower than the other two methods.[93] On the other hand, this approach is more data intensive and requires availability of a range of demographic and possibly attitudinal/behavioural variables that are part of the WTP function, in each site.

For policy decisions, we are interested in the actual WTP rather than its log-transformation. Therefore we perform a reverse transformation when predicting willingness to pay of individual i for site p. Note that because this reverse transformation involves an exponential function, which is non-linear, it requires an additional adjustment term, as explained below:

Equation 6

$$\widehat{WTP_{ip}} = r \cdot \exp(b_0 + b_1 Q_p + b_2 C_p + b_3 A_p + b_4 S_{ip}) - 1$$

$r = \exp(s^2/2)$ is an adjustment term which accounts for the effect that the variance of the error term in the regression underlying Equation 5 has on the expected value of WTP, given that WTP is an exponential function of the value predicted by the regression and s is an estimate of the variance of the error term in Equation 5.

Finally, we average Equation 6 across individuals to predict mean willingness to pay for policy site p:

Equation 7

$$\widehat{WTP_p} = \overline{\widehat{WTP_{ip}}}$$

The non-linearity of the exponential transformation means that the averaging procedure of Equation 7 is not equivalent to entering $\bar{S}_p$ (the average socio-economic characteristics of the individuals at site p) instead of S_{ip} in Equation 6. As the exponential function is convex, this shorthand approach would produce a lower value than the averaging procedure of Equation 7.

In the contingent valuation section of our study, Equation 5 is estimated iteratively for each city/cathedral. Here, in contrast, out of the four sites in each category we select a subset of three sites (which become the study sites) and estimate a benefit function on pooled data from these three study sites. The omitted fourth site then becomes the policy site and characteristics from the omitted site are plugged into Equation 6 to predict individual-level WTPs at the policy site and finally the mean WTP at the policy site, aggregated according to Equation 7.[94] Each of the four sites in each category has "its turn" as a policy site and so the above process is conducted four times omitting a different site each

[92] Rosenberger and Loomis 2003
[93] Brouwer and Spaninks 1999
[94] Bateman et al. 2011

time, which then becomes the policy site for that particular iteration of the study. We therefore predict WTP values for each of the four sites in each category based on pooled benefit functions from the other three sites.

2.6.3 Transfer error testing

A number of transfer tests have been proposed to test the predictive power of BT. The statistical validity of benefit transfer is based on the assumption that value estimates are statistically identical across study and policy contexts. In other words, the values estimated for the pooled study sites should not be significantly different from the policy site. This difference, known as transfer error, is measured in two ways.

First, we calculate the percentage difference between the observed and the predicted WTP value, as follows:

Equation 8

$$TE = \left(\frac{\widehat{WTP_p} - \overline{WTP_p}}{\overline{WTP_p}} \right) \times 100$$

What is an acceptable transfer error and whether the transfer is still informative depends on the intended policy use of the transferred estimates, and the corresponding accuracy required.[95] We compared estimates of transfer error to established ranges within the literature. In one review paper[96], the average transfer errors in intra and cross-country benefit transfer studies were found to be in the range of 20% to 40%, while individual transfers had errors as high as 100-200%, particularly when involving complex goods. For the purpose of testing we therefore applied a threshold of maximum 40% transfer error to all individual transfer errors.

Second, we test the statistical difference between observed and predicted WTP in each case using t-tests. The acceptable threshold of statistically significant transfer error is not clearly set in the benefit transfer literature. For the purposes of transfer testing in this study we deemed transfer errors to be acceptable if differences in observed policy site and pooled study sites WTP values were statistically insignificant in at least three of the four cases. Given the lack of guidance from the literature, we placed more weight on transfer tests which satisfy the 20-40% transfer error threshold criterion proposed by Ready and Navrud.[97]

Details of the statistical hypotheses we tested for each of the three BT methods outlined in Equation 3 - Equation 5 are summarised in Table 2-2. For the transfer of use values across sites and populations we tested all of the listed hypotheses. For the transfer of non-use values across sites for the same general population we tested only hypothesis 1 given the weaker explanatory power of the value functions (see Section 1.5.1).

Table 2-2 Benefit transfer tests

BT APPROACH	T-TEST HYPOTHESIS
UNIT TRANSFER	
Simple	$H1: \overline{WTP}_p = \overline{WTP}_s$ Null hypothesis: equivalence of observed mean policy site WTP and mean pooled study site WTP

[95] Brookshire and Neill 1992; Desvousges et al. 1992
[96] Ready and Navrud 2006
[97] Ready and Navrud 2006

Adjusted	$H2$: $\frac{1}{a_p}\overline{WTP_p} = \frac{1}{a_s}\overline{WTP_s}$ where $a_i = (\bar{Y}_i)^e$ for $i = p, s$ Null hypothesis: equivalence of observed mean policy site WTP and mean pooled study site WTP, adjusted for income difference between policy and study site.
FUNCTION TRANSFER	
Function	$H3$: $\overline{WTP_p} = \overline{\exp(b \cdot X_p + \varepsilon)} - 1$ Null hypothesis: equivalence of observed mean policy site WTP and mean predicted WTP for policy site.

Notes: $\overline{WTP_p}$, $\overline{WTP_s}$ *= average WTP at policy* (p) *and study* (s) *sites;* $\bar{Y}_p, \bar{Y}_s$ *= average household income at policy and study side respectively;* $e = 1$*;* b *= coefficients obtained from WTP function estimated at study sites; and* X_p *= characteristics of the policy site. For simple and adjusted unit transfer approaches, we use the equivalent of a two-sample unpaired t-test with unequal variances for weighted data, for the function transfer approach we use a paired t-test.*

Hypothesis H1 tests the equality of mean WTP values at the policy site and the study site. Alternatively, average values from multiple study sites can be used, which is our approach here.

There are, however, many possible differences in population and/or site characteristics between the study and the policy sites, such as differences in average respondent income, age or other demographic characteristics, as well as differences in the heritage site or in the policy change considered, which could lead to rejection of H1 and hence indicate low predictive power for the simple BT. When that is the case, BT methods that control for observable differences between site populations may have better predictive power.

Hypothesis H2 tests the equality of adjusted mean WTP values at the policy site and the study site (or pool of study sites), adjusting for differences in any relevant characteristics. Accounting for differences in income is the most common adjustment and is the approach we used in this study for use values.

Hypothesis H3 tests the transferability of a pooled benefit function, which is obtained after pooling the datasets from the study sites (excluding the policy case in each case) and estimating a WTP function for the pooled dataset. Specifically, H3 tests the equality of the observed mean WTP at the policy site and the predicted mean WTP for the policy site, using the estimated parameter coefficients of the pooled WTP function and the values of predictor variables observed at the policy site. The pooled WTP function incorporates variations in site characteristics, yielding a common function to be transferred to the policy site, considered as a linear combination of characteristics of existing sites.[98] Theoretically, the adjustment of variables contained in the pooled model enables compensation for differences between the study and policy site characteristics, and may allow for a more robust function transfer model and less error, improving the transfer accuracy.[99]

[98] Bateman et al. 2011; Johnston et al. 2015; Loomis 1992
[99] Rosenberger and Loomis 2003

3 Contingent Valuation Results

3.1 Users of historic cities

3.1.1 Socio-demographics

Table 3-1 breaks down the overall sample of city users into the cities visited. The overall sample was relatively balanced across cities, with the highest number of users from York and the lowest number from Lincoln.[100]

Table 3-1 City users sample

	Canterbury	Lincoln	Winchester	York	Total
City users 	-	351	372	473	1584

Table 3-2 and

Table 3-3 summarise the key socio-demographic characteristics across the four city user study groups. A full description of all variables used in Section 3 are provided in Annex 6.4. For comparison, Table 3-2 reports socio-demographic results without weighting and

Table 3-3 with weighting based on age and gender data of the user sample for each city and the total population of users of that city. Weighting addresses issues related to self-selection bias in the types of respondents who answer the survey. Note that comparison of Table 3-2 and

Table 3-3 indicates that each relevant group (age and gender) in the population could be balanced by applying weighting. Annex 6.7 provides the weights used for the cities and a comparison with the population in general.

The unweighted socio-demographic characteristics for the city user samples show that a higher proportion of respondents were female across all four cities. This is a slight over-representation which was corrected by weighting. The average age ranged from 40 to 43, which is weighted upwards in

Table 3-3.

Between 32% (Lincoln) and 48% (Canterbury) of city users were university educated, while the majority across all four cities were in employment (65%-72%), married/with partner (43%-48%) and in good health (69%-77%). The highest proportion of city users living in London was in the Canterbury sample (20.2%), while the lowest was in the Lincoln sample (5.1%). Between 21% (York) and 26%-25% (Canterbury, Lincoln & Winchester) of city users were members of a heritage, conservation, environmental or other organisation.

Table 3-2 City user socio-demographic characteristics (unweighted)

	Canterbury	Lincoln	Winchester	York
Female % (n/N)	62.4% (242/388)	68.7% (241/351)	66.9% (249/372)	64.1% (303/473)

[100] Note that sample size differences are corrected in the pooled regression by equivalising weights

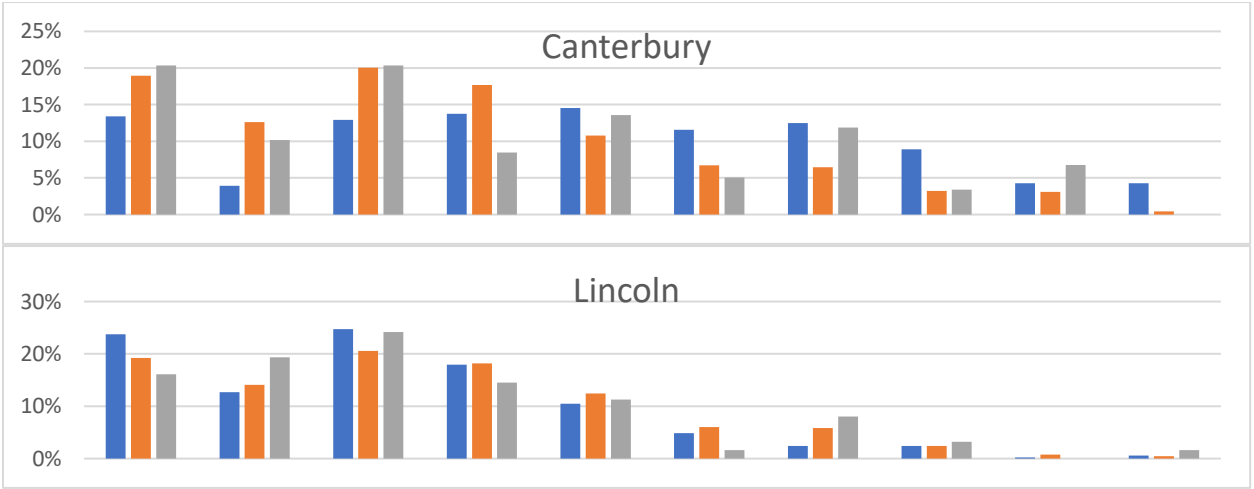
Mean age (standard deviation)	41 (15)	42 (17)	40 (16)	43 (16)
Mean household annual income (standard deviation)	£39,472 (£29,051)	£33,876 (£22,637)	£36,158 (£24,195)	£34,864 (£24,836)
Dependent children under 16 years % (n/N)	34.6% (134/387)	35.9% (126/351)	33.4% (123/368)	36.4% (172/472)
Married/with partner % (n/N)	47.5% (182/383)	47.6% (167/351)	43.0% (159/370)	43.7% (205/469)
University education % (n/N)	47.8% (183/383)	31.6% (111/351)	42.5% (158/372)	42.1% (198/470)
In employment (full-time, part-time, self-employed) % (n/N)	71.7% (276/385)	64.4% (226/351)	68.5% (255/372)	66.2% (312/471)
Living in London % (n/N)	20.1% (78/388)	4.8% (17/351)	11.8% (44/372)	6.8% (32/473)
Current resident % (n/N)	7.2% (28/388)	9.7% (34/351)	4.3% (16/372)	0.2% (1/473)
Health (is good, very good, excellent) % (n/N)	76.8% (294/383)	69.2% (243/351)	77.1% (286/371)	71.6% (338/472)
Member of any heritage, conservation, environmental or other organisation % (n/N)	26.0% (101/388)	24.8% (87/351)	26.1% (97/372)	20.9% (99/473)
Religious % (n/N)	59.7% (221/370)	53.1% (182/343)	52.9% (193/365)	55.7% (259/465)
Practicing religion % (n/N)	26.5% (95/359)	17.7% (59/333)	23.9% (84/351)	17.8% (81/456)

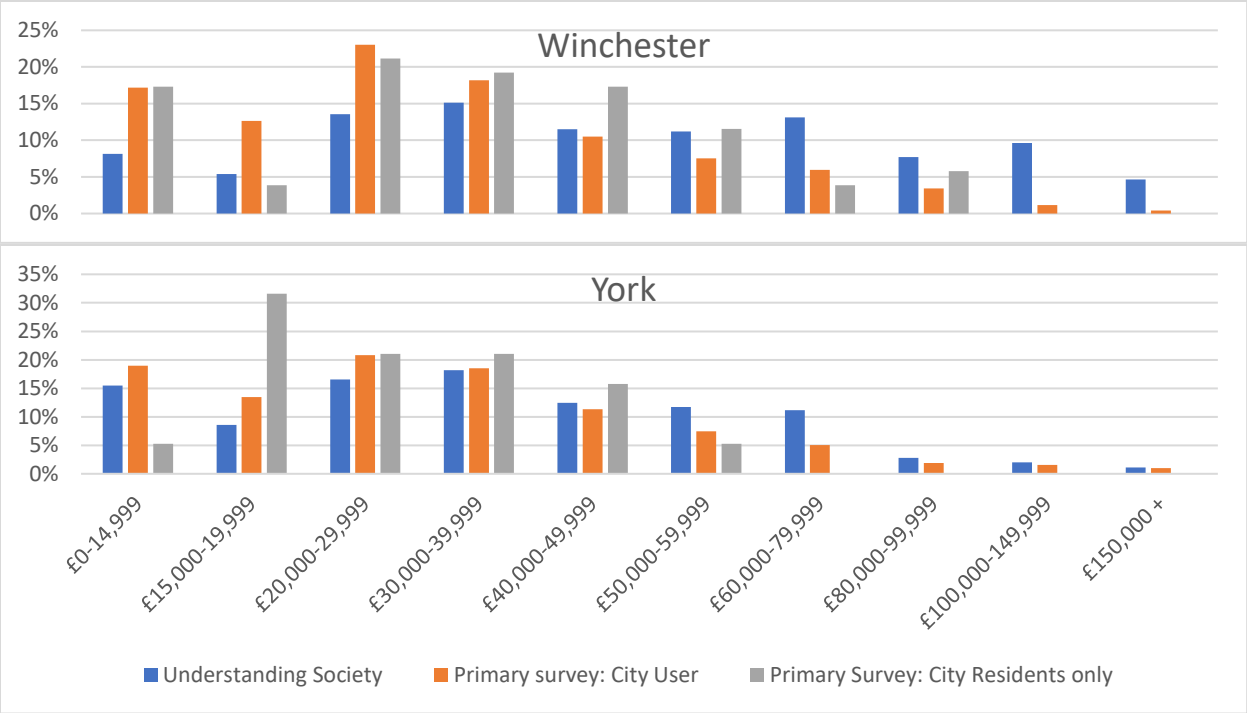
Notes: Income is measured as gross annual household income. Age and income averages are computed using the midpoints of the income and age categories.

The unweighted socio-demographic characteristics show that average annual household income in the sample ranged from £33,876 to £39,472. Income was highest in Canterbury. This could reflect an imbalance in the Canterbury sample compared to that which is nationally representative. However, a higher proportion of Canterbury users were from London. As Canterbury is the closest of our four cathedrals to the capital, we would expect Canterbury city users to have higher London-based incomes compared to the other cities. Note that we were unable to weight for income variations due to the lack of data available for our city visitor samples.

We compared the household income reported by our city user and city resident samples against household income averages taken from the Understanding Society (USoc) Survey (pooled across the years 2009-2016) (Figure 3-1). Note that the data available in Understanding Society relates only to city residents, and not to city visitors, who make up a large proportion of our sample. In the absence of reliable income data for visitors we were unable to weight for income in our analysis. Given the low sample sizes available for city residents in both our survey (19-64 for each city) and Understanding Society (around 600-700 for each city), these distribution graphs should be seen as illustrative only.

Figure 3-1 Income distributions: Survey sample and city average (Understanding Society)





The figure shows how the income distribution in the survey samples of the different cities compared to the national income distribution.

Canterbury: The income distribution in the city user and resident samples was relatively similar to the national income distribution. However, there was a higher representation of lower income groups in the Canterbury city resident sample compared to the national income distribution.

Lincoln: The income distribution in the city user and city resident samples was similar to the national income distribution. Compared to the other city samples, there was a slightly lower representation of lower income groups in the Lincoln resident sample relative to the national income distribution. To pre-empt our results, this may account for some of the issues of lower model fit and the insignificant association between WTP and income observed in Lincoln city models in Section 3.1.5.

Winchester: There was a higher representation of lower income groups in the city resident samples and lower representation of higher income groups in our city resident sample compared to the national income distribution.

York: The income distribution in the city resident sample was dissimilar to the national distribution in the two lower income bands, with an underrepresentation of respondents in the lowest income band in our city resident sample, and an over-representation at the second lowest income band, compared to the national distribution. At the higher income end of the national income distribution (over £60,000), there were no observations in the city samples. These differences are though partly due to the subsample of York residents in our survey (19 only) being smaller than that of the other three cities.

In all subsequent tables in section 3.1 (

Table 3-3 onwards), we report only city user weighted figures.

Table 3-3 shows the same results after weighting the sample of each city to make it representative of all users for that city.

Table 3-3 City user socio-demographic characteristics (weighted)

	Canterbury	Lincoln	Winchester	York
Female %	45.0%	50.4%	52.8%	47.8%
Mean age (standard deviation)	46 (17)	42 (18)	45 (18)	45 (16)
Mean household annual income (standard deviation)	£41,697 (£30,357)	£34,407 (£22,423)	£38,426 (£23,067)	£34,529 (£25,327)
Dependent children under 16 years %	29.6%	28.4%	33.8%	38.1%
Married/with partner %	52.0%	44.9%	44.1%	46.3%
University education %	56.0%	26.8%	40.1%	41.6%
In employment (full-time, part-time, self-employed) %	67.7%	64.2%	62.5%	65.7%
Living in London %	23.7%	2.0%	6.8%	6.2%
Current resident %	6.8%	9.0%	5.4%	0.5%
Health (is good, very good, excellent) %	75.3%	70.0%	79.9%	68.7%
Member of any heritage, conservation, environmental or other organisation %	31.0%	24.0%	31.8%	23.0%
Religious %	60.7%	51.4%	55.2%	53.9%
Practicing religion %	26.1%	17.6%	29.4%	19.2%

Notes: Income is measured as gross annual household income. Age and income averages are computed using the midpoints of the income and age categories. Weights are based on the breakdown by age and gender (see Annex 6.7).

3.1.2 Historic city usage

Table 3-4 summarises information about visits to each of the four cities within the city user samples. Recall that the city user sample is composed of city residents and city visitors (both in the past three years). The highest proportion of city users were visitors, ranging from 90% in the case of York to 77% among Winchester city users.

The information on city residents sampled reveals that over half (57%) of city residents in Lincoln were current (as opposed to former) residents, compared to only 5% of city residents in York. This discrepancy was driven by the low sample (n=19) of city residents in York relative to the other cities, which may be due to York attracting more external visitors and so their being more represented in the sample. Nearly half (45%) of the city residents in the Lincoln sample had lived in the city for over 10 years compared to 18% of city residents in Winchester. Around a fifth of city users across all 4 cities were very or extremely familiar with information regarding the city.

Table 3-4 shows that 71-82% of the city user sample were also cathedral users. A higher proportion of city visitors in all cities had visited the respective cathedral (84%- 93%). This is not surprising as a high proportion of historic city visitors would visit the cathedral as one of the main visitor attractions. A higher proportion of visitors still had viewed the cathedral from the outside (88%-89%) but this is not sufficient to be classed as a cathedral user.

Table 3-4 City user sample usage information

	Canterbury	Lincoln	Winchester	York
City user usage information				
City user (sample size)	388	351	372	473

Residents (current and former) %	14.9%	15.5%	22.8%	9.8%
Current residents %	6.8%	9.0%	5.4%	0.5%
Former resident %	8.1%	6.5%	17.5%	9.3%
Visitors %	85.1%	84.5%	77.2%	90.2%
Very or extremely familiar with city info %	20.5%	20.4%	19.3%	20.7%
Visited cathedral in lifetime %	89.8%	85.1%	93.7%	89.7%
Cathedral users (past 3 years) %	80.1%	77.2%	81.6%	71.0%
City resident usage information				
City resident (sample size)	59	63	55	19
Current resident %	45.6%	58.0%	23.5%	4.8%
Former resident (past 3 years) %	54.4%	42.0%	76.5%	95.2%
Resident for more than 10 years %	24.7%	47.3%	17.9%	14.1%
Visited cathedral in lifetime %	90.4%	90.2%	96.5%	92.8%
Cathedral user (past 3 years) %	84.7%	74.1%	91.2%	85.6%
Visited other historic sites in city %	62.8%	69.8%	36.9%	50.2%
City visitor usage information				
City visitor (past 3 years) (sample size)	329	288	317	454
Visited cathedral in lifetime %	89.7%	84.2%	92.9%	89.4%
Cathedral user (past 3 years) %	79.3%	77.8%	79.0%	69.4%
Viewed cathedral from outside %	87.5%	88.0%	88.5%	87.6%

Notes: Sample weighted by city user weights.

3.1.3 Attitudes

Table 3-5 shows attitudes towards culture and heritage for each city user sample. The table shows a high rate of participation and engagement with culture and heritage. Across all four cities, between 96% (Winchester) and 98% (Canterbury) of respondents had been to a cultural or historic site in the last 12 months, although this partly reflects the fact that visits to these cities in the last year may be contributing to these totals. Between 82% (York) and 90% (Winchester) of the city user sample had been taken to museums or galleries as a child.

A number of respondents (32%-43%) placed heritage or arts as among the 5 top priorities for public spending. These percentages are higher than the 26-27% found among the museum visitors surveyed in the Natural History Museum and Tate Liverpool in our earlier study, although the question used in that study was more stringent, asking about the *Top 3* priorities for public funding only.

A large majority of respondents across all city visitor groups agreed or strongly agreed that the cathedral of the city is a national treasure to be preserved for future generations and that the historic character of the city has a value even for those who do not visit. 72%-78% of respondents agreed or strongly agreed that visiting heritage sites increases one's wellbeing. A small proportion of respondents (17%-23%) agreed or strongly agreed with the negative statement that there are more important things to spend money on than preserving heritage.

Table 3-5 City user attitudes towards culture and heritage

	Canterbury	Lincoln	Winchester	York

Been to a cultural or historic site in last 12 months %	98.2%	96.8%	95.9%	97.3%
Been to a cultural entertainment event in last 12 months %	88.2%	86.2%	89.9%	87.9%
Taken to museums, heritage sites or galleries as a child %	85.6%	88.9%	90.0%	82.0%
Selected heritage or arts in Top 5 of public spending %	42.5%	31.6%	39.2%	42.5%
[Cathedral] is a national treasure to be preserved for future generations %	84.7%	82.9%	86.9%	88.1%
The historic character of [City] has a value even for those who do not visit %	77.5%	79.0%	74.7%	81.7%
There are more important things to spend money on than preserving heritage %	16.9%	19.8%	22.7%	23.0%
Visiting heritage sites increases one's wellbeing (happiness) %	78.0%	71.7%	77.0%	75.2%

Notes: Sample weighted by city user weights.

3.1.4 WTP summary statistics (use values)

Table 3-6 shows the proportion of city users who indicated that they were in principle willing to pay a one-off donation to reduce the damage caused by climate change, improve the maintenance and conservation of historic buildings in the city, and reduce the risk of irreparable damage and closure of those buildings currently open to the public. The historic city WTP questions stated clearly that the cathedral composes part of this historic character and will be protected via this donation. These figures are therefore inclusive of any value for the cathedral as part of this.

For all cities, a high proportion of the city users sample were in principle willing to pay (Yes or Maybe) a one-off donation. 67.2% were definitely or maybe willing to pay in principle for Canterbury, 73.2% for Lincoln, 67.5% for Winchester and 68.2% for York. However, 'Maybe' was the most common response (over 40% in all cases), while only 22%-30% responded 'yes'. We conclude that the relatively low proportion who respond 'yes' when asked to support the preservation of the historic city is realistic and reflects the nature of the good being valued (given for instance that only 32%-43% placed heritage, conservation or environmental organisations in their top 5 priorities for public spending).

Table 3-6 City user willingness to pay in principle

WTP	Canterbury	Lincoln	Winchester	York
Yes	26.7%	30.4%	24.1%	21.9%
Maybe	40.4%	42.8%	43.3%	46.3%
No	32.8%	26.8%	32.5%	31.8%

Notes: Sample weighted by city user weights.

Table 3-7 shows the mean and median WTP of city users to pay a one-off donation on behalf of their household to reduce the damage caused by climate change, improve the maintenance and conservation of the historic buildings in the city, and reduce the risk of irreparable damage and closure of those buildings currently open to the public. In line with standard analysis of WTP (as outlined in Section 2.4) those that answered 'no' to the WTP in principle question were included in these calculations and assumed to have a zero WTP.

Table 3-7 shows that the mean WTP of users was between £9.18 (median £5.50) in the case of York, and £9.96 (median £5.50) in the case of Winchester. The mean WTP for Lincoln was £9.64 (median £5.50) and £9.74 (median £5.50) for Canterbury. These WTP values are inclusive of any value placed on the cathedral as part of the city's historic buildings.

The WTP values that include all not willing to pay responses as £0 bids are within the range of expected values. The WTP use values are lower than the comparable UK study of the Grainger City conservation plan in Newcastle (£24.66 at 2017 prices), but that study was conducted using an open elicitation format which is commonly found to lead to overestimation of WTP. [101] However, WTP use values are not greatly higher than the individual museums evaluated in the earlier museums study (£6.01-£7.79), despite the fact that people are here valuing the maintenance and conservation of the historic character of an entire city. This may suggest limited sensitivity to scope of WTP (i.e. that people are not fully considering the extent of the heritage good being valued).

Overall the proportion of zero responses (including those not willing to pay in principle) is higher (around one third of the sample) than for museum users in the earlier museums study (where zero responses were 10% and below), but in line with findings from other CV studies in the cultural sector (e.g. 20-30% in the NHM/Tate Liverpool study).

The proportion of zero WTP answers among those that stated yes or maybe to the in-principle question and went on to express a zero WTP ('payment card zeros') is very low, between 0.3% and 1.4%. This is suggestive that the scenario presented was realistic, the valuations had been given thought by the survey respondents, and the range of payment amounts offered was credible. However, a high proportion (70-78%) of the user samples are drawn from those who are either unwilling to pay or unsure about their willingness to pay (answering 'no' or 'maybe'). This may impact on the statistical power of the regressions used in the subsequent validity testing section, as it provides a very small sample of respondents who were definitely willing to pay in principle (22%-30%).

Table 3-7 City user mean and median use willingness to pay (one-off donation)

	Canterbury	Lincoln	Winchester	York
Mean (standard error)	£9.74 (£1.01)	£9.64 (£1.19)	£9.96 (£1.31)	£9.18 (£0.83)
95% CI low	£7.76	£7.31	£7.39	£7.54
95% CI high	£11.73	£11.97	£12.53	£10.81
Median	£5.50	£5.50	£5.50	£5.50
Max	£112.5	£175.0	£175.0	£112.5
Zeros (including those not WTP in principle)	33.8%	28.0%	32.8%	33.2%
Payment card zeros (among respondent who state that they are WTP in principle)	1.0%	1.2%	0.3%	1.4%

All WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Summary statistics calculated with inclusion of 'No' at payment principle (coded £0). Sample weighted by city user weights.

3.1.5 Validity testing: WTP determinants

We checked the theoretical validity of our results by testing if city users' WTP (as a donation to improve the maintenance and conservation of the historic buildings in the city) was associated with socio-demographic, behavioural (i.e. usage and knowledge) and attitudinal factors expected to drive WTP (Table 3-8). Note that a log transformation to WTP+1 was applied in this analysis to account for the skew towards zero in WTP distribution and maintain inclusion of 'no' in principle responses as £0 bids.

[101] Garrod et al. 1996

The independent variables used followed the recommendations of Bateman et al. (2002), which is common practice in modern applications of CV. In particular, we included a range of standard socio-demographic variables (i.e. gender, age, children, ethnicity, education and income) and relevant attitudinal variables (e.g. familiarity with city information; attitudes towards heritage and public spending on culture). Annex 6.4 summarises the variables used.

Table 3-8 Factors associated with city users WTP, as a one-off donation to preserve the historic city

	Canterbury	Lincoln	Winchester	York	Pooled historic city
Female	0.022	0.014	-0.037	-0.112	-0.022
Log age, using age midpoint	-0.277	0.419*	0.180	0.381*	0.200
Log income, using income midpoints	0.348***	0.007	0.268*	0.228**	0.209***
Degree and above	-0.294	0.124	0.063	0.477***	0.091
With dependent children	0.486***	0.339*	0.236	-0.069	0.215**
Selected heritage or arts in Top 5 of public spending	0.637***	0.124	0.746***	0.172	0.465***
Familiarity with city information (very or extremely familiar)	0.491***	0.293	0.112	0.565***	0.398***
Agree to 'Visiting heritage sites increases one's wellbeing (happiness)'	0.358**	0.253	0.418*	0.347**	0.323***
Log distance: Home postcode to cathedral	-0.050	-0.001	-0.305***	-0.109	-0.129***
Constant	-1.392	-0.555	-1.430	-2.043	-1.358
Observations	349	327	334	427	1437
Adjusted R2	0.217	0.058	0.157	0.139	0.105

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Reference group: for gender ref = male; for BAME ref = white; for education Degree and above ref = all qualifications under Degree; for Dependent children ref = no children; for Familiar with city information: Very/Extremely ref = not at all – moderately familiar. Gross annual household income; averages computed using the midpoints of the income and age categories. We control for random differences in audio-visual information (use of male vs female voice). Heteroskedasticity-robust standard errors. All VIF scores <2 in pooled regression. Regression models significant at p<0.005.*

Table 3-8 shows the findings on whether (log)WTP is associated with theoretically consistent drivers of value in ways that accord with prior expectations and previous findings from the literature.[102] In the best-fit pooled regression (Table 3-8, last column) and in three of the city models (Canterbury, Winchester, and York), income (log) is significantly and positively associated with log WTP. This is consistent with previous CV studies of cultural institutions which find that individuals earning higher income are more likely to pay more to support the work of cultural institutions.[103] Lincoln is the only city for which there is no significant association between income and WTP.

Age (log) is significant and positively associated with WTP for historic cities in two city models (Lincoln and York). This indicates that older city users hold higher values for the preservation of the historic character of towns and cities in England. Gender is not significantly associated with mean WTP in any case. Higher education is significantly and positively associated with WTP in the York city model only.

[102] Bateman et al. 2002
[103] Noonan 2003

Distance (log) between the respondent's home postcode and the cathedral (as a proxy for the centre of the city) is significantly and negatively associated with city user WTP in the pooled regression, and in the Winchester city model.

We included a number of indicators of cultural engagement within the validity testing model, to test our results against the theoretical assumption that those who are more engaged in culture (i.e. prioritise public spending on arts and heritage and agree that historic cities have value even for those who do not use it) would value the site they visit more highly.[104] Prioritisation attached to public spending on arts, culture and heritage is significantly and positively associated with mean WTP in the pooled model and two historic city models (Canterbury and Winchester). We find a positive association with mean WTP for those who agree or strongly agree that 'visiting heritage sites increases one's wellbeing (happiness)' in three of the city models (Canterbury, Winchester, and York) and the pooled model.

Familiarity with the information presented about the historic city is also significantly and positively associated with mean WTP in the pooled model and two of the city models (Canterbury and York).

In the pooled model, the R^2 measure of model fit is 0.10 (perfect model fit would be measured as 1.0). The model fit is higher for the Canterbury (0.22), Winchester (0.16) and York (0.14) city models, but very low for the Lincoln model (0.06). These low measures of model fit of the city user models may be due to the low sample size and the high number of respondents who are not willing to pay in principle. They may also point to the fact that there are unobserved determinants of WTP that we do not have data on and so cannot be included in the models. Note that, with the exception of Lincoln, the adjusted R^2 values are only about 33% lower than in the regressions analysing the WTP of museum visitors in our earlier museums study. Sensitivity testing of follow up certainty questions is reported in Annex 6.5. Tests of model fit (Adjusted R^2) are low.

3.1.6 Summary: Historic city use-value analysis

The mean WTP of city users was between £9.18 and £9.96 across the four historic city sites. These values are higher than the use values elicited for a single cultural institution in our earlier museums study which is consistent with the greater scope of the cultural good being valued (a historic city containing multiple sites of cultural value). We are confident that the method used to elicit values (payment card) is more robust than that used in previous UK studies of historic cities (e.g. Grainger Town), which accounts for the lower mean WTP found in the present study. We note that WTP use values are only a little higher than the individual museums evaluated in our earlier museums study, which may suggest limited proportionality of WTP.

The regression results accord with theoretical expectations, being significantly associated, in the directions expected, with income (in three city models and the pooled model). Although income is not significantly associated with WTP in the Lincoln city model, we believe that the variation in variables' significance across the individual historic city models may be driven by their low sample sizes of the individual models (at the minimum range of sample size for CV surveys in response to the demands for cost-effectiveness in data collection). In addition, we note that the variation of income levels in our individual samples can be low as shown by the low standard deviation measures in Table 3-2). It may also be that some of the income effect on WTP is being captured in the significant association between age and mean WTP (for instance, in the case of Lincoln). However, we note that the low statistical power of some of the city regressions may be driven by the small sample of respondents who were willing to pay and the high proportion (around 30%) who were not willing to pay in principle. One possibility is that this low willingness to pay in principle may be due to respondents' unfamiliarity with the hypothetical scenario and scope of the good being valued. While people are familiar with the concept of paying an entry fee to access a museum or gallery or to pay to preserve a single heritage site (as in the case of the cathedral WTP in Sections 3.3 and 3.4), the concept of paying a donation to preserve the historic character of an entire city may be unfamiliar to respondents, which may be driving the possible issues around insensitivity to scope.

[104] Noonan 2003

3.2 Non-users of historic cities

3.2.1 Socio-demographics

Table 3-9 shows the sample sizes of city non-users by city. The overall sample was relatively balanced across cities, with the highest number of non-users from Winchester and the lowest number from York.

Table 3-9 City non-users sample

	Canterbury	Lincoln	Winchester	York	Total
City non-users 	357	346	378	271	1352

Table 3-10 and Table 3-11 summarise the key socio-demographic characteristics across the four city non-user study groups, unweighted and weighted based on general population ONS English Annual Population Survey data.

The unweighted socio-demographic characteristics for the city non-user survey samples show that a higher proportion of respondents in the sample were male across all four city non-user groups. The average age (46-47 years old) of non-users was similar across cities. When we apply weighting to correct for population demographics (Table 3-11), the proportion of females increased (rising to 54% in Winchester). Average age was also adjusted slightly downwards (44-46 years old) for all cities.

The unweighted socio-demographic characteristics show that average annual household income in the sample was broadly similar across the four city non-user groups (£30k to £31k). This was lower than the income range among city users (£33,876 to £39,472) which may be driven by the comparative affluence of residents of the cities studied and of those visitors who can afford more regular holidays and trips in the UK. Approximately one third of non-users in each city were university educated, while over half of the non-users for all four cities were in employment (53%-58%). Between 14% (York) and 17% (Lincoln) were members of a heritage, conservation, environmental or other organisation, which is lower than the proportion in the city users sample (21%-26%) and is to be expected given the self-selection of more culturally engaged individuals into the city user sample.

Annex 6.7 provides the general population weights used for city non-users.

Table 3-10 City non-user socio-demographic characteristics (unweighted)

	Canterbury	Lincoln	Winchester	York
Female % (n/N)	30.5% (109/357)	34.1% (118/346)	35.7% (135/378)	35.4% (96/271)

Mean age (standard deviation)	47 (16)	47 (17)	47 (16)	46 (18)
Mean household annual income (standard deviation)	£30,007 (£22,349)	£30,307 (£22,070)	£31,164 (£22,548)	£30,561 (£24,791)
Dependent children under 16 years % (n/N)	27.2% (97/357)	23.2% (80/345)	27.6% (104/377)	26.2% (71/271)
Married/with partner % (n/N)	47.2% (168/356)	37.8% (130/344)	40.3% (151/375)	39.6% (107/270)
University education % (n/N)	33.0% (116/352)	32.0% (110/344)	31.9% (120/376)	30.4% (82/270)
In employment (full-time, part-time, self-employed) % (n/N)	56.2% (200/356)	55.4% (191/345)	57.7% (217/376)	52.6% (142/270)
Living in London % (n/N)	9.5% (34/357)	11.6% (40/346)	9.3% (35/378)	14.8% (40/271)
Living in local region %	12.3% (44/357)	8.7% (30/346)	13.8% (52/378)	1.5% (4/271)
Health (good, very good, excellent) % (n/N)	60.1% (214/356)	59.4% (205/345)	62.1% (234/377)	67.5% (183/271)
Member of any heritage, conservation, environmental or other organisation % (n/N)	16.5% (59/357)	17.3% (60/346)	16.1% (61/378)	14.4% (39/271)
Religious % (n/N)	44.0% (155/352)	46.5% (159/342)	52.4% (197/376)	50.4% (132/262)
Practicing religion % (n/N)	14.0% (48/343)	14.5% (48/332)	13.7% (50/364)	15.8% (40/253)

Notes: Income is measured as gross annual household income. Age and income averages are computed using the midpoints of the income and age categories.

In all subsequent tables in section 3.2 (Table 3-11 onwards), we report only nationally representative weighted figures.

Table 3-11 City non-user socio-demographic characteristics (weighted)

	Canterbury	Lincoln	Winchester	York
Female %	47.6%	45.3%	54.4%	43.7%
Mean age (standard deviation)	45 (16)	44 (18)	46 (17)	45 (19)
Mean household annual income (standard deviation)	£30,237 (£22,916)	£32,071 (£24,699)	£32,781 (£24,093)	£29,534 (£22,147)
Dependent children under 16 years %	27.1%	24.3%	27.2%	24.5%
Married/with partner %	44.5%	36.6%	35.8%	41.8%
University education %	32.5%	31.6%	33.1%	31.2%
In employment (full-time, part-time, self-employed) %	52.7%	52.9%	58.2%	50.2%
Living in London %	13.3%	14.5%	15.0%	19.1%
Living in local region %	11.9%	6.7%	11.8%	1.2%
Health (good, very good, excellent) %	61.4%	64.1%	63.7%	72.4%
Member of any heritage, conservation, environmental or other organisation %	14.9%	17.7%	17.9%	16.5%
Religious %	45.3%	47.5%	51.8%	52.5%

Practicing religion %	16.4%	14.0%	18.4%	18.2%

Notes: Income is measured as gross annual household income. Age and income averages are computed using the midpoints of the income and age categories.

3.2.2 Attitudes

Attitudes towards culture and heritage are depicted for each of the city non-user samples in Table 3-12. The table shows that the city non-user sample had a high rate of participation and engagement with culture and heritage. Across all four cities, between 73% (Canterbury) and 81% (Lincoln) of respondents had been to a cultural or historic site in the last 12 months. Between 80-81% of non-users in all four cities had been taken to museums or galleries as a child. A number of respondents (27%-32%) placed heritage, arts or environment among the 5 top priorities for public spending. In all cases the proportions are lower among city non-users than among the city user sample (as reported in Section 3.1.3). This may suggest an element of selection, whereby those who have visited or live in one of the four historic cities have higher levels of cultural engagement in general. However, we would not necessarily expect the selection effect to be that strong, as non-users of these four cities could still have visited or lived in another historic city in England. We cannot therefore discount that this may be an artefact of the online survey sampling approach.

In terms of agreement questions, the majority of respondents across all city non-user groups agreed or strongly agreed that the cathedral of the city is a national treasure to be preserved for future generations and that the historic character of the city has a value even for those who do not visit it. 61%-67% of respondents agreed or strongly agreed that visiting heritage sites increases one's wellbeing. A small proportion of respondents (19%-26%) agreed or strongly agreed with the negative statement that there are more important things to spend money on than preserving heritage.

Table 3-12 City non-user attitudes towards culture and heritage

	Canterbury	Lincoln	Winchester	York
Been to a cultural or historic site in last 12 months %	72.8%	80.8%	77.6%	78.3%
Been to a cultural entertainment event in last 12 months %	72.2%	70.9%	77.2%	71.0%
Taken to museums, heritage sites or galleries as a child %	80.8%	80.2%	80.6%	81.4%
Selected heritage or arts in Top 5 of public spending %	27.1%	27.3%	26.7%	32.5%
[Cathedral] is a national treasure to be preserved for future generations %	64.2%	57.3%	66.0%	68.1%
The historic character of [City] has a value even for those who do not visit %	56.6%	48.9%	54.2%	64.0%
There are more important things to spend money on than preserving heritage %	25.8%	19.0%	22.6%	19.4%
Visiting heritage sites increases one's wellbeing (happiness) %	63.5%	67.1%	60.6%	62.8%

Notes: Sample is weighted by general population weights (age and gender).

3.2.3 WTP summary statistics (city non-use values)

Table 3-13 shows the proportion of city non-users who indicated that they were in principle willing to pay a one-off donation to reduce the damage caused by climate change, improve the maintenance and conservation of historic buildings in the selected city, and reduce the risk of irreparable damage and closure of those buildings currently open to the public. As with the city user sample, this value is inclusive of the cathedral as part of the historic townscape.

We see that for all cities over half of the non-users were in principle willing to pay ('yes' or 'maybe') a one-off donation. 53.7% are willing to pay in principle for Canterbury, 52.5% for Lincoln, 57.1% for Winchester and 56.8% for York. However, the figures show that 'maybe' was the most popular response to being willing to pay (40%-44%). Only 10%-17% responded 'yes' to being willing to pay in principle. This may affect the statistical power of the regressions used in the subsequent validity testing section, as it results in a very small sample of respondents who are definitely willing to pay (less than 20%).

Table 3-13 City non-user willingness to pay in principle

WTP	Canterbury	Lincoln	Winchester	York
Yes	12.8%	10.2%	13.8%	17.2%
Maybe	40.9%	42.3%	43.3%	39.6%
No	46.3%	47.5%	42.9%	43.3%

Notes: Sample weighted by general population weights (age and gender). All No responses coded as £0 for WTP analysis.

Table 3-14 shows the mean and median WTP of city non-users to pay a one-off donation on behalf of their household to reduce the damage caused by climate change, improve the maintenance and conservation of the historic buildings in the city, and reduce the risk of irreparable damage and closure of those buildings currently open to the public.

Among city non-users, mean WTP ranged from £5.32 (median £1.25) in the case of Canterbury to £7.30 in the case of York (median £1.25). Mean non-users WTP for Lincoln was £5.96 (median £1.25) and £5.97 (median £4.50) for Winchester. These WTP values include all 'not willing to pay' responses as £0 values. As expected, the range of non-use WTP values among city non-users is lower than the use WTP among city users.[105]

Non-user WTP was higher for non-users of historic cities than for non-users of individual museums in the DCMS museums study (£2.79 -£4.06), although we are unable to test for statistical significance of the difference and the difference is not that large. Also, the results are not strictly comparable, as they are based on different survey instruments, and are valuing different cultural goods. Overall the proportion of zero responses (including those not willing to pay in principle) is comparable (around half of the sample) to museum non-users in the museums study and in line with findings from other CV studies in the cultural sector (e.g. 56% in the Tate Liverpool study).

The proportion of 'payment card' zero WTP answers was very low (respondents who stated yes or maybe to the willing to pay in principle question and went in to express a zero WTP), between 0.1% and 2.8%. This suggests the scenario presented was valued and realistic, and the range of payment amounts offered was credible and affordable. Again, it does mean that a high proportion (around 40%) of the non-user samples are drawn from those who were not willing to pay in principle, which may impact on the statistical power of the regressions used in the subsequent validity testing section.

Table 3-14 City non-user mean and median non-use Willingness to pay (one-off donation)

	Canterbury	Lincoln	Winchester	York
Mean (standard error)	£5.32 (£0.61)	£5.96 (£0.75)	£5.97 (£0.59)	£7.30 (£1.11)
95% CI low	£4.13	£4.49	£4.81	£5.11
95% CI high	£6.52	£7.42	£7.13	£9.50
Median	£1.25	£1.25	£4.50	£1.25
Max	£112.5	£112.5	£175.0	£112.5
Zeros (including those not WTP in principle)	47.8%	49.0%	43.1%	46.1%

[105] Noonan 2003

Payment card zeros (among respondent who state that they are WTP in principle)	1.5%	1.5%	0.1%	2.8%

Note: All WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Summary statistics calculated with inclusion of 'No' at payment principle (coded £0). Sample weighted by gen. pop. weights (age and gender).

3.2.4 Validity testing: WTP determinants (city non-users)

We investigated the validity of our results by analysing whether non-user WTP for historic cities was associated with socio-demographic, knowledge, and attitudinal factors that are expected to affect WTP.[106]

Table 3-15 shows the results for factors associated with city non-user WTP, as a one-off donation, to improve the maintenance and conservation of the historic buildings in the city. We note that given the small number of those willing to pay in principle, and the effect of this on reducing sample size, that the statistical power of validity testing using regression analysis on the city non-user sample is limited.

Table 3-15 Factors associated with non-user willingness to pay, as a one-off donation to preserve the historic city

	Canterbury	Lincoln	Winchester	York	Pooled city regression
Female	0.236	-0.110	0.008	0.182	0.090
Log age, using age midpoint	-0.066	0.316	-0.447*	0.114	0.036
Log income, using income midpoints	0.207*	0.241**	0.013	0.203	0.184***
Degree and above	-0.134	0.122	-0.309*	0.239	-0.040
With dependent children	-0.212	0.397*	-0.148	0.001	0.034
Selected heritage or arts in Top 5 of public spending	0.506***	0.222	0.618***	0.709***	0.549***
Member of heritage, conservation or environmental organisation	0.410*	-0.004	0.657***	0.470*	0.346***
Familiarity with city information (very or extremely familiar)	0.782**	-0.210	0.641	0.543	0.587***
Agree to 'There are more important things to spend money on than preserving heritage'	-0.294	-0.928***	-0.471***	-0.274	-0.455***
Constant	-0.912	-2.364*	2.861**	-1.680	-0.931
Observations	329	315	338	241	1223
Adjusted R2	0.102	0.141	0.159	0.091	0.101

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Reference group: for gender ref = male; for BAME ref = white; for education Degree and above ref = all qualifications under Degree; for Dependent children ref = no children; for Familiar with city information: Very/Extremely ref = not at all – moderately familiar. Sample restricted to residents in England aged 16 and over. Sample weighted by city non-user weights. Gross annual household income; averages computed using the midpoints of the income and age categories. We control for random differences in audio-*

[106] Bateman et al. 2002

visual information (use of male vs female voice). Heteroskedasticity-robust standard errors. All VIF scores <2 in pooled regression. Regression models significant at p<0.005.

In two of the four city non-user models, income is not significantly associated with log WTP. This contrasts with the findings of many previous CV studies of cultural institutions that individuals earning higher income are more likely to pay more to support cultural institutions.[107] However, it is not an uncommon finding when dealing with very small WTP amounts (e.g. our median WTP values vary between £1.25 and £4.50) that are unlikely to be constrained by income.

Non-use WTP is significantly associated with indicators of cultural engagement, which we would expect based on previous studies of cultural institutions. In the pooled model and three of the city models (Canterbury, Winchester and York) those who are members of heritage, conservation, environmental organisations or other organisations are associated with significantly higher mean non-use WTP.

Those who ranked spending on arts and heritage among their top 5 fiscal priorities are associated with significantly higher mean non-use WTP in all but one (Lincoln) model, while familiarity with information about the city is significantly and positively associated with mean non-use WTP in the pooled model and one city model (Canterbury).

Agreement with the statement that 'There are more important things to spend money on than preserving heritage' is significantly negatively associated with mean WTP in the pooled model and two city models (Lincoln and Winchester). This is the direction that we would expect the variable to interact with WTP, given that it is phrased in a negative way in relation to cultural value.

Sensitivity testing of follow up certainty questions is reported in Annex 6.5. Tests of model fit (Adjusted R^2) range between 0.10 and 0.16 for the individual city non-user models, and 0.10 for the pooled regression. Again, these measures of model fit are low within the city non-user models, which may suggest that WTP is influenced by low sample size, the high number of respondents who are not willing to pay in principle, and unobserved factors that we do not have data on and so cannot therefore be included in the models. Nonetheless, the adjusted R^2 values are comparable to those obtained from WTP regressions for valuing other cultural goods, such as the museum non-use WTP from the DCMS museums study (with the exception of the Ashmolean Museum).

3.2.5 Summary: City non-users' non-use value analysis

The mean non-use WTP for our four cities ranged from £5.32 to £7.30, which appears reasonable for annual donations. We note that the non-use values for the entire historic city are only a little higher than the individual museums evaluated in the DCMS museums study.

Mean and median WTP were lower among non-users than for users in all cases. This is as we would anticipate, based on theoretical expectations that users should hold higher values for a good or service than non-users.[108]

Validity tests indicate that the signs of the coefficients associated with non-use WTP results broadly conform to expectations, with cultural engagement variables significantly and positively associated with mean non-use WTP in multiple city models. Income is only significant in two of the four city models. Again, we believe that the variation in significance across individual historic city models may be driven by the low sample size of the individual models (at the minimum range of sample size for CV surveys in response to the demands for cost-effectiveness in data collection). The low statistical power of validity testing using regression analysis on the city non-user sample - as demonstrated by the low R^2 values for model fit - may have impacts on the applicability of the function transfer approach for non-use values in subsequent transfer testing in Section 4 . The low statistical power of the regressions may be driven by the small sample of non-users who were willing to pay, and the high proportion who were not willing to pay in principle.

[107] Noonan 2003
[108] Bateman et al. 2002

3.3 Cathedral users

3.3.1 Socio-demographics

Table 3-16 shows the sample sizes of cathedral users by the cathedrals visited. The sample was relatively balanced across cathedrals, with the highest number of users from York Minster (304) and the lowest number from Lincoln Cathedral (246). Note that some respondents (n=72) who had given a positive value for the historic city, subsequently indicated that they did not wish to allocate part of that value to the cathedral. These individuals were coded as missing, because we cannot state for certain whether they have a specific positive value for the cathedral.

Table 3-16 Cathedral users sample

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster	Total
Cathedral Users 	295	246	268	304	1113

Table 3-17 and Table 3-18 summarise the key socio-demographic characteristics across the four cathedral user study groups, both weighted and unweighted.

The unweighted socio-demographic characteristics for the cathedral user survey samples show that a higher proportion of respondents in the sample are female across all four cathedral user groups. The average age of respondents ranged from 40-43. When we applied weighting (Table 3-18), the proportion of females was adjusted slightly downwards for three of the cathedrals (except for Winchester, where it went up by 0.9 percentage points). Average age remained virtually unchanged (41-43 years old). Note that cathedral user weights are not based on age or gender, and only account for the number of cathedrals visited by the respondent.

The unweighted socio-demographic characteristics show that the average annual household income of respondents ranged from £34k to £41k. Between 33% (Lincoln) to 49% (Canterbury) were university educated, while the majority across all four cathedrals were in employment (65%-77%) and in good health (70%-78%). The highest proportion of cathedral users living in London existed within the Canterbury sample (23%), while the lowest was within the York and Canterbury sample (6%). Between 22% (York) and 28% (Winchester) were members of a heritage, conservation, environmental or other organisation.

Table 3-17 Cathedral user socio-demographic characteristics (unweighted)

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Female % (n/N)	63.1% (186/295)	68.7% (169/246)	65.7% (176/268)	63.5% (193/304)
Mean age (standard deviation)	40 (15)	43 (17)	41 (16)	43 (16)
Mean household annual income (standard deviation)	£40,643 (£30,291)	£33,996 (£22,757)	£37,393 (£25,340)	£35,458 (£21,659)
Dependent children under 16 years % (n/N)	36.4% (107/294)	35.8% (88/246)	33.1% (88/266)	40.6% (123/303)
Married/with partner % (n/N)	48.1% (140/291)	48.4% (119/246)	43.1% (115/267)	47.7% (144/302)
University education % (n/N)	49.1% (143/291)	32.9% (81/246)	45.1% (121/268)	41.9% (127/303)
In employment (full-time, part-time, self-employed) % (n/N)	77.1% (226/293)	65.4% (161/246)	74.6% (200/268)	71.4% (217/304)

Living in London % (n/N)	22.7% (67/295)	6.1% (15/246)	12.7% (34/268)	6.3% (19/304)
Current resident % (n/N)	6.1% (18/295)	10.6% (26/246)	4.9% (13/268)	0.0% (0/304)
Health (is good, very good, excellent) % (n/N)	75.9% (221/291)	70.3% (173/246)	77.5% (207/267)	71.3% (216/303)
Member of any heritage, conservation, environmental or other organisation % (n/N)	26.8% (79/295)	26.4% (65/246)	28.0% (75/268)	22.0% (67/304)
Religious % (n/N)	62.4% (176/282)	52.9% (127/240)	57.4% (151/263)	57.4% (171/298)
Practicing religion % (n/N)	28.6% (78/273)	18.0% (42/233)	28.0% (71/254)	18.9% (55/291)

Notes: Income is measured as gross annual household income. Age and income averages are computed using the midpoints of the income and age categories.

In all subsequent tables in section 3.3 (Table 3-18 onwards) we report only cathedral user weighted figures.

Table 3-18 Cathedral user socio-demographic characteristics (weighted)

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Female %	60.8%	65.6%	66.6%	63.1%
Mean age (standard deviation)	42 (15)	43 (17)	41 (16)	42 (15)
Mean household annual income (standard deviation)	£41,288 (£29,932)	£35,059 (£23,065)	£39,659 (£27,407)	£36,537 (£23,288)
Dependent children under 16 years %	38.3%	36.9%	34.2%	41.6%
Married/with partner %	51.4%	47.9%	42.4%	48.2%
University education %	52.1%	34.6%	47.3%	43.7%
In employment (full-time, part-time, self-employed) %	78.0%	67.2%	74.1%	73.0%
Living in London %	21.2%	6.7%	14.4%	7.9%
Current resident %	4.9%	9.0%	4.0%	0.0%
Health (is good, very good, excellent) %	75.4%	70.8%	79.1%	71.9%
Member of any heritage, conservation, environmental or other organisation %	31.4%	30.8%	31.8%	24.6%
Religious %	61.7%	55.6%	57.1%	57.6%
Practicing religion %	29.3%	19.5%	29.1%	20.4%

Notes: Income is measured as gross annual household income. Age and income averages are computed using the midpoints of the income and age categories. Sample weighted by cathedral user weights (see Annex 6.7).

3.3.2 Cathedral usage

Table 3-19 summarises information about visits to each of the four cathedrals within the cathedral user samples (where a user is defined by having visited the cathedral in the last 3 years).

The majority of cathedral visitors (84%-96%) in the sample were city visitors (as opposed to city residents) which reflects the higher proportion of visitors in the city user sample (see Section 3.1.2). 12%-18% of cathedral users across all 4 cities were very or extremely familiar with information regarding the cathedral.

The results show that between 5% (Winchester) and 9% (Lincoln and York) of the cathedral users had visited the cathedral more than six times in their lifetime. A small proportion regularly attended services in the cathedral (3% in the case of York Minster, and between 11%-16% for the other cathedrals).

The information on entry fees reveals that the average Canterbury cathedral user paid a fee of £8.33 on their last visit, compared to £4.20 paid by Winchester cathedral users. This is likely to be driven by a larger proportion of cathedral users in Winchester entering the cathedral for free (66%) compared to Canterbury (54%).

In the case of Canterbury Cathedral, we have real-world data on cathedral donations to compare against reported donations (those who had actually donated to Canterbury Cathedral on a previous trip). We see that the average annual amount donated to Lincoln cathedral users in 2017 (among those who donated) was £118.55, around double the average amount that was reported by the 12 Canterbury Cathedral users who had donated to the cathedral in 2017 within our sample (£53.55).

In Canterbury, Lincoln, and Winchester Cathedral, over half of the cathedral users indicated that they had visited another cathedral in the past 12 months. Between 29% (York) and 60% (Lincoln) of cathedral users stated that they walk past the cathedral on a regular basis.

Table 3-19 Cathedral user sample usage information

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Visited the cathedral more than six times in lifetime %	6.1%	9.2%	5.1%	9.4%
Visited city in past 3 years %	85.2%	83.6%	85.6%	96.3%
Residents (current and former)	14.8%	16.4%	14.4%	3.7%
Familiar with cathedral information %	17.8%	15.6%	11.8%	12.8%
Regularly attends services %	16.0%	11.1%	15.8%	2.8%
Average entry fee for last visit (standard deviation)	£8.33 (£19.22)	£5.53 (£15.26)	£4.20 (£9.49)	£4.84 (£6.97)
Entered cathedral for free %	53.5%	61.5%	66.0%	60.7%
Has a personal connection to cathedral %	5.2%	6.1%	8.4%	5.1%
Regularly donates to cathedral %	5.6%	4.8%	5.4%	1.6%
Average amount donated in 2017 (standard deviation)	£53.55 (£111.94)	£166.50 (£284.33)	£40.90 (£35.65)	£44.00 (£41.38)
Regularly sees cathedral %	53.4%	59.7%	46.2%	28.6%
Visited other cathedral in past 12 months %	53.4%	57.4%	54.1%	48.7%

Notes: Sample weighted by cathedral user weights.

3.3.3 Attitudes

Attitudes towards culture and heritage are depicted for each sub-sample of cathedral users in Table 3-20. The table shows a high rate of participation and engagement with culture and heritage. Across all four cathedrals, at least 90% of respondents had been to a cultural/historic site or cultural entertainment event in the last 12 months. Between 86% and 92% had been taken to museums and galleries as a child. Between 44% and 51% of respondents placed arts, culture & heritage amongst the 5 top priorities for public spending.

In terms of agreement questions, a large majority of respondents across all cathedral user groups agreed or strongly agreed that preserving cathedrals for the appreciation of current and future generations is important (85%-90%) and the

historic character of the city has a value even for those who do not visit (79%-84%), while 76-77% of respondents agreed or strongly agreed that visiting heritage sites increases one's wellbeing. A small proportion of respondents (15%-21%) agreed or strongly agreed with the negative statement that there are more important things to spend money on than preserving heritage.

Table 3-20 Cathedral user attitudes towards culture and heritage

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Been to a cultural or historic site in last 12 months %	99.3%	98.2%	98.7%	99.0%
Been to a cultural entertainment event in last 12 months %	91.2%	91.0%	90.9%	89.5%
Taken to museums, heritage sites or galleries as a child %	88.2%	87.2%	91.8%	86.1%
Selected heritage or arts in Top 5 of public spending %	50.1%	43.8%	51.2%	48.8%
[Cathedral] is a national treasure to be preserved for future generations %	86.9%	88.7%	84.8%	89.5%
The historic character of [City] has a value even for those who do not visit %	79.6%	84.4%	78.6%	84.3%
There are more important things to spend money on than preserving heritage %	19.0%	18.2%	15.2%	20.9%
Visiting heritage sites increases one's wellbeing (happiness) %	76.2%	76.2%	76.7%	76.7%

Notes: Sample weighted by cathedral user weights.

3.3.4 WTP summary statistics (cathedral use values)

Table 3-21 shows the proportion of cathedral users who indicated that they were in principle willing to reduce the damage caused by climate change, improve the maintenance and conservation of the cathedral, and reduce the risk of irreparable damage and closure of the building. Recall that respondents (n=72) who had given a positive WTP value for the historic city but indicated that they did not wish to allocate any of that value to the cathedral were coded as missing.

We see that in all cases, a high proportion of cathedral users were in principle willing to pay (Yes or Maybe) a one-off donation to preserve the cathedral. 75.9% were definitely or maybe willing to pay in principle for Canterbury Cathedral, 77.9% for Lincoln Cathedral, 72.8% for Winchester Cathedral and 72.2% for York Minster. The proportion who responded 'yes' and 'maybe' to the willing to pay in principle question is evenly split for all cathedrals. As such, over half of the sample were not, or only maybe, willing to pay in principle.

We note that the willingness to pay in principle question is slightly different for those answering the allocation question (asking if they would be willing to allocate part of the donation they gave for the historic city to the cathedral), as those who answered 'no' to the allocation in principle question were assigned a missing value (because we could not infer a positive or negative value specific to the cathedral for these individuals). The effect of this coding decision is explored in sensitivity analysis in Annex 6.8 (see summary in Section 3.3.6). We note that this recoding to missing produces a slight upward bias, driving a higher proportion of willing to pay in principle for the cathedral across the remaining sample.

Table 3-21 Cathedral user willingness to pay in principle

WTP	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Yes	37.2%	39.7%	36.4%	33.5%
Maybe	38.7%	38.2%	36.4%	38.7%

No	24.1%	22.1%	27.3%	27.7%

Notes: All summary WTP statistics calculated as combination of allocation and independent WTP. Sample weighted by cathedral user weights. Respondents (n=72) who had given a positive value for the historic city indicated that they did not have any preference for allocation of that value to the cathedral were coded as missing, because we cannot state for certain whether they have a specific positive value for the cathedral (further sensitivity analysis of these respondents provided in Annex 6.8).

The mean WTP of users was between £6.66 (median £2.81) for York Minster and £8.05 (median £3.33) for Lincoln Cathedral. The mean WTP for Canterbury Cathedral was £7.00 (median £3.30) and £7.98 (median £3.66) for Winchester Cathedral. These WTP values are within the range of expected values, based on prices charged for special exhibitions and paid museums in England and comparable to use values estimated in previous studies for the Natural History Museum (£6.65) and Tate Liverpool (£10.83).[109]

Overall the proportion of zero responses (including those not willing to pay in principle) was higher (22%-29%) than for museum users in our earlier museums study (where zero responses were 10% and below), but in line with findings from other CV studies in the cultural sector (e.g. 20-30% in the NHM/Tate Liverpool study). The proportion of 'payment card' zero WTP answers was low (those that states 'yes' or 'maybe' to the in-principle question and went in to express a zero WTP), at 1% or below. We note that this may be driven by the nature of the allocation slider format, which may discourage people from selecting a 0% response.

Table 3-22 Cathedral user mean and median use Willingness to pay (one-off donation): Combined allocation and independent elicitation methods

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Mean (standard error)	£7.00 (£0.76)	£8.05 (£1.05)	£7.98 (£1.48)	£6.66 (£1.08)
95% CI low	£5.51	£5.98	£5.06	£4.53
95% CI high	£8.48	£10.12	£10.89	£8.78
Median	£3.30	£3.33	£3.66	£2.81
Max	£111.4	£124.3	£131.3	£87.8
Zeros (including those not WTP in principle)	25.1%	22.6%	28.6%	28.8%
Payment card zeros (among respondent who state that they are WTP in principle)	1.0%	0.5%	1.3%	1.0%

Notes: Allocation WTP values are calculated from the city WTP as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Allocation WTP statistics calculated with 'No' at allocation principle coded missing. Independent WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Sample weighted by cathedral user weights.

We provide separate WTP results for those who answered the allocation question (assigning a proportion of their initial city WTP specifically to the cathedral) and those who independently valued the cathedral (because they had not given a positive value for the initial city WTP question). Those who had already previously stated a positive WTP for the preservation of the historic city (Table 3-23) had a higher WTP when asked to allocate part of that donation to the cathedral than those who had previously given a non-positive value for the historic city and were asked to pay an independent donation just for the cathedral (Table 3-24). This is to be expected for two reasons. First, the willingness to pay to preserve the historic character of the city is an indicator for people who hold higher values for cultural heritage in general, and these individuals would be expected to give a higher value for the cathedral. The allocation sample is therefore based on those who self-selected into paying to preserve cultural heritage in the first question and is a proportion of that stated value. Second, the cathedral is itself one of the historic buildings in the city, and in many cases is the oldest and most iconic from among them. Therefore, when asked their willingness to allocate specifically to the cathedral, we would expect that a higher proportion of the value that people hold for the historic city as a whole would be allocated to the cathedral, than to other historic buildings. We do note, however, that the second allocation question

[109] Bakhshi et al. 2015

may introduce some focusing bias, whereby respondents are being drawn to think about the cathedral, and that this leads to them allocating a larger proportion of their WTP to it. In contrast, those who gave a non-positive WTP in the city question also had a high zero response rate (88% and above) which reflects the opposite selection effect, with those who indicated that they do not hold values for cultural heritage confirming this through their unwillingness to pay for the cathedral independently.

In addition, we note that the mean WTP elicited for the cathedral via the allocation method is higher than the mean WTP elicited for the historic city from the total user sample. This is because the two values are not comparable, as the historic city WTP includes zero responses, while the allocation method only applies to non-zeros. This is one of the limitations of the allocation elicitation method that should be considered going forward.

Table 3-23 Cathedral user mean and median use Willingness to pay (one-off donation): Allocation elicitation method only

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Mean (standard error)	£9.29 (£0.97)	£10.50 (£1.35)	£11.34 (£2.09)	£9.52 (£1.51)
95% CI low	£7.39	£7.84	£7.21	£6.54
95% CI high	£11.20	£13.17	£15.47	£12.50
Median	£5.22	£5.27	£5.50	£4.79
Max	£111.4	£124.3	£131.3	£87.8
Zeros (including those not WTP in principle)	0.7%	0.0%	0.0%	0.4%
Payment card zeros (among respondent who state that they are WTP in principle)	0.7%	0.0%	0.0%	0.4%

Notes: Allocation WTP values are calculated from the city WTP as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Allocation WTP statistics calculated with 'No' at allocation principle coded missing. Sample weighted by cathedral user weights.

Table 3-24 Cathedral user mean and median use Willingness to pay (one-off donation): Independent donation elicitation method only

WTP in principle	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Mean (standard error)	£0.64 (£0.31)	£0.83 (£0.37)	£0.94 (£0.35)	£0.70 (£0.31)
95% CI low	£0.02	£0.09	£0.25	£0.09
95% CI high	£1.26	£1.57	£1.62	£1.32
Median	£0.00	£0.00	£0.00	£0.00
Max	£22.5	£22.5	£22.5	£32.5
Zeros (including those not WTP in principle)	92.7%	88.9%	88.4%	87.9%
Payment card zeros (among respondent who state that they are WTP in principle)	1.8%	2.0%	4.1%	2.4%

Notes: Independent WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Sample weighted by cathedral user weights.

3.3.5 Validity testing: WTP determinants

As described in Section 2.4.2 we checked the theoretical validity of our results by testing if cathedral users' WTP (as a one-off donation on behalf of their household to reduce the damage caused by climate change, improve the maintenance

and conservation of the cathedral, and reduce the risk of irreparable damage and closure of the building) is associated with different socio-demographic, behavioural (number of visits i.e. usage and knowledge) and attitudinal factors that are theoretically expected to drive WTP.

Our choice of independent variables followed those used for city users. We also included a control for those who allocated part of their city WTP value to the cathedral, to account for differences in WTP that may be associated with the difference in elicitation method. We note that given the small number of those willing to pay in principle, and the concurrent impact this has on sample size, the statistical power of validity testing using regression analysis on the cathedral non-user sample will be limited.

Table 3-25 shows the results for cathedral visitor use WTP in terms of their willingness to pay a one-off donation to help preserve the cathedral, controlling for a range of factors.

Table 3-25 Factors associated with cathedral users WTP, as a one-off donation to help preserve the cathedral

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster	Pooled cathedral regression
Dummy for cathedral elicitation method: 1=Allocation of city WTP; 0=Independent cathedral WTP	1.665***	1.657***	1.706***	1.544***	1.612***
Female	-0.158	-0.144	0.294***	-0.070	-0.029
Log age, using age midpoint	0.029	0.265	0.049	0.025	0.112
Log income, using income midpoints)	0.115*	0.044	0.189**	0.052	0.104**
Degree and above	0.220**	-0.123	-0.003	0.140	0.055
With dependent children	0.236**	-0.022	0.099	0.410***	0.177***
Selected heritage, arts, or environment in Top 5 of public spending	0.069	0.169	0.423***	0.346***	0.237***
Cathedral - # of visits in lifetime	0.017	0.130**	0.075	0.041	0.053**
Familiarity with cathedral information (very or extremely familiar)	-0.021	0.268	0.123	0.325*	0.140
Agree to 'Visiting heritage sites increases one's wellbeing (happiness)'	0.223**	0.209	-0.036	0.059	0.138**
Log distance: Home postcode to cathedral	-0.072*	0.029	0.090	-0.017	-0.014
Constant	-1.071	-1.710	-2.928**	-0.749	-1.573***
Observations	268	233	246	273	1020
Adjusted R2	0.537	0.420	0.550	0.539	0.495

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Reference group: for gender of audio information ref = male; for gender ref = male; for BAME ref = white; for education Degree and above ref = all qualifications under Degree; for Dependent children ref = no children; for Familiar with city information: Very/Extremely ref = not at all – moderately familiar. Sample restricted to residents in England aged 16 and over. Gross annual household income; averages computed using the midpoints of the income and age categories. We control for random differences in audio-visual information (use of male vs female voice). Heteroskedasticity-robust standard errors. All VIF scores <2 in pooled regression. Respondents (n=72) who had*

given a positive value for the historic city indicated that they did not have any preference for allocation of that value to the cathedral were coded as missing (further sensitivity analysis of these respondents provided in Annex 6.8). Regression models significant at p<0.005.

Table 3-25 allows us to assess whether WTP is associated with theoretically consistent drivers of value in ways that accord with prior expectations and previous findings from the literature.[110] In the best-fit pooled regression (Table 3-25, last column), income is significantly and positively associated with log WTP. In the cathedral-level models, income is only significantly associated with WTP in two cases (Canterbury and Winchester).

Gender, age, and distance between the respondent's home postcode and the cathedral are not associated with log WTP in the pooled model. Familiarity with information about the cathedral is not significantly associated with WTP in any model except for York.

Cathedral engagement is significantly associated with higher log WTP: Those who visited the cathedral more often in their lifetime report significantly higher mean WTP on average in one cathedral model (Lincoln Cathedral) and in the pooled model.

We find a significant association between prioritisation attached to public spending on arts, culture and heritage and mean WTP in the pooled model and two cathedral models (Winchester Cathedral and York Minster).

In addition, respondents who agreed or strongly agreed that 'Visiting heritage sites increases one's wellbeing (happiness)' have a significantly higher mean WTP in the pooled regression and in one cathedral model (Canterbury Cathedral).

We find a strong and statistically significant association between mean WTP and elicitation methods, with respondents who answered the independent standalone payment for the cathedral stating lower WTP values on average, compared to those who allocated part of the overall city WTP. As outlined in Section 2.5.4, the allocation elicitation method is important as it avoids insensitivity to scope by preventing respondents from providing a higher WTP value for the cathedral alone than for the city as a whole (of which the cathedral is part). However, the inclusion of a dummy controlling for the difference in WTP associated with the allocation and independent cathedral WTP questions may also lead to information loss within our regression models, where this dummy variable drives much of the explanatory power of the cathedral WTP regression. These results indicate that the two elicitation methods (allocation and independent payment) are not comparable, due to the fact that the allocation method only applies to that portion of the city user population who gave a positive value to protect the historic city, while the independent payment is eligible for all those who were not willing to pay in principle to support the historic city.

Sensitivity testing of follow up certainty questions is reported in Annex 6.5. Tests of model fit (Adjusted R^2) are high, ranging between 0.42 and 0.55 for the cathedral user models, and 0.49 for the pooled regression (perfect model fit would be measured as 1.0).[111] These measures of model fit are therefore acceptable, considering that WTP is likely to be influenced by unobserved factors for which we do not have data, and which cannot therefore be included in the models. We note that the improved model fit found for cathedral user regressions may be due to the allocation dummy being such a strong predictor of WTP.

In Annex 6.8, we perform sensitivity analysis to explore how cathedral WTP results would have differed if we had taken a stricter interpretation and assumed that respondents who were not willing to allocate actually had a zero value for the preservation of the cathedral. Subjective analytical judgement had to be taken when considering how to deal with those respondents (n=175) who gave a positive value to the city WTP question, but indicated when asked that they would not be willing to allocate a specific proportion of their overall city WTP towards the maintenance and preservation of the cathedral. The original decision was made to code these respondents as 'missing' for the purposes of cathedral WTP analysis, to account for the fact that we do not know if these individuals had a zero value for the cathedral, or were

[110] Bateman et al. 2002

[111] For instance, the Natural History Museum (R2=0.11-0.19) and Tate Liverpool (R2=0.06-0.15); see Bakhshi et al. 2015. As noted by Eftec (2005) there is no commonly accepted threshold value for the *R2* statistic that denotes a bid function as having an acceptable power of explanation. However, at lower values (perhaps around 0.1) conclusions may be drawn that the WTP values from the sample population show very little in the way of distinguishable patterns (following Bateman et al., 2002).

simply happy for the cathedral to be protected as part of the automatic allocation of funds to the cathedral from the overall city-wide preservation measures. Coding these individuals as missing for the purpose of WTP calculations was chosen as the best available approach given the incomplete information we had about their preferences. However, we acknowledge that this may introduce some upward bias in the WTP results.

Overall, we see that all WTP values decrease slightly under sensitivity analysis (with cathedral allocation=No coded as £0 instead of missing). The range of mean WTP values across the four cathedrals becomes lower, ranging between £6.13 to £7.64, compared to a WTP range of £6.66 to £8.05 in Table 3-24. This is explained by the increased proportion of zero responses (including those not willing to pay in principle) (28-34% compared to 22%-29%).

Overall the goodness of fit of the cathedral WTP regression models decreases compared to the original models in Table 3-25. This fits our hypothesis that those individuals who state they do not wish to allocate their city WTP are less uniform and less predictable. Validity testing is unaffected, with the statistical significance of the factors associated with WTP consistent between the annex and the main report. This provides supporting evidence that the inclusion/exclusion of these respondents does not significantly change the behaviour of people's WTP within the sample.

A comparison of transfer errors shows that the maximum observed transfer error across all three methods (now 19.7%) still falls below the 40% threshold for transfer errors suggested in the literature. The simple unit transfer still performs best overall.

Consequently, we are satisfied that the choice of coding Allocation=No as missing in the cathedral use WTP calculations was appropriate, given that incomplete information we had about these individuals, and this is supported by sensitivity analysis showing that mean WTP does not increase greatly with their exclusion, and that goodness of model fit decreases when these individuals are coded as £0 in Annex 6.8.

3.3.6 Summary: Cathedral user use-value analysis

The mean WTP of cathedral users was between £6.66 and £8.05 across the four cathedrals. This is similar to the use values elicited for individual cultural sites in the earlier museums study, and comparable to use values estimated in previous studies.[112]

We note that the use of an allocation WTP question (where respondents allocate part of their historic city WTP just to the cathedral), meant that we excluded those individuals (n=72 across all cathedral users) who were not willing in principle to allocate part of their historic city donation to the cathedral (in other words, 'no' responses to the cathedral allocation in principle question are coded as missing). In the absence of clear data on their preferences for funding of cathedral conservation measures, we assume that those who answer 'no' to this question do not necessarily have a zero value for the cathedral (they may simply be happy with the automatic allocation of funds to the cathedral from the overall city-wide preservation measures). By recoding these individuals as missing, we avoid mis-estimation of cathedral WTP. An alternative approach could have been to assign a fixed proportion of their WTP based on the total number of historic buildings present in the city, which would assume that the cathedral holds equal weight as any other historic building. However, this would require decisions to be made about the classification of buildings in the city as composing the 'historic character' of the city for which external information was not available, and for which no provision was made in the hypothetical scenario. This would have resulted in a higher estimation for the cathedral allocation WTP value. We therefore selected the option of recoding no in principle responses as missing as the most appropriate approach to avoid either over or underestimation of cathedral WTP.

When we investigated WTP values as provided via the two different elicitation methods, those who answered the allocation method had a higher WTP compared to the independent donation just for the cathedral. We would expect that a higher proportion of the value that people hold for the historic city overall would be allocated to the cathedral, than to other historic buildings. We do note, however, that the second allocation question may introduce some focusing

[112] Bakhshi et al. 2015

bias, whereby respondents are being drawn to think about the cathedral, and that this leads to them allocating a larger proportion of their WTP to it.

Validity tests indicate that the signs of the coefficients associated with cathedral WTP results broadly conform to expectations, being positively and significantly associated with priorities for public spending and past usage of the cathedral under study (in one case study and the pooled regression).

We found that the cathedral models had better R^2 measures of model fit than the city models. However, the improved model fit found for cathedral user regressions may be due to the allocation dummy being a strong predictor of WTP. Income is significantly associated with WTP in only two cathedral user models, which reduces the confidence around the cathedral user WTP samples, which may have impacts on the applicability of the function transfer approach for non-use values in subsequent transfer testing in Section 4 .

3.4 Cathedral non-users

3.4.1 Socio-demographics

Table 3-26 shows the sample sizes of cathedral non-users split by cathedral. The overall sample was relatively balanced across cathedrals, with the highest number of non-users from Winchester and the lowest number from York. As in Section 3.3, respondents who had given a positive value for the historic city but indicated that they did not wish to allocate part of that value to the cathedral were coded as missing because we cannot state for certain whether they have a specific positive value for the cathedral.

Table 3-26 Cathedral non-users sample

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster	Total
Cathedral non-users 	416	408	426	367	1617

Table 3-27 and Table 3-28 summarise the key socio-demographic characteristics across the four cathedral non-user samples, both weighted and unweighted.

The unweighted socio-demographic characteristics for the cathedral non-user survey samples show that a higher proportion of respondents were male across all four cathedral non-user groups. The average age ranged from 45-47. We weighted the sample of non-users for each cathedral to make it representative of the general population. When we applied weighting (Table 3-28), the proportion of females was adjusted upwards for (up to 54% in York). Average age remained unchanged in the weighted cathedral non-user survey sample.

The unweighted socio-demographic characteristics show that the average annual household income was approximately £31k across all four cathedral non-user sample groups. Between 30% (Lincoln) to 35% (Canterbury) were university educated, while the majority of respondents across all four cathedral non-user groups were in employment (52%-57%), married/with partner (39%-48%) and in good health (61%-69%). The highest proportion of cathedral non-users living

in London existed within the York sample (13%), while the lowest was within the Lincoln sample (9%). Between 15% (York) and 19% (Lincoln) were members of a heritage, conservation, environmental or other organisation.

Table 3-27 Cathedral non-user socio-demographic characteristics (unweighted)

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Female % (n/N)	35.6% (148/416)	41.4% (169/408)	40.8% (174/426)	47.4% (174/367)
Mean age (standard deviation)	47 (16)	46 (17)	46 (16)	45 (18)
Mean household annual income (standard deviation)	£30,952 (£22,981)	£30,638 (£22,196)	£31,202 (£21,308)	£30,552 (£25,895)
Dependent children under 16 years % (n/N)	27.4% (114/416)	25.6% (104/407)	28.6% (121/423)	26.7% (98/367)
Married/with partner % (n/N)	47.5% (197/415)	39.9% (162/406)	41.6% (176/423)	38.6% (141/365)
University education % (n/N)	34.8% (143/411)	30.0% (122/407)	33.2% (141/425)	33.9% (124/366)
In employment (full-time, part-time, self-employed) % (n/N)	54.8% (227/414)	56.3% (229/407)	56.8% (241/424)	51.5% (188/365)
Living in London % (n/N)	10.3% (43/416)	9.1% (37/408)	9.4% (40/426)	12.8% (47/367)
Current resident % (n/N)	1.7% (7/416)	1.2% (5/408)	0.7% (3/426)	0.3% (1/367)
Living in local region %	18.8% (78/416)	11.5% (47/408)	19.2% (82/426)	10.9% (40/367)
Health (is good, very good, excellent) % (n/N)	63.5% (263/414)	61.2% (249/407)	64.5% (274/425)	69.2% (254/367)
Member of any heritage, conservation, environmental or other organisation % (n/N)	17.3% (72/416)	18.6% (76/408)	16.4% (70/426)	15.0% (55/367)
Religious % (n/N)	46.4% (189/407)	49.4% (199/403)	50.1% (212/423)	51.3% (183/357)
Practicing religion % (n/N)	15.4% (61/396)	15.3% (60/392)	12.7% (52/408)	16.4% (57/347)

Notes: Gross annual household income; averages computed using the midpoints of the income and age categories. Sample restricted to residents in England aged 16 and over

In all subsequent tables in section 3.4 (Table 3-28 onwards), we report only nationally representative weighted figures.

Table 3-28 Cathedral non-user socio-demographic characteristics (weighted)

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Female %	46.5%	49.6%	49.9%	53.7%
Mean age (standard deviation)	46 (17)	45 (18)	46 (17)	47 (18)

Mean household annual income (standard deviation)	£31,074 (£23,595)	£32,887 (£26,196)	£32,332 (£22,058)	£30,578 (£25,647)
Dependent children under 16 years %	25.4%	25.1%	29.7%	22.5%
Married/with partner %	44.6%	38.6%	38.8%	39.1%
University education %	32.9%	27.5%	32.5%	34.3%
In employment (full-time, part-time, self-employed) %	53.7%	52.6%	54.6%	48.3%
Living in London %	16.1%	11.6%	14.9%	17.6%
Current resident %	1.5%	1.7%	0.8%	0.2%
Living in local region	16.5%	8.9%	16.3%	11.6%
Health (is good, very good, excellent) %	64.0%	64.1%	65.4%	69.5%
Member of any heritage, conservation, environmental or other organisation %	15.7%	18.7%	17.7%	21.0%
Religious %	47.0%	50.5%	50.6%	54.4%
Practicing religion %	15.8%	15.0%	15.8%	20.0%

Gross annual household income; averages computed using the midpoints of the income and age categories. Sample weighted by cathedral non-user weights

3.4.2 Attitudes

Attitudes towards culture and heritage are depicted for each cathedral non-user sample in Table 3-29. The table shows a high rate of participation and engagement with culture and heritage among non-users. Across non-users of all four cathedrals, between 70% and 83% of respondents had been to a cultural/historic site or cultural entertainment event in the last 12 months. Between 79% and 83% had been taken to museums and galleries as a child. Between 25% and 37% of respondents placed arts, culture & heritage among the 5 top priorities for public spending.

In terms of agreement questions, we find that a majority of respondents across all cathedral non-user groups agreed or strongly agreed that preserving cathedrals for the appreciation of current and future generations is important and that the historic character of the city has a value even for those who did not visit. A small proportion of respondents (17%-23%) agreed or strongly agreed with the negative statement that there are more important things to spend money on than preserving heritage and 63%-70% of respondents agreed or strongly agreed that visiting heritage sites increases one's wellbeing.

Table 3-29 Cathedral non-user attitudes towards culture and heritage

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Been to a cultural or historic site in last 12 months %	75.3%	82.5%	80.2%	83.1%
Been to a cultural entertainment event in last 12 months %	73.6%	70.4%	78.0%	71.9%
Taken to museums, heritage sites or galleries as a child %	81.0%	82.8%	82.5%	78.8%
Selected heritage or arts in Top 5 of public spending %	25.0%	30.7%	28.1%	36.6%
[Cathedral] is a national treasure to be preserved for future generations %	67.4%	63.1%	69.7%	75.4%

The historic character of [City] has a value even for those who do not visit %	59.4%	57.5%	56.7%	71.6%
There are more important things to spend money on than preserving heritage %	22.3%	19.3%	23.0%	17.0%
Visiting heritage sites increases one's wellbeing (happiness) %	64.4%	69.7%	63.2%	67.4%

Sample weighted by cathedral non-user weights.

3.4.3 WTP summary statistics (non-use values)

Table 3-30 shows the proportion of cathedral non-users who indicated that they were in principle willing to pay a one-off donation to reduce the damage caused by climate change, improve the maintenance and conservation of the cathedral, and reduce the risk of irreparable damage and closure of the building.

We see that in most cases, over half of the sample of cathedral non-users were in principle willing to pay ('yes' or 'maybe') a one-off donation to preserve the cathedral. 59.7% were willing to pay in principle for Canterbury Cathedral, 60.5% for Winchester Cathedral, 59.5% for York Minster and 52.9% for Lincoln Cathedral. However, the figures show that the majority of these were 'maybe' willing to pay (33%-37%). Around a quarter responded 'yes' to being willing to pay in principle. The highest proportion of respondents (between 40%-47%) were not willing to pay. This may impact on the statistical power of the regressions used in the subsequent validity testing section, as it provides a rather small sample of respondents who were willing to pay (less than a quarter).

A higher proportion of non-users were willing to pay in principle for the cathedral alone (around a quarter) than for the city (10-17% amongst city non-users). However, the willingness to pay in principle question is slightly different for those answering the allocation question (asking if they would be willing to allocate part of the donation they gave for the historic city). Further, those who answered 'no' to the allocation in principle question were assigned a missing value and it is likely that this recoding as missing is driving the higher proportion of willing to pay in principle for the cathedral, than any special status accorded to the cathedrals within these cities.

Table 3-30 Cathedral non-user willingness to pay in principle

WTP	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Yes	23.0%	20.0%	23.4%	25.2%
Maybe	36.7%	32.9%	37.1%	34.3%
No	40.3%	47.1%	39.4%	40.5%

Sample weighted by cathedral non-user weights. Respondents (n=103) who had given a positive value for the historic city indicated that they did not have any preference for allocation of that value to the cathedral were coded as missing (further sensitivity analysis of these respondents provided in Annex 6.8).

Table 3-31 shows the mean and median WTP of cathedral non-users to pay a one-off donation for their household to reduce the damage caused by climate change, improve the maintenance and conservation of the respective cathedral, and reduce the risk of irreparable damage and closure.

The mean WTP of non-users was between £3.27 (median £0.55) for Lincoln Cathedral and £4.20 (median £1.38) for York Minster. The mean WTP for Canterbury Cathedral was £3.63 (median £1.13) and £3.89 (median £1.10) for Winchester Cathedral. These WTP values include all no responses to the independent elicitation method as £0 bids and exclude no responses to the allocation elicitation method.

The proportion of 'payment card' zero WTP answers was low (those that stated yes or maybe to the in principle question and went on to express a zero WTP), between 0.0% and 0.9%. This is suggestive that the scenario presented was valued and realistic, and the range of payment amounts offered was credible and affordable.

Table 3-31 Cathedral non-user mean and median use Willingness to pay (one-off donation): Combined allocation and independent elicitation methods

	Canterbury	Lincoln	Winchester	York
Mean (standard error)	£3.63 (£0.38)	£3.27 (£0.35)	£3.89 (£0.40)	£4.20 (£0.51)
95% CI low	£2.89	£2.59	£3.11	£3.19
95% CI high	£4.37	£3.96	£4.67	£5.21
Median	£1.13	£0.55	£1.10	£1.38
Max	£67.5	£57.4	£112.5	£90.0
Zeros (including those not WTP in principle)	42.0%	47.5%	41.0%	41.5%
Payment card zeros (among respondent who state that they are WTP in principle)	1.8%	0.4%	1.5%	1.0%

Notes: All summary WTP statistics calculated as combination of allocation and independent WTP. Allocation WTP values are calculated from the city WTP as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Allocation WTP statistics calculated with 'No' at allocation principle coded missing. Independent WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Sample weighted by cathedral non-user weights.

We provide separate WTP results for those who answered the allocation question and those who independently valued the cathedral. Again, we see that those who were asked to allocate part of the donation they had provided for the historic city had higher WTP on average, and that the low WTP values for those who answered the independent donation question was driven by high proportion of £0 coded values from responses by those not willing to pay in principle to preserve the city.

Table 3-32 Cathedral non-user mean and median use Willingness to pay (one-off donation): Allocation elicitation method only

	Canterbury	Lincoln	Winchester	York
Mean (standard error)	£5.88 (£0.58)	£6.20 (£0.56)	£6.19 (£0.56)	£7.21 (£0.84)
95% CI low	£4.73	£5.09	£5.10	£5.57
95% CI high	£7.03	£7.31	£7.29	£8.86
Median	£3.08	£4.28	£4.07	£4.51
Max	£67.5	£57.4	£45.4	£90.0
Zeros (including those not WTP in principle)	0.0%	0.3%	0.7%	0.9%
Payment card zeros (among respondent who state that they are WTP in principle)	0.0%	0.3%	0.7%	0.9%

Allocation WTP values are calculated from the city WTP as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Allocation WTP statistics calculated with 'No' at allocation principle coded missing). weighted by cathedral non-user weights.

Table 3-33 Cathedral non-user mean and median use Willingness to pay (one-off donation): Independent payment elicitation method only

	Canterbury	Lincoln	Winchester	York
Mean (standard error)	£1.02 (£0.39)	£0.40 (£0.13)	£0.95 (£0.42)	£0.44 (£0.19)
95% CI low	£0.26	£0.14	£0.12	£0.07
95% CI high	£1.79	£0.66	£1.78	£0.81

Median	£0.00	£0.00	£0.00	£0.00
Max	£32.5	£22.5	£112.5	£11.0
Zeros (including those not WTP in principle)	90.8%	93.8%	92.5%	92.3%
Payment card zeros (among respondent who state that they are WTP in principle)	3.8%	0.4%	2.7%	1.2%

Independent WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Summary statistics calculated with inclusion of 'No' at payment principle (coded £0). Sample weighted by cathedral non-user weights.

3.4.4 Validity testing: WTP determinants

We checked the theoretical validity of our results by testing if cathedral non-users' WTP (as a one-off donation on behalf of their household to reduce the damage caused by climate change, improve the maintenance and conservation of the cathedral, and reduce the risk of irreparable damage and closure of the building) is associated with socio-demographic, and behavioural and attitudinal factors that are expected to drive WTP. Again, we included controls for those who allocated part of their city WTP value to the cathedral, to account for differences in WTP associated with the difference in elicitation method between those who allocated part of their positive value given for the city WTP question, and those that did not give a positive value for the historic city WTP question and therefore answered an independent cathedral WTP question. We note that given the small number of those willing to pay in principle, and the impact this has on sample size, the statistical power of validity testing using regression analysis on the cathedral non-user sample will be limited.

Our choice of independent variables followed those used for city non-users.

Table 3-34 shows the results for cathedral non-users WTP in terms of their willingness to pay a donation, controlling for a range of factors (again, including their mode of elicitation, whether an allocation of the original amount they agreed to pay to preserve the historic city, or as an independent standalone payment for the cathedral only (for those who had not positive WTP for the historic city)).

Table 3-34 Factors associated with cathedral non-users WTP, as a one-off donation to preserve the cathedral

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster	Pooled cathedral regression
Dummy for cathedral elicitation method: 1=Allocation of city WTP; 0=Independent cathedral WTP	1.313***	1.465***	1.453***	1.482***	1.426***
Female	-0.015	-0.048	0.060	0.125	0.024
Log age, using age midpoint	0.208*	0.065	-0.047	0.122	0.112**
Log income, using income midpoints)	0.169**	0.063	0.093	0.152**	0.121***
Degree and above	-0.134	-0.026	0.032	0.148	0.015
With dependent children	-0.069	0.031	-0.127	0.253*	0.011
Member of heritage, conservation or environmental organisation	0.229**	0.030	0.084	0.249**	0.148***
Familiarity with cathedral information (very or extremely familiar)	-0.010	0.327	0.177	0.098	0.112
Agree to 'There are more important things to spend money on than preserving heritage'	-0.294***	-0.143**	-0.108	0.122	-0.123**

Constant	-2.154***	-0.670	-0.588	-2.076***	-1.476***
Observations	392	382	392	343	1509
Adjusted R2	0.495	0.578	0.511	0.590	0.537

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Reference group: for gender ref = male; for BAME ref = white; for education Degree and above ref = all qualifications under Degree; for Dependent children ref = no children; for Familiar with city information: Very/Extremely ref = not at all – moderately familiar. Sample restricted to residents in England aged 16 and over. Gross annual household income; averages computed using the midpoints of the income and age categories. We control for random differences in audio-visual information (use of male vs female voice). Heteroskedasticity-robust standard errors. All VIF scores <2 in pooled regression. Respondents (n=103 across all cathedral non-users) who had given a positive value for the historic city indicated that they did not have any preference for allocation of that value to the cathedral were coded as missing (further sensitivity analysis of these respondents provided in Annex 6.8). Regression models significant at p<0.005.*

Table 3-34 shows whether WTP is associated with theoretically consistent drivers of value in ways that accord with prior expectations and previous findings from the literature.[113] In the best-fit pooled regression (Table 3-34, last column) income is significantly and positively associated with log WTP. In the cathedral-level models, income is only significantly associated with WTP in two cases (Canterbury and York).

Familiarity with information about the cathedral is not significantly associated with mean WTP.

We find a significant positive association between being a member of a heritage, conservation or environmental organisation and mean WTP in two cathedral-level models (Canterbury and York) and in the pooled model.

Agreement with the statement that 'There are more important things to spend money on than preserving heritage' is significantly negatively associated with log WTP in two cathedral models (Canterbury and Lincoln) and the pooled model. This is the direction that we would expect the variable to interact with WTP, given that it is phrased in a negative way in relation to cultural value.

Again, there is a strong and statistically significant association between mean WTP and elicitation methods, with respondents who answer the independent standalone payment for the cathedral only stating higher WTP values on average, compared to those who allocated part of the overall city WTP.[114] As outlined in Section 3.3.5, the allocation method leads to information loss within our regression models, where the elicitation method dummy drives a large amount of the explanatory power of the cathedral WTP regression.

Sensitivity testing of follow up certainty questions is reported in Annex 6.5. Tests of model fit (Adjusted R^2) are high again for cathedral non-users, ranging between 0.50 and 0.59 for the individual cathedral non-user models, and 0.54 for the pooled regression (perfect model fit would be measured as 1.0).[115] These measures of model fit are therefore acceptable, considering that WTP is likely to be influenced by unobserved factors for which we do not have data, and which cannot therefore be included in the models. We note that the improved model fit found for cathedral user regressions (compared to the city user regressions) may be due to the allocation dummy being such a strong predictor of WTP.

In Annex 6.8, we perform sensitivity analysis to explore how cathedral WTP results would have differed if we had taken a stricter interpretation and assumed that non-users who were not willing to allocate actually had a zero value for the preservation of the cathedral.

Overall, we see that all WTP values decrease slightly under sensitivity analysis (with cathedral allocation=No coded as £0 instead of missing). The range of mean non-use WTP values across the four cathedrals becomes lower, ranging between

[113] Bateman et al. 2002

[114] Some respondents (n=103 across all cathedral non-users) who had given a positive value for the historic city indicated that they did not have any preference for allocation of that value to the cathedral. These individuals were coded as missing, because we cannot state for certain whether they have a specific positive value for the cathedral.

[115] for instance, the Natural History Museum (R2=0.11-0.19) and Tate Liverpool (R2=0.06-0.15); see Bakhshi et al. 2015

£3.07 to £3.91, compared to a WTP range of £3.27 to £4.20 in Table 3-31. This is explained by the increased proportion of zero responses (including those not willing to pay in principle) (43.6%-50.8% compared to 41.0%-47.5%).

Overall the goodness of fit of the cathedral WTP regression models decreases compared to the original models in Table 3-34. This fits our hypothesis that those individuals who state they do not wish to allocate their city WTP are less uniform and less predictable. Validity testing is unaffected, with the statistical significance of the factors associated with WTP consistent between the annex and the main report. This provides supporting evidence that the inclusion/exclusion of these respondents does not significantly change the behaviour of people's WTP within the sample.

A comparison of transfer errors shows that the maximum observed transfer error across all three methods (now 26.6%) still falls below the 40% threshold for transfer errors suggested in the literature. The simple unit transfer still performs best overall.

Consequently, we are satisfied that the choice of coding Allocation=No as missing in the cathedral non-use WTP analysis was appropriate, given that incomplete information we had about these individuals, and this is supported by sensitivity analysis showing that mean WTP does not increase greatly with their exclusion, and that goodness of model fit decreases when these individuals are coded as £0 in Annex 6.8.

3.4.5 Summary: Cathedral non-user non-use-value analysis

The mean WTP of cathedral non-users was between £3.27 and £4.20 across the four cathedrals. This accords with theoretical expectations, being positively and significantly associated with attitudes to culture (within the pooled cathedral non-user regression model).

As stated in Section 3.3.6, we excluded those individuals who were not willing in principle to allocate part of their historic city donation to the cathedral ('no' responses coded as missing). This option was chosen as the most appropriate approach to avoid either over or underestimation of cathedral WTP (see detailed sensitivity analysis in Annex 6.8.2).

Validity tests indicate that the signs of the coefficients associated with cathedral WTP results broadly conform to expectations, being positively and significantly associated with priorities for public spending and past usage of the cathedral under study (in one case study and the pooled regression).

In terms of the applicability of these models for subsequent transfer testing in Section 4 , we note that income is significantly associated with WTP in only two cathedral non-user models, which reduces the confidence around the cathedral non-user WTP samples while the improved model fit found for cathedral non-user regressions, similarly to the cathedral user regressions, may be due to the allocation dummy being a strong predictor of WTP.

3.5 Discussion of use and non-use-values

Table 3-35 summarises the main results from our study of the four cities and cathedrals: Canterbury (Canterbury Cathedral), Lincoln (Lincoln Cathedral), Winchester (Winchester Cathedral) and York (York Minster). Care must be taken when using and interpreting the range of values estimated.

Use and non-use value is measured as a WTP per person of a one-off donation to reduce the damage caused by climate change, improve the maintenance and conservation of the cathedral, and reduce the risk of irreparable damage and closure of the building. Users and non-users of the cities and cathedrals are weighted using the user and non-user weights outlined in Section 6.2 to ensure accurate representation of the target population. We exclude n=11 outlier responses who gave WTP values of £200 or more.

We interpret the values as a use or non-use value, but there could be some non-use elements within the use value and vice versa. We note the conceptual and practical difficulties of separating direct use and non-use value among visitors.[116] We cannot, therefore, exclude the possibility that use values capture some element of non-use value, and vice versa.

Table 3-35 Summary of use and non-use Willingness to Pay values

City user WTP or Use value	Canterbury	Lincoln	Winchester	York
Mean (standard error)	£9.74 (£1.01)	£9.64 (£1.19)	£9.96 (£1.31)	£9.18 (£0.83)
Median	£5.50	£5.50	£5.50	£5.50
City non-user WTP or Non-use value	**Canterbury**	**Lincoln**	**Winchester**	**York**
Mean (standard error)	£5.32 (£0.61)	£5.96 (£0.75)	£5.97 (£0.59)	£7.30 (£1.11)
Median	£1.25	£1.25	£4.50	£1.25
Cathedral user WTP or Use value	**Canterbury Cathedral**	**Lincoln Cathedral**	**Winchester Cathedral**	**York Minster**
Mean (standard error)	£7.00 (£0.76)	£8.05 (£1.05)	£7.98 (£1.48)	£6.66 (£1.08)
Median	£3.30	£3.33	£3.66	£2.81
Cathedral non-user WTP or Non-use value	**Canterbury Cathedral**	**Lincoln Cathedral**	**Winchester Cathedral**	**York Minster**
Mean (standard error)	£3.63 (£0.38)	£3.27 (£0.35)	£3.89 (£0.40)	£4.20 (£0.51)
Median	£1.13	£0.55	£1.10	£1.38

Sample weighted. All WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except for £0).

The results for **city user WTP values** are within the range of expected values. We note, however, that they are not much larger than those obtained for previous CV studies of individual cultural institutions (for example, the Natural History Museum, where the mean WTP for an entrance fee was £6.87) may suggest limited proportionality of WTP (i.e., that people are not fully considering the scope of the heritage good being valued). This may lead to an underestimation of the value of the historic character of the city as a whole.

The results for **non-user WTP** an annual donation are also plausible and within the range we would expect for non-user donations. The non-use values are also lower than the range of use values, which accords with expectations that users hold higher values for a good or service than non-users.[117] In terms of comparisons with non-use values from other heritage sites in the UK, the non-use values estimated for historic cities are lower than the estimated non-user WTP for Stonehenge World Heritage Site in our earlier study (£14.41), but arguably this is to be expected given the prominent status that Stonehenge has in the eyes of the public.

Overall, for the city user models, econometric tests tend to support the theoretical validity of the results, i.e. log WTP increases with income and with positive attitudes to culture in most of the city-level models and the pooled model. The city non-user and cathedral models are less consistent with relation to the association between income and WTP, with

[116] Bakhshi et al. 2015
[117] Bateman et al. 2002

income insignificant in two of the four city/cathedral-level models. Note that we run validity testing on log WTP to account for outliers with higher WTP values and to better detect variation in the smaller WTP values.

The validity tests on WTP are overall consistent with theoretical expectations, being driven in part by indicators of cultural engagement and income. However, although income is significant in all four pooled regression models, it is not significant in some city/cathedral-level models. Model fit in the historic city models (both user and non-user) is relatively low, which raises issues about the applicability of the function transfer approach for non-use values in subsequent transfer testing in Section 4 . However, we note that the low statistical power of some of the city regressions may be driven by small sample of respondents who were willing to pay, and the high proportion (around 30%) who were not willing to pay in principle. Further, the variation of income levels in our individual samples can be low.

Model fit in the cathedral regressions are stronger, but the association between income and WTP is significant in fewer of the cathedral-level models. In addition, a large amount of the difference in WTP is associated with the different cathedral elicitation methods (allocation and independent payment), which must be taken into account when using the values. There is also some loss of information and sample from the cathedral regressions made necessary by the dropping of individuals who did not state a preference for the allocation of their city-level donation. On balance, this is considered the most appropriate way to deal with the lack of information about people's motivations for selecting this response option when faced with the allocation in principle question (as outlined in sensitivity analysis, Annex 6.8).

4 Benefit transfer

This section applies and tests the three benefit transfer (BT) methods introduced in Section 2.6. That the mean WTP values reported in Section 3 are broadly similar across the four cities or cathedrals is encouraging in terms of their possible transferability between sites. This section investigates the validity of these benefit transfer methods in further detail. The purpose of this analysis is to evaluate the scope for transferring average WTP values reported in this study to other historic cities and/or cathedrals in England.

The validity tests assess whether the estimated WTP values are transferable between study and policy sites both in terms of the extent of transfer error incurred, but also in terms of the statistical significance of the difference between actual and predicted mean WTP (according to the relevant test among those outlined in Table 2-2).

All benefit transfer calculations and tests use relevant weights for city users, city non-users, cathedral users and cathedral non-users, as described in Section 3 .

4.1 Historic cities use WTP

Table 4-1 shows how the simple unit benefit transfer can be applied to use values in each of the four cities. In every column one of the cities is selected as a policy site and the remaining three cities are treated as pooled study sites. Comparing the observed mean WTPs for each policy site with the corresponding BT predictions shows how well the simple unit benefit transfer method would have worked if applied to that policy site. In particular, the greater the % difference between the BT prediction and the observed mean WTP at a given policy site, the greater the transfer error.

The results show that transfer errors (TE) were low overall, with the largest errors observed for York (|TE|=7%) and Winchester (|TE|=5%) and the smallest errors observed for Canterbury (|TE|=2%) and Lincoln (|TE|=0%). The mean difference between observed and predicted WTP (see hypothesis H1 in Table 2-2) was not significant in any of the cities.

In sum, as the simple unit transfer errors vary between 0% and 7%, they are all safely within what is considered to be an acceptable range (see Section 2.6.3).

Table 4-1 Historic city users WTP: Simple unit transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York

Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Policy site: Observed mean WTP	£9.74	£9.64	£9.96	£9.18
BT prediction: Pooled mean WTP from study sites	£9.59	£9.63	£9.52	£9.78
Difference (absolute £)	£-0.15	£-0.01	£-0.45	£0.61
Transfer error	-1.5%	-0.1%	-4.5%	6.6%
t-test: Difference significant at 5% level?	No	No	No	No

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ given by Equation 3.

Table 4-2 shows that the adjusted unit transfer approach leads to a decrease in transfer errors for the two cities where the simple unit transfer errors were largest (York and Winchester). However, in the two remaining cities (Canterbury and Lincoln) transfer errors increase as the income adjustment overshoots the observed mean WTP (for example, in the case of Canterbury the simple unit BT prediction was slightly below the observed mean, whereas adjusting the prediction up by the income ratio of 1.2 brings it substantially above the observed mean). This increase in transfer errors could be due to an imbalance in the income of the city user sample compared to national income distribution

Overall, the range of transfer errors using the adjusted unit transfer approach falls between 0% in the case of Winchester and 15% in the case of Canterbury, which remains within what is considered an acceptable range. The mean difference between observed and predicted WTP (see hypothesis H2 in Table 2-2) is again not significant in any of the cities.

Table 4-2 Historic city users WTP: Adjusted unit transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Income adjustment				
Policy site: Mean income	£41,697	£34,407	£38,426	£34,529
Pooled study sites: Mean income	£35,781	£38,233	£36,870	£38,150
Income ratio (Policy income / Study income)	1.2	0.9	1.0	0.9
Benefit transfer				
Policy site: Observed mean WTP	£9.74	£9.64	£9.96	£9.18
BT prediction: Pooled mean WTP from study sites, adjusted by income ratio	£11.18	£8.66	£9.92	£8.85
Difference (absolute £)	£1.43	£-0.97	£-0.04	£-0.32
Transfer error	14.7%	-10.1%	-0.4%	-3.5%
t-test: Difference significant at 5% level?	No	No	No	No

Note: Transfer error is calculated according to Equation 8 with $\widehat{WTP}_p$ given by Equation 4.

Finally, we show the results from the function transfer approach. Note that due to issues of poor model fit (explained below), we present function transfer as an illustrative example only.

Usually the researcher selects a smaller set of explanatory variables than those presented in the WTP regression models of Table 3-8, opting for variables that are easily available at each site. Here, a simple pooled WTP model is used with only demographic and location variables as regressors (The model retains the log-transformation $lWTP_i = \log(WTP_i + 1)$ applied in Section 3):

Equation 9

$$lWTP_i = \alpha + \beta_1 X_{income,i} + \beta_2 X_{Distance,i} + \varepsilon_i$$

where $X_{income,i}$ is a log variable calculated from the mid-points of income categories and $X_{Distance,i}$ is the log of geodesic distance from respondent's postcode to the city that is being valued (point-to-point distance as the crow flies, in kilometres). Age of survey respondents was not included in the reduced model as it was found to be insignificant in the pooled regression. The simple WTP models were estimated by ordinary least squares, with robust standard errors.

Regression results are presented in Table 4-3. Unsurprisingly, the explanatory power of the reduced regressions is lower than the explanatory power of the best-fit regressions in Table 3-8, given the absence of behavioural and attitudinal determinants. However, the use of reduced regression covariates composed of only those variables which are applicable to all sites is recommended to avoid the problems of over-parameterisation (overfitting), which can lead to increased transfer errors in the transfer function approach.[118] Furthermore, attitudinal and behavioural variables will not be readily available to policymakers who will want to apply benefit transfer in the future, without bespoke data collection.

Table 4-3 Historic city users: Reduced WTP regressions for value transfer (OLS, robust standard errors)

Policy site	Canterbury	Lincoln	Winchester	York	New city
Study sites on which BT function is estimated, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester	Canterbury, Lincoln, Winchester, York
Log income, using income midpoints	0.208**	0.328***	0.263***	0.254***	0.264***
Distance to allocated cathedral (in km)	-0.001	-0.001**	-0.001	-0.001**	-0.001**
Constant	-0.450	-1.640**	-1.004	-0.902	-1.008
Observations	1109	1133	1123	1033	1466
Adjusted R-squared	0.014	0.043	0.025	0.028	0.027

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Sample restricted to residents in England aged 16 and over. Sample weighted by city user weights. Heteroskedasticity-robust standard errors. Differences in model sample size due to lower omission of observations due to missing data for model covariates. Regression model significant at p<0.005.*

Table 4-4 shows the mean predicted WTPs based on fitting the regression model in Equation 9 with the coefficients estimated above. The function transfer errors reported in Table 4-4 vary between a low of 1% in the case of York and a high of 13% in the case of Lincoln. This error range again falls below the threshold proposed in the literature. The mean difference between observed and predicted WTP (see hypothesis H3 in Table 2-2) is not significant in any of the cities.

Despite the relatively low transfer errors, the reliability of WTP predictions based on the function transfer approach should be treated cautiously. The low explanatory power of the reduced WTP regressions for value transfer, as measured by the low adjusted R squared, means that these regressions are not successful at predicting the individual WTP values. The addition of log distance as a covariate is also not significant in some models (for instance, Canterbury and Winchester). Therefore, the reduced transfer errors of the function approach (e.g. TE=3% for Canterbury) as opposed to adjusted unit value transfer (TE=15% for Canterbury) may be due to chance rather than improved transferability.

For the most accurate prediction based on Equation 9, individual-level data on the characteristics of the policy site users is required, which is not likely to be available in practice. If, on the other hand, only average values of the policy site users' characteristics were entered into the WTP transfer function, the expected prediction error would likely be larger.

[118] Bateman et al. 2011

Due to convexity (non-linearity) of the exponential transformation, the resulting prediction would be a biased estimate (underestimate) of the mean WTP for the policy site.

Table 4-4 Historic city users WTP: Pooled function transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Policy site: Observed mean WTP	£9.83	£9.68	£10.11	£9.18
BT prediction: Applying value transfer function coefficients from pooled study sites to mean policy site characteristics	£10.10	£10.95	£10.95	£9.05
Difference (absolute £)	£0.26	£1.26	£0.84	£-0.13
Transfer error	2.7%	13.1%	8.3%	-1.4%
t-test: Difference significant at 5% level?	No	No	No	No

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ given by Equation 7 with regressors in Equation 5 replaced by those from Equation 9. Note that mean WTP for each city will differ slightly to values presented earlier due to the reduced set of control variables and resulting model sample size. Due to missing data, the values presented in this table are calculated only for respondents used in the pooled regression. Regression model significant at $p<0.005$.

4.1.1 Transfer errors summary: Historic cities use WTP

The results in Table 4-5 show that transferring historic city use values from pooled study sites to potential policy sites can be performed with relatively low transfer errors.

A comparison of transfer errors across all three benefit transfer methods shows that the maximum observed transfer error (15%) falls below the 40% threshold for transfer errors suggested in the literature (see Section 2.6.3). The simple unit transfer method performs best overall, with the lowest mean transfer error (3.2%) and the lowest maximum transfer error (6.6%). The adjusted unit transfer approach yields slightly higher transfer errors, although still within an acceptable range. Statistical tests of difference between observed and predicted WTP are not significant for either method, which adds confidence in the applicability of these values to simple and adjusted unit transfer.

Transfer errors for the function transfer approach are in a similar range to the adjusted unit transfer approach, with the maximum transfer error (13%) also falling below the accepted threshold of 40%. Statistical tests of difference between observed and predicted WTP are not significant. However, the regression models used in the function transfer approach have low explanatory power.

Table 4-5 Benefit transfer errors (TE) – Historic city use values - summary

	Canterbury	Lincoln	Winchester	York	Mean |TE|	Max |TE|
i) Simple pooled unit transfer	1.5%	0.1%	4.5%	6.6%	3.2%	6.6%
ii) Adjusted for income	14.7%	10.1%	0.4%	3.5%	7.2%	14.7%
iii) Pooled Function transfer	2.7%	13.1%	8.3%	1.4%	6.4%	13.1%

Note: we removed signs on transfer errors as they are not relevant to the final results.

Based on these findings, we recommend that policymakers choose which transfer approach to apply depending on data availability and contextual factors, as outlined below.

- **Simple pooled unit transfer**: Suitable for transferring use WTP values from the four cities we study to policy sites which are sufficiently similar in city characteristics and city user demographics. This method produced the lowest transfer errors in our example and has the additional benefit of requiring less data than the adjusted and function transfer approaches.
- **Adjusted pooled unit transfer**: This method produces acceptable transfer errors, although in some cases it may not improve the precision of WTP predictions relative to the simple transfer approach.
- **Function transfer**: We find that significant factors in the benefit function of use WTP values are the income of visitors and the distance visitors are willing to travel. However, other factors are also likely to be at play. This approach should be treated with caution due to the low explanatory power of the functional models. This may be due to the low variation of income levels in our city user sample (composed of city residents and visitors), the interaction between age, income and WTP within these samples, and the small sample of respondents who were definitely willing to pay to preserve the historic character of the city. Also, we note the significant input data requirements of the function transfer approach. As a result, we do not recommend that our estimated function for transferring use values be applied to other historic cities, given that sample sizes are too small to achieve adequate explanatory power in our models.

4.2 Historic city non-use WTP

Table 4-6 shows how the simple unit benefit transfer can be applied to non-use values in each of the four cities. In every column a city is selected as a policy site and the remaining pooled three cities are treated as a study site. By comparing the observed mean WTPs for each policy site with the corresponding BT predictions we can see how well the simple unit benefit transfer method would have worked if applied to that policy site. In particular, the greater the percentage difference between the BT prediction and the observed mean WTP at a given policy site, the greater the transfer error.

The results show that the transfer errors (TE) are low to medium overall, with the largest errors observed for York and Canterbury (|TE|=21%) and the smallest errors are observed for Winchester and Lincoln (|TE|=4%). The mean difference between observed and predicted WTP (see hypothesis H1 in Table 2-2) is not significant in any of the cities.

In sum, as the simple unit transfer errors vary between 4% and 21%, they are slightly larger than the historic city use WTP transfer errors but remain within what is considered to be an acceptable range (see Section 2.6.3).

Table 4-6 Historic city non-users WTP: Simple unit transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Policy site: Observed mean WTP	£5.32	£5.96	£5.97	£7.30
BT prediction: Pooled mean WTP from study sites	£6.41	£6.20	£6.19	£5.75
Difference (absolute £)	£1.09	£0.24	£0.23	£-1.56
Transfer error	20.5%	4.0%	3.9%	-21.4%
t-test: Difference significant at 5% level?	No	No	No	No

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ *given by Equation 3.*

Table 4-7 shows that the adjusted unit transfer approach leads to a decrease in transfer error only in the case of Canterbury, while for the remaining three cities transfer errors increase slightly. Overall, the range of transfer errors using the adjusted unit transfer approach falls between 8% in the case of Lincoln and 27% in the case of York, which remains within what is considered to be an acceptable range. York has the highest mean WTP which is why the transfer

error is negative for York, but positive for all other sites (as the pooled value there includes the high York value). The mean difference between observed and predicted WTP (see hypothesis H2 in Table 2-2) is again not significant in any of the cities.

Table 4-7 Historic city non-users WTP: Adjusted unit transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Income adjustment				
Policy site: Mean income	£30,237	£32,071	£32,781	£29,534
Pooled study sites: Mean income	£31,445	£30,820	£30,614	£31,673
Income ratio (Policy income / Study income)	1.0	1.0	1.1	0.9
Benefit transfer				
Policy site: Observed mean WTP	£5.32	£5.96	£5.97	£7.30
BT prediction: Pooled mean WTP from study sites, adjusted by income ratio	£6.16	£6.45	£6.63	£5.36
Difference (absolute £)	£0.84	£0.49	£0.66	£-1.94
Transfer error	15.8%	8.3%	11.1%	-26.6%
t-test: Difference significant at 5% level?	No	No	No	No

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ given by Equation 4.

Finally, we consider the function transfer approach. As before, due to issues of low model fit we present function transfer as an illustrative example only.

As benefits transfer using a function approach depends on the existence of comparable explanatory variables for each site a smaller set of explanatory variables than those presented in the WTP regression models of Table 3-15 are typically used. We used the same pooled WTP model specified in Equation 9 to test WTP for city non-users. The simple WTP models were estimated by ordinary least squares, with robust standard errors.

Regression results are presented in Table 4-8. As would be expected the explanatory power of the reduced regressions is lower than the explanatory power of the best-fit regressions in Table 3-15 due to the absence of behavioural and attitudinal determinants. However, the use of reduced regression covariates composed of only those variables which are applicable to all sites is recommended to avoid the problems of over-parameterisation which can lead to increased transfer errors in the transfer function approach.[119]

Table 4-8 Historic city non-users: Reduced WTP regressions for value transfer (OLS, robust standard errors)

Policy site	Canterbury	Lincoln	Winchester	York	Another historic city
Study sites on which BT function is estimated, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester	Canterbury, Lincoln, Winchester, York

[119] Bateman et al. 2011

Log income, using income midpoints	0.164**	0.124	0.217***	0.148**	0.164**
Distance to allocated cathedral (in km)	-0.001*	-0.001	-0.000	-0.001***	-0.001*
Constant	-0.263	0.121	-0.924	-0.101	-0.303
Observations	913	926	902	997	1246
Adjusted R-squared	0.013	0.009	0.017	0.017	0.014

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Sample restricted to residents in England aged 16 and over. Sample weighted by city non-user weights. Heteroskedasticity-robust standard errors. Differences in model sample size due to lower omission of observations due to missing data for model covariates. Regression model significant at p<0.005.*

The function transfer errors reported in Table 4-9 vary between a low of 0% in the case of Lincoln and a high of 35% in the case of York. This error range falls below the threshold proposed in the literature, although the maximum error is close to the threshold value. The mean difference between observed and predicted WTP (see hypothesis H3 in Table 2-2) is not significant in all cities except York (p=0.03), where the transfer error is also highest.

Despite the relatively low transfer errors, the reliability of WTP predictions based on the function transfer approach should be treated cautiously. The very low explanatory power of the reduced WTP regressions for value transfer, as measured by the low adjusted R squared (no more than 2%), means that these regressions are unsuccessful at predicting the individual WTP values. However, as our benefit transfer prediction is an average of these individual values, the individual prediction errors cancel out in the averaging process, which is why the reported transfer errors are relatively small.

Table 4-9 Historic city non-users WTP: Pooled function transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Policy site: Observed mean WTP	£5.38	£6.34	£6.27	£7.76
BT prediction: Applying value transfer function coefficients from pooled study sites to mean policy site characteristics	£6.17	£6.35	£6.03	£5.06
Difference (absolute £)	£0.79	£0.01	£-0.24	£-2.70
Transfer error	14.6%	0.2%	-3.8%	-34.8%
t-test: Difference significant at 5% level?	No	No	No	Yes

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ given by Equation 7, with regressors in Equation 5 replaced by those from Equation 9. Note that mean WTP for each city will differ slightly to values presented earlier due to the reduced set of control variables and resulting model sample size. Due to missing data, the values presented in this table are calculated only for respondents used in the pooled regression. Regression model significant at p<0.005.

4.2.1 Transfer errors summary: Historic cities non-use WTP

Table 4-10 summarises the results for the transfer errors of the historic cities non-use value. The results indicate that transferring historic city non-use values from pooled study sites to potential policy sites can be performed with relatively low transfer errors.

The comparison of transfer errors between the simple and adjusted unit transfer approaches shows that the maximum observed transfer error across these two methods (27%) falls below the 40% threshold for transfer errors suggested in the literature (see Section 2.6.3). The maximum transfer error is higher for city non-users than city users (15%, recall

Section 4.1.1), which may reflect the fact that city users are a more homogenous group (they have all experienced the city) and their value should be linked to that experience. By contrast the general population non-user values may vary more widely depending on the personal preferences of individuals for cultural heritage. The simple unit transfer method performs best overall, with the lowest mean transfer error (13%) and the lowest maximum transfer error (21%). Statistical tests of difference between observed and predicted WTP are not significant for either method, which adds confidence in the applicability of these values to simple and adjusted unit transfer.

Transfer errors for the function transfer approach are in a similar range to the adjusted unit transfer approach, with the maximum transfer error (35%) still remaining below the accepted threshold of 40%. Statistical tests of difference between observed and predicted WTP are significant in one case within the function transfer tests, which gives lower confidence on the applicability of function transfer for the city non-user values elicited in this study. Because of this, as well as the low explanatory power of the regression models used in the function transfer approach, we do not recommend application of the function approach to transfer historic city non-use values to policy sites.

Table 4-10 Benefit transfer errors (TE) – Historic city non-use values - summary

	Canterbury	Lincoln	Winchester	York	Mean |TE|	Max |TE|
i) Simple pooled unit transfer	20.5%	4.0%	3.9%	21.4%	12.5%	21.4%
ii) Adjusted for income	15.8%	8.3%	11.1%	26.6%	15.5%	26.6%
iii) Pooled Function transfer	14.6%	0.2%	3.8%	34.8%	13.4%	34.8%

Note: we removed signs on transfer errors as they are not relevant to the final results.

Based on these findings, we recommend that policymakers apply either the simple or adjusted unit transfer method for city non-user populations.

- **Simple pooled unit transfer method**: Suitable for transferring non-use WTP values from the four cities we study to policy sites which are sufficiently similar in city characteristics and city user demographics. This method produced the lowest transfer errors for city non-users.
- **Adjusted pooled unit transfer:** This method produces acceptable transfer errors, although in some cases it may not improve the precision of WTP predictions relative to the simple transfer approach.
- **Function transfer:** We find that the only significant factor in the benefit function of non-use WTP values is the respondents' income. However due to the low explanatory power of the functional models we do not recommend that our estimated function be applied for transferring non-use values to other historic cities, given that the explanatory power in our models is so low.

4.3 Cathedral use WTP

Table 4-11 shows how the simple unit benefit transfer can be applied to use values in each of the four cathedrals. Every column selects one of the cathedrals as a policy site and treats the remaining three cathedrals as pooled study sites. Comparing the observed mean WTPs for each policy site with the corresponding BT predictions allows us to assess how well the simple unit benefit transfer method would have worked if it were applied to that policy site. In particular, the greater the % difference between the BT prediction and the observed mean WTP at a given policy site, the greater the transfer error.

Table 4-11 shows that the transfer errors (TE) are medium overall, with the largest error observed for York (|TE|=15%) and the smallest error observed for Canterbury (|TE|=8%). The mean difference between observed and predicted WTP (see hypothesis H1 in Table 2-2) is not significant in any of the cathedrals.

As the simple unit transfer errors vary between 8% and 15%, they remain safely within what is considered to be an acceptable range (see Section 2.6.3).

Table 4-11 Cathedral users WTP: Simple unit transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Policy site: Observed mean WTP	£7.00	£8.05	£7.98	£6.66
BT prediction: Pooled mean WTP from study sites	£7.56	£7.21	£7.23	£7.67
Difference (absolute £)	£0.56	£-0.84	£-0.74	£1.02
Transfer error	8.0%	-10.4%	-9.3%	15.3%
t-test: Difference significant at 5% level?	No	No	No	No

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ given by Equation 3.

Table 4-12 shows that the adjusted unit transfer approach leads to a decrease in transfer errors for two of the cathedrals (York and Winchester) and an increase in transfer errors for the two remaining cathedrals (Canterbury and Lincoln). This illustrates the possibility that if the transfer error in the simple unit transfer approach was caused by factors other than income, then – depending on whether the correlation is negative or positive – income adjustment may either reduce or amplify the underlying prediction errors.

Overall, the range of transfer errors using the adjusted unit transfer approach falls between 4% in the case of Winchester and 20% in the case of Canterbury, which remains within what is considered to be an acceptable range. The mean difference between observed and predicted WTP (see hypothesis H2 in Table 2-2) is again not significant in any of the cathedrals.

Table 4-12 Cathedral users WTP: Adjusted unit transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Income adjustment				
Policy site: Mean income	£41,288	£35,059	£39,659	£36,537
Pooled study sites: Mean income	£37,061	£39,171	£37,619	£38,643
Income ratio (Policy income / Study income)	1.1	0.9	1.1	0.9
Benefit transfer				
Policy site: Observed mean WTP	£7.00	£8.05	£7.98	£6.66
BT prediction: Pooled mean WTP from study sites, adjusted by income ratio	£8.42	£6.45	£7.63	£7.26
Difference (absolute £)	£1.42	£-1.60	£-0.35	£0.60
Transfer error	20.3%	-19.8%	-4.4%	9.0%
t-test: Difference significant at 5% level?	No	No	No	No

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ given by Equation 4.

Finally, we consider the function transfer approach. Note that due to issues of low model fit (explained below) we present function transfer as an illustrative example only.

Usually the researcher selects a smaller set of explanatory variables than those presented in the WTP regression models of Table 3-25, opting for variables that are easily available at each site. For our analysis we specified a simple pooled WTP model with income as the only regressor (note that the model retains the log-transformation $lWTP_i = \log(WTP_i + 1)$ applied in Section 3):

Equation 10

$$WTP_i = \alpha + \beta_1 X_{Income,i} + \varepsilon_i$$

where $X_{Income,i}$ is a log variable calculated from the mid-points of income categories. Age and distance to the cathedral being valued are not included in the reduced model as they are found to be insignificant in the pooled regression. The simple WTP models was estimated by ordinary least squares, with robust standard errors.

Regression results are presented in Table 4-13. Unsurprisingly, the explanatory power of the reduced regressions is lower than the explanatory power of the best-fit regressions in Table 3-25, given the absence of behavioural and attitudinal determinants. However, the use of reduced regression covariates composed of only those variables which are applicable to all sites is recommended to avoid the problems of over-parameterisation which can lead to increased transfer errors in the transfer function approach.[120]

Table 4-13 Cathedral users: Reduced WTP regressions for value transfer (OLS, robust standard errors)

Policy site	Canterbury	Lincoln	Winchester	York	Another comparable cathedral
Study sites on which BT function is estimated, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester	Canterbury, Lincoln, Winchester, York
Log income, using income midpoints	0.279***	0.333***	0.265***	0.283***	0.290***
Constant	-1.440*	-2.029***	-1.308**	-1.453**	-1.557**
Observations	779	820	803	775	1059
Adjusted R-squared	0.028	0.044	0.027	0.032	0.033

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Sample restricted to residents in England aged 16 and over. Sample weighted by cathedral user weights. Heteroskedasticity-robust standard errors. Differences in model sample size due to lower omission of observations due to missing data for model covariates. Regression model significant at p<0.005. R^2 values are lower in the reduced model compared to the full models in Section 3 due to the exclusion of the control variable for elicitation method (allocation vs individual).*

The function transfer errors reported in Table 4-14 vary between a minimum of 5% in the case of Canterbury and a maximum of 19% in the case of Lincoln. This error range again falls below the threshold proposed in the literature. The mean difference between observed and predicted WTP (see hypothesis H3 in Table 2-2) is not significant in any of the cathedrals.

Despite the relatively low transfer errors, the reliability of WTP predictions based on the function transfer approach should be treated with caution. The low explanatory power of the reduced WTP regressions for value transfer, as measured by the low adjusted R squared, means that these regressions are unsuccessful at predicting the individual WTP values.

As our benefit transfer prediction is an average of these individual values, the individual prediction errors cancel out in the averaging process, which is why the reported transfer errors are relatively small. However, in order to apply this

[120] Bateman et al. 2011

averaging process, individual-level data on the characteristics of the policy site users is required, which is not likely to be available in practice. If, on the other hand, only average values of the policy site users' characteristics were entered into the value transfer function, the expected prediction error would probably be larger. Moreover, the resulting prediction would be a biased estimate (underestimate) of the mean WTP for the policy site due to convexity of the exponential transformation.

Table 4-14 Cathedral users WTP: Pooled function transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Policy site: Observed mean WTP	£7.06	£8.18	£8.13	£6.74
BT prediction: Applying value transfer function coefficients from pooled study sites to mean policy site characteristics	£7.39	£6.67	£7.03	£7.34
Difference (absolute £)	£0.32	£-1.52	£-1.09	£0.60
Transfer error	4.6%	-18.5%	-13.4%	8.9%
t-test: Difference significant at 5% level?	No	No	No	No

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ given by Equation 7 with regressors in Equation 5 replaced by those from Equation 10. Note that mean WTP for each city will differ slightly to values presented earlier due to the reduced set of control variables and resulting model sample size. Due to missing data, the values presented in this table are calculated only for respondents used in the pooled regression. Regression model significant at p<0.005.

4.3.1 Transfer errors summary: Cathedral use WTP

The results displayed in Table 4-15 indicate that transferring cathedral use values from pooled study sites to potential policy sites can be performed with relatively low transfer errors.

A comparison of transfer errors shows that the maximum observed transfer error across all three methods (20.3%) falls below the 40% threshold for transfer errors suggested in the literature (see Section 2.6.3). The simple unit transfer method performs best overall, with the lowest mean transfer error (10.8%) and the lowest maximum transfer error (15.3%). The adjusted unit transfer approach yields higher transfer errors, although still within an acceptable range. Statistical tests of difference between observed and predicted WTP are not significant for either method, which adds confidence in the applicability of these values to simple and adjusted unit transfers.

Transfer errors for the function transfer approach are in a similar range to the adjusted unit transfer approach, with the maximum transfer error (18.5%) also falling below the accepted threshold of 40%. Statistical tests of difference between observed and predicted WTP are not significant. We note, however, that the regression models used in the function transfer approach have low explanatory power and the relatively low transfer errors in our test result mainly from averaging across a large number of (low-quality) individual-level predictions. Therefore, we do not recommend application of the function approach to transfer cathedral use values to policy sites.

Table 4-15 Benefit transfer errors (TE) – Cathedral use values - summary

	Canterbury	Lincoln	Winchester	York	Mean |TE|	Max |TE|

i) Simple pooled unit transfer	8.0%	10.4%	9.3%	15.3%	10.8%	15.3%
ii) Adjusted for income	20.3%	19.8%	4.4%	9.0%	13.4%	20.3%
iii) Pooled Function transfer	4.6%	18.5%	13.4%	8.9%	11.4%	18.5%

Based on these findings, we recommend that policymakers choose which transfer approach to apply depending on data availability and contextual factors, as outlined below.

- **Simple pooled unit transfer method**: Suitable for transferring use WTP values from the four cathedrals we study to policy sites which are sufficiently similar in cathedral characteristics and cathedral user demographics. This method produced the lowest transfer errors in our example and has the additional benefit of requiring less data than the adjusted and function transfer approaches.
- **Adjusted pooled unit transfer:** This method produces acceptable but higher transfer errors. In most cases it does not improve the precision of WTP predictions relative to the simple transfer approach.
- **Transfer of benefit functions**: We find that the only significant factor in the benefit function of use WTP values is the income of visitors. However, we note a word of caution on the low explanatory power of the regression models used. Also, we note the significant input data requirements of the function transfer approach. As a result, we do not recommend that our estimated function for transferring use values to other cathedrals is applied in practice given the low explanatory power in the models.

4.4 Cathedral non-use WTP

Table 4-16 shows how the simple unit benefit transfer can be applied to non-use values in each of the four cathedrals. In each column one of the cathedrals is selected as the policy site while the remaining three cathedrals are treated as pooled study sites. By comparing the observed mean WTPs for each policy site with the corresponding BT predictions we can assess how well the simple unit benefit transfer method would have worked if it were applied to that policy site. In particular, the greater the percentage difference between the BT prediction and the observed mean WTP at a given policy site, the greater the transfer error.

The results show that the transfer errors (TE) are low to medium overall, with the largest errors observed for Lincoln (|TE|=19%) and York (|TE|=14%), and the smallest errors are observed for Winchester (|TE|=5%) and Lincoln (|TE|=4%). The mean difference between observed and predicted WTP (see hypothesis H1 in Table 2-2) is not significant in any of the cathedrals.

In sum, as the simple unit transfer errors vary between 4% and 19%, they are within what is considered to be an acceptable range (see Section 2.6.3).

Table 4-16 Cathedral non-users WTP: Simple unit transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Policy site: Observed mean WTP	£3.63	£3.27	£3.89	£4.20
BT prediction: Pooled mean WTP from study sites	£3.79	£3.91	£3.70	£3.60
Difference (absolute £)	£0.16	£0.63	£-0.19	£-0.60

Transfer error	4.4%	19.3%	-4.9%	-14.3%
t-test: Difference significant at 5% level?	No	No	No	No

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ given by Equation 3.

Table 4-17 shows that the adjusted unit transfer approach leads to an increase in transfer errors for the two cathedrals where the simple unit transfer errors were largest (Lincoln and York) and a decrease in transfer errors for the two remaining cathedrals (Winchester and Canterbury). Once again, this illustrates that if the source of transfer error in the simple transfer approach is a factor other than income, then the adjusted unit transfer approach may exacerbate the error instead of reducing it.

Overall, the range of transfer errors using the adjusted unit transfer approach falls between 2% in the case of Canterbury and 25% in the case of Lincoln, which remains within what is considered to be an acceptable range. The mean difference between observed and predicted WTP (see hypothesis H2 in Table 2-2) is again not significant in any of the cathedrals.

Table 4-17 Cathedral non-users WTP: Adjusted unit transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Income adjustment				
Policy site: Mean income	£31,074	£32,887	£32,332	£30,578
Pooled study sites: Mean income	£31,937	£31,326	£31,513	£32,089
Income ratio (Policy income / Study income)	1.0	1.0	1.0	1.0
Benefit transfer				
Policy site: Observed mean WTP	£3.63	£3.27	£3.89	£4.20
BT prediction: Pooled mean WTP from study sites, adjusted by income ratio	£3.69	£4.10	£3.80	£3.43
Difference (absolute £)	£0.06	£0.83	£-0.09	£-0.77
Transfer error	1.6%	25.3%	-2.4%	-18.4%
t-test: Difference significant at 5% level?	No	No	No	No

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ given by Equation 4.

Finally, we consider the function transfer approach. Note that, as before, due to issues of low model fit the function transfer model is presented for illustrative purposes only.

Usually a smaller set of explanatory variables are selected than those presented in the WTP regression models of Table 3-34 due the to the restriction that some variables are less readily available at each site. Here, a simple pooled WTP model was used with only demographic and location variables as regressors (note that the model retains the log-transformation $lWTP_i = \log(WTP_i + 1)$ applied in Section 3 :

Equation 11

$$lWTP_i = \alpha + \beta_1 X_{income,i} + \beta_2 X_{Distance,i} + \beta_3 X_{Female,i} + \beta_4 X_{Age,i} + \varepsilon_i$$

where $X_{income,i}$ is a log variable calculated from the mid-points of income categories, $X_{Distance,i}$ is the log of geodesic distance from respondent's postcode to the city which is being valued (point-to-point distance as the crow flies, in

kilometres), $X_{Female,i}$ is an indicator variable which takes the value 1 if the respondent is a woman and is 0 otherwise, and $X_{Age,i}$ is the respondent's age defined as the mid-point of the relevant age bracket. The simple WTP models are estimated by ordinary least squares, with robust standard errors.

Table 4-18 presents the regression results. Unsurprisingly, the explanatory power of the reduced regressions is lower than the explanatory power of the best-fit regressions in Table 3-34, given the absence of many behavioural and attitudinal determinants. However, the use of reduced regression covariates composed of only those variables which are applicable to all sites is recommended to avoid the problems of over-parameterisation which can lead to increased transfer errors in the transfer function approach.[121]

Table 4-18 Cathedral non-users: Reduced WTP regressions for value transfer (OLS, robust standard errors)

Policy site	Canterbury	Lincoln	Winchester	York	New cathedral
Study sites on which BT function is estimated, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester	Canterbury, Lincoln, Winchester, York
Log income, using income midpoints	0.210***	0.190***	0.238***	0.171***	0.204***
Distance to allocated cathedral (in km)	-0.000	-0.001**	-0.000	-0.001**	-0.001*
Female	0.224***	0.246***	0.213***	0.151**	0.209***
Midpoint age	0.005**	0.005**	0.006***	0.006**	0.005***
Constant	-1.388***	-1.089**	-1.772***	-0.968*	-1.323***
Observations	1098	1105	1096	1144	1481
Adjusted R-squared	0.041	0.047	0.050	0.036	0.043

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Sample restricted to residents in England aged 16 and over. Sample weighted by cathedral non-user weights. Heteroskedasticity-robust standard errors. Differences in model sample size due to lower omission of observations due to missing data for model covariates. Regression model significant at p<0.005. R^2 values are lower in the reduced model compared to the full models in Section 3 due to the exclusion of the control variable for elicitation method (allocation vs individual).*

The function transfer errors reported in Table 4-19 vary between a low of 2% in the case of Canterbury and a high of 28% in the case of York. This error range is below the threshold proposed in the literature, although the maximum error is close to the threshold value. The mean difference between observed and predicted WTP (see hypothesis H3 in Table 2-2) is not significant in all cathedrals except York (p=0.03), where the transfer error is also highest.

Table 4-19 Cathedral non-users WTP: Pooled function transfer errors in relative (%) and absolute (£) terms

Policy site	Canterbury	Lincoln	Winchester	York
Study sites on which BT prediction is based, corresponding to the policy site in column header	Lincoln, Winchester, York	Canterbury, Winchester, York	Canterbury, Lincoln, York	Canterbury, Lincoln, Winchester
Policy site: Observed mean WTP	£3.57	£3.41	£3.98	£4.24
BT prediction: Applying value transfer function coefficients from pooled study sites to mean policy site characteristics	£3.48	£3.77	£3.44	£3.06
Difference (absolute £)	£-0.08	£0.37	£-0.54	£-1.18

[121] Bateman et al. 2011

Transfer error	-2.4%	10.8%	-13.6%	-27.9%
t-test: Difference significant at 5% level?	No	No	No	Yes

Note: Transfer error is calculated according to Equation 8, with $\widehat{WTP}_p$ given by Equation 7 with regressors in Equation 5 replaced by those from Equation 11. Note that mean WTP for each city will differ slightly to values presented earlier due to the reduced set of control variables and resulting model sample size. Due to missing data, the values presented in this table are calculated only for respondents used in the pooled regression. Regression model significant at $p<0.005$.

4.4.1 Transfer errors summary: Cathedral non-use WTP

The results displayed in Table 4-20 indicate that transferring cathedral non-use values from pooled study sites to potential policy sites can be performed with relatively low transfer errors.

A comparison of transfer errors between the simple and adjusted unit transfer approaches shows that the maximum observed transfer error across these two methods (25%) falls below the 40% threshold for transfer errors suggested in the literature (see Section 2.6.3). The maximum transfer error is slightly higher for cathedral non-users than cathedral users (20%, recall Section 4.3.1), which may reflect the fact that cathedral users are a more homogenous group (they have all experienced the cathedral) and that their value should be linked to that experience, whereas general population non-user values may vary more widely depending on the personal preferences of individuals for cultural heritage. The simple unit transfer method performed best overall, with the lowest mean transfer error (10.7%) and the lowest maximum transfer error (19.3%). Statistical tests of difference between observed and predicted WTP are not significant for either method, which adds confidence in the applicability of these values to simple and adjusted unit transfer.

Transfer errors for the function transfer approach are in a similar range to the adjusted unit transfer approach, with the maximum transfer error (27.9%) also falling below the accepted threshold of 40%. Statistical tests of difference between observed and predicted WTP are significant in the case of one cathedral (York). This provides lower confidence in the applicability of function transfer for the cathedral non-user values elicited in this study. When combined with the low explanatory power of the functional models used in the function transfer approach, we do not recommend application of the function approach to transfer cathedral non-use values to policy sites.

Table 4-20 Benefit transfer errors (TE) – Cathedral non-use values - summary

	Canterbury	Lincoln	Winchester	York	Mean |TE|	Max |TE|
i) Simple pooled unit transfer	4.4%	19.3%	4.9%	14.3%	10.7%	19.3%
ii) Adjusted for income	1.6%	25.3%	2.4%	18.4%	11.9%	25.3%
iii) Pooled Function transfer	2.4%	10.8%	13.6%	27.9%	13.7%	27.9%

Based on these findings, we recommend that policymakers apply either the simple or adjusted unit transfer method for city non-user populations.

- **Simple pooled unit transfer method**: Suitable for transferring non-use WTP values from the four cathedrals we study to policy sites which are sufficiently similar in cathedral characteristics and cathedral user demographics. This method produced the lowest transfer errors for cathedral non-users.
- **Adjusted pooled unit transfer:** This method produces acceptable but higher transfer errors. In many cases it does not improve the precision of WTP predictions relative to the simple transfer approach.
- **Function transfer:** We find that the significant factor in the benefit function of non-use WTP values are respondents' income, gender, age and distance to the cathedral in question. However

due to the low explanatory power of the functional models this should be treated cautiously. As result, we do not recommend that our estimated function be applied for transferring non-use values to other cathedrals, given that sample sizes are too small to achieve adequate explanatory power in our models.

4.5 Guidance and recommendations for application of values to benefit transfer

In this section, we discuss the relevant considerations and data requirements that should inform the choice of benefit transfer method. The tables below are to allow the appropriate benefit transfer method to transfer use and/or non-use values to a fifth policy site, based on the values generated from the eight sites analysed in this study.

Simple unit transfer performs best in all cases (historic city user and non-user, and cathedral user and non-user models). Adjusted unit transfer (by income) performs within an acceptable range of transfer error. The effect of including income in the adjusted model is inconsistent. In some cities/cathedrals transfer errors increase and in others they decrease when compared to the simple approach. Adjusted transfer may present a viable option for a new policy site where analysists wish to adjust for an income differential between our sample and a local average income.

Function transfer is included for illustrative purposes only (due to the low explanatory power of the models and inconsistent association between household income and WTP in city/cathedral-level models), the function transfer does perform better than adjusted transfer for use values, but not for non-use values. A limitation of the function transfer is that the regression models have low explanatory power, something that might be improved with larger sample sizes.

4.5.1 Pooled simple unit transfer

In our testing, simple unit transfer is found to produce the lowest transfer errors from among the three methods tested. We outline below the data required and criteria to be taken into account in applying the simple unit transfer approach (Table 4-21), and the final set of pooled study site values and transfer errors for use in benefit transfer (Table 4-22).

Table 4-21 Simple unit transfer: Data requirements and selection criteria

Data required from study sites	Mean use and non-use WTP
Data required at policy site	Information about the expected characteristics of the policy site, to allow the comparability of study and policy sites to be assessed (following selection criteria, Section 1.4).
When to use this method	When there is relative homogeneity in characteristics of the study and policy sites. When data on relevant populations (for function transfer/adjusted transfer) do not exist, or do not vary between study and policy site.
When not to use this method	When study and policy sites differ in site and population characteristics in important ways.

Table 4-22 Use and non-use WTP for benefit transfer: Simple unit transfer

Population	Use/non-use value	Valuation variable	Study site mean WTP (4 sites)	Mean transfer error	Max transfer error
Historic cities					
Resident/Visitor	Use	One-off donation on behalf of their household to reduce the damage caused by climate change, improve the maintenance and conservation of the historic buildings in the city, and reduce the risk of irreparable damage and closure of those buildings currently open to the public	£9.63	3.2%	6.6%
Non-resident/visitor	Non-use		£6.14	12.5%	21.4%

Cathedrals					
Visitor	Use	One-off donation for their household to reduce the damage caused by climate change, improve the maintenance and conservation of the respective cathedral, and reduce the risk of irreparable damage and closure	£7.42	10.8%	15.3%
Non-visitor	Non-use		£3.75	10.7%	19.3%

Notes: Sample restricted to residents in England aged 16 and over. All WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Summary statistics calculated with inclusion of 'No' at payment principle (coded £0) excluding those who responded No to the cathedral allocation question. User and non-user weights applied.

4.5.2 Pooled adjusted unit transfer

In our testing, *adjusted unit transfer* produced acceptable transfer errors, although slightly higher than in the simple unit transfer approach. The adjusted transfer method allows the analyst to adjust the benefits to be transferred from the study to policy sites based on observed differentials between them. Commonly this is based on the average income of the visitor or general population groups associated with the policy institution. The benefit is that this approach is less data intensive than the transfer function approach and allows for ex-post adjustment specific on the policy context.

Table 4-23 Adjusted unit transfer: Data requirements and selection criteria

Data required from study sites	Mean use and non-use WTP. Mean annual household income levels
Data required at policy site	Information about the expected characteristics of the policy site, to assess comparability of study and policy sites (following selection criteria, Section 1.4).
When to use this method	When differences are expected between study and policy site populations, it is recommended to adjust transfer for the relevant characteristics (usually income, which is recognised as the strongest theoretical and empirical driver of WTP value).
When not to use this method	When data on income differentials between study and policy site do not exist or are not significantly different. When study and policy site populations do not differ in average income (e.g. identical national non-user populations). When there are extreme differences in characteristics other than income between the study and policy sites.

Table 4-24 provides the study site mean WTP and income data required by the analyst to perform adjusted unit transfer of use and non-use values to potential policy sites.

Table 4-24 Use and non-use WTP for benefit transfer: Adjusted unit transfer

Population	Use/non-use value	Valuation variable	Study site mean WTP (4 sites)	Study site mean income	Policy site mean income	Income differential (Policy/ Study)	Mean transfer error	Max transfer error
Historic cities								
Resident/ Visitor	Use	One-off donation on behalf of their household to reduce the damage caused by climate change, improve the maintenance and conservation of the historic buildings in the city, and reduce the risk of irreparable damage and closure of those buildings currently open to the public	£9.63	£38,426	Mean income of users of policy site	$\left(\frac{\bar{Y}_p}{\bar{Y}_s}\right)^e$	7.2%	14.7%
Non-resident/ Non-visitor	Non-use		£6.14	National mean income (ONS statistics)	Mean income of non-user population (e.g. region)		15.5%	26.6%
Cathedrals								
Visitor	Use	One-off donation for their household to reduce the damage caused by climate change, improve the maintenance and conservation of the respective cathedral, and reduce the risk of irreparable damage and closure	£7.42	£39,659	Mean income of visitors to policy site	$\left(\frac{\bar{Y}_p}{\bar{Y}_s}\right)^e$	13.4%	20.3%
Non-visitor	Non-use		£3.75	National mean income (ONS statistics)	Mean income of non-user population (e.g. region)		11.9%	25.3%

Notes: Sample restricted to residents in England aged 16 and over. All WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Summary statistics calculated with inclusion of 'No' at payment principle (coded £0). Pooled sample weighted by user or non-user weights accordingly.

4.5.3 Pooled benefit function transfer

As outlined in Section 3, the regressions used for validity testing have low explanatory power. As a consequence, we would recommend that they are not used for transfer, *except as an illu*stration. As such, the function transfer testing in this report is an illustration of the procedure. Based on the analysis we consider that to ensure robust use of this method it is likely that more information on the factors that affect individuals' valuations and larger sample sizes would be needed.

In general, the function transfer approach is better suited for policy sites which do not share similar characteristics or in situations where data on characteristics is unknown. However, the data requirements for the policy site are significant. And there will always remain the large share of unobservable variables which are important for WTP.

As an illustration, data is required on the characteristics of visitors to the policy site used in the regression, specifically annual household income (log), and the average distance travelled (log). If data on region of origin exists, it is possible to calculate average distance from the midpoint of this region. These variables were selected because they are commonly available at potential policy sites. Where policy sites involve prospective new development, initial scoping and audience prediction data may be used to compare study and policy sites.

Table 4-25 Function transfer: Data requirements and selection criteria

Data required from study sites	Data on visitor demographics: age, income, distance travelled/region of origin. Where relevant, data on site characteristics: e.g. type of site (historic city or cathedral), size, etc.
Data required at policy site	When differences are expected in characteristics of study and policy site characteristics and populations. When policy site visitor demographic data is available, adjustment of the variables contained in the function model may produce a more robust function transfer model and less error.
When to use this method	When the unit value transfer methods have low explanatory power. When there are considerable differences between sites to adjust for, but we know the main drivers responsible for the differences in WTP.
When not to use this method	When the study and policy site are similar in terms of the main drivers of WTP. When data on the demographics of the users of the policy site is not available.

The predicted WTP values and function coefficients required for function transfer are displayed in Table 4-26. We demonstrate how the function transfer is calculated using the example of the historic city user WTP regression below.

Equation 12

$$lWTP_{Policy} = -1.008 + 0.264 * Log\ income - 0.001\ * Log\ distance$$

For the purposes of benefit transfer, the regression coefficients from the model are multiplied by measures of the variables for the policy site to derive the log WTP estimate[122], and an exponential transformation then applied to arrive at the WTP estimate, correcting for the estimated WTP variance.

Table 4-26 Function transfer: Historic city and cathedral use WTP across four study sites: (OLS, robust standard errors) (relevant population weights applied)

	Historic city use WTP	Historic city non-use WTP	Cathedral use WTP	Cathedral non-use WTP
Mean transfer error	6.4%	13.4%	11.4%	13.7%

[122] following Rosenberger and Loomis 2003

Max transfer error	13.1%	34.8%	18.5%	27.9%
Function transfer values				
Log income, using income midpoints	0.264***	0.164**	0.290***	0.204***
Log geodesic distance to site (in km)	-0.001**	-0.001*		-0.001*
Gender (female)				0.2109***
Age				0.005***
Constant	-1.008	-0.3103	-1.557**	-1.323***
Observations	1466	1246	1059	1481
Adjusted R-squared	0.027	0.014	0.033	0.043

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Sample restricted to residents in England aged 16 and over. Sample weighted by user or non-user weights accordingly. Gross annual household income; averages computed using the midpoint of income categories. Heteroskedasticity-robust standard errors. Differences in model sample size due to lower omission of observations due to missing data for model covariates.*

5 References

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City and cathedral icons by Freepik from www.flaticon.com

6 Annexes

6.1 Survey exclusions

Table 6-1 Survey exclusions

Exclusion	General Population	City Booster	Cathedral booster	Total
Not assigned a city	0	138	0	138
Unreliable users from Main	801	0	0	801
Unreliable users from New Sample	14	0	0	14
City resident who selected wrong region	0	231	92	323
City resident whose postcode is not from the region	0	39	23	62
City non-users from Cathedral users	0	18	25	43
Cathedral users who never visited it	0	1	0	1
City visitors not in 2015/2018	0	443	71	514
Cathedral users not in 2015/2018	0	93	155	248
Speedsters	19	1	0	20
No gender for weighting	1	1	1	3
Selected a WTP City £200 or higher	1	3	7	11
No valid WTP values for cities	76	25	23	124
None	1352	757	827	2936

6.2 Sampling weights

To ensure representativeness to the populations of relevance (cathedral users, city users, and the general population of non-users), responses were weighted.[123] For weighting, we obtained information on the breakdown by age and gender for each of the target populations. There were separate target populations for the analysis of city user WTP, cathedral user WTP, and non-user WTP, which are described in more detail below. Each respondent in our survey sample was assigned a weight according to the following formula:

Equation 13

$$w_i = \frac{p_i}{s_i}$$

Here, p_i is the number of people in the respondent category determined by the values of the respondent's weighting variables in the target population, whereas s_i is the size of the same category in the survey sample. We dropped three respondents who indicated 'other' or 'rather not say' for the gender or age questions due to the inability to calculate weights for these individuals. After calculating the weights, we obtained weighted means for WTP or any other characteristic x according to the formula:

[123] Solon et al. 2013

Equation 14

$$\bar{x} = \frac{\sum_{i=1}^{N} x_i w_i}{\sum_{i=1}^{N} w_i}$$

The target populations were set as follows:

- For the City and cathedral non-users, this is the total population of England. To be 100% accurate, this should actually be equal to the total population of England *minus* the number of residents of and visitors to the city or the number of cathedral visitors respectively. However, the number of residents and visitors of the cities in our study, and especially of the cathedral visitors, is very small relative to the entire population of England. Therefore, subtracting them would not yield a significant change in the demographic composition of the target population so we ignore this factor for simplicity. The weighting variables for non-users were age, gender and region. Data on the total population of England and its demographic splits was taken from the Office for National Statistics 2011 Household Census.
- For the city users, the target population was set to be a sum of the city resident and city visitor populations. The city resident population was again taken from the 2011 Household Census. Information on city visitors was taken from the Great Britain Tourism Survey (three-year average for 2014-16). The visitor data is less accurate because it is based on a sample survey (not Census) and relies on extrapolation to arrive at population estimates. Furthermore, it lists data on the number of visits, which may overstate the number of visitors because some people will have visited more than once. The weighting variables for city users were age, gender, visitor/resident status, and local/non-local status. A respondent was identified as local if they were from the same region as the respective city being surveyed. All residents were by definition local. Separate city user weights were calculated for each city.
- For the cathedral users, there was unfortunately no sufficiently reliable external data to enable population weighting on the number or demographic composition of cathedral visitors. Given this, we assumed that the cathedral visitors in the survey were a random sample from the total cathedral visitor population (the booster survey which provided the cathedral user respondents did not have age or gender quotas). We therefore considered the user sample of a cathedral as surveyed in this study to be representative of the user population of that cathedral (and therefore we did not apply any correction to that extent).
- In addition, we apply survey weights as a further correction for the way people were screened into our survey. We apply weights to city and cathedral users based on their past visitor frequency. This means that for respondents of the City and Cathedral user surveys, we introduced a correction for the fact that respondents who were users of multiple cities or cathedrals were only asked to provide information on one of them. In the Non-user survey, each respondent was randomly presented each city and cathedral with 0.25 probability (in other words, they are randomly presented only one of the four cities).[124] In the user surveys, the city/cathedral that is presented to the respondent for valuation is randomly chosen only among those the respondent has been to. A respondent who reported having visited only one of the four sites will be presented that site throughout the survey and therefore has a probability 1 of being asked about that site, whereas a respondent who reported having visited n = (2, 3 or 4) of the 4 sites will have probability 1/n of being shown that site. This is corrected by multiplying the sampling weight by the number of sites lived in or visited (out of the four relevant for our study).

For the purposes of BT, we combined WTP values from multiple sites together, eliciting WTP from city users, city non-users, cathedral users and cathedral non-users across cities and cathedrals. There are several issues to consider when switching to pooled data analysis. For instance, some sites have larger sample sizes than others, which could give them

[124] Note that respondents are never duplicated across multiple cities/cathedral, i.e., respondent who visited two cathedrals but was randomly displayed Lincoln is included in analysis for Lincoln only.

undue weight in the pooled analysis. All weights within each site have therefore been equivalised[125] to attribute equal importance to all of four sites.

6.3 Cultural Value Benefits Transfer Pilot Results

We performed a pilot survey using a nationally representative panel of n=40 on 9th February 2018. Debrief questions were asked to ascertain how well participants were responding to the survey to identify potential areas in need of change prior to going into the field. The pilot survey also allowed us to test the range of willingness to pay (WTP) values in the payment cards, and add additional options if it appeared that the payment card was introducing a range bias by not providing sufficient high or low values, following best practice in CV design. The pilot was performed under identical conditions to the full survey.

6.3.1 City and cathedral visits

Table 6-2 shows the numbers of respondents who visited the city/cathedral that were randomly assigned to them at the start of the survey. This dictated whether they were classified as a visitor or non-visitor for the purposes of WTP.

Table 6-2 City and cathedral visits

City	City resident (now or in past 3 years)	City visitor (past 3 years)	City non-visitor	Cathedral visitor	Cathedral non-visitor
Canterbury	1	0	10	1	9
Lincoln	0	2	9	1	10
Winchester	0	2	7	1	8
York	0	3	6	2	7

We note that this figure is based on a small sample of n=40 people, and that the sample design is based on 3 surveys: A general population with natural fall out, a booster targeted on city visitors/residents, and a final booster targeted on cathedral visitors. These samples have been guaranteed to provide the minimum 250 completed responses we require in each bucket.

We asked specific questions about the valuation section related to potential issues of hypothetical bias.

In the first valuation scenario (CITY), we asked all respondents (visitors and non-visitors) the maximum they would be willing to pay to support the conservation of the historic character of the city through a one-off donation to an independent fund, to reduce the damage caused by climate change and improve the maintenance and conservation of the historic buildings in [CITY]

- 85% (n=34) found valuation scenario one realistic in follow up questions
- 8% (n=3) did not find it realistic. 3 respondents replied 'Don't know

In the second valuation scenario (CATHEDRAL), we asked all respondents the maximum they would be willing to pay to reduce the damage caused by climate change and improve the maintenance and conservation of the [CATHEDRAL]

- Again, 85% (n=34) found valuation scenario two realistic in follow up questions

[125] By dividing each type of weight by the sum of its type of weights (i.e. dividing each city user weight by the sum of city user weights, etc.). This makes the sum of each type of weights to be 1.

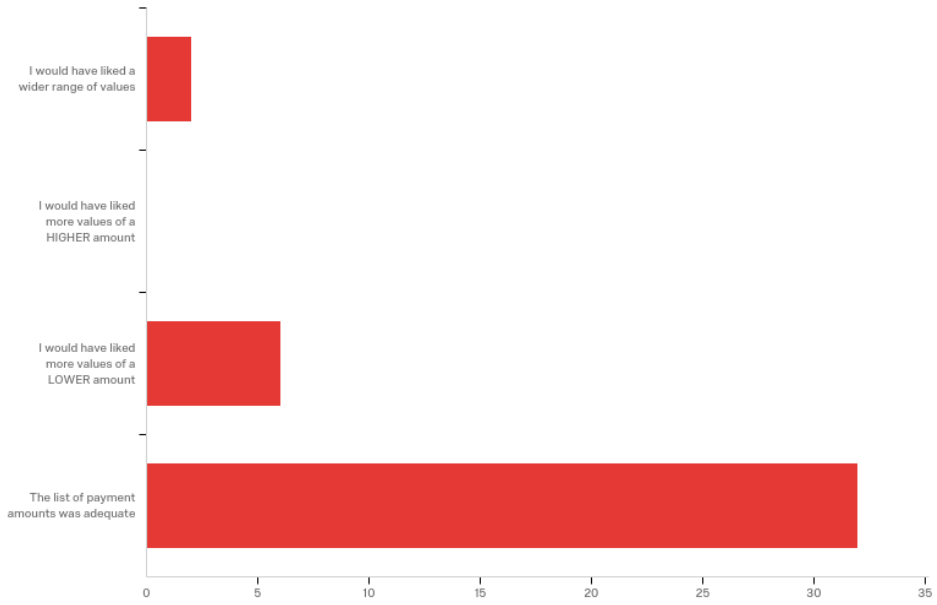
- 8% (n=3) did not find it realistic. 3 respondents replied 'Don't know

95% (n=38) indicated that they had **enough information about each of the sites** to answer the survey. 5% (n=2) would have liked less information.

6.3.2 Willingness to pay range

We asked if the range of payment amounts shown in the WTP payment ladder was adequate, in terms of the number of values shown and the range of values (either as an entry fee or donation).

Figure 6-1 WTP Value range



- **80% (n=32) found the WTP range presented in the survey to be adequate**. 5% (n=2) would have liked a wider range of values. Six individuals would have liked more values of a lower amount

We therefore investigated the WTP range elicited during the pilot, to identify any need for additional amounts at the higher or lower range of the payment card.

6.3.3 WTP results

We first asked respondents whether they were in principle willing to pay to support the conservation of the historic character of the city through a one-off donation to an independent fund, to reduce the damage caused by climate change and improve the maintenance and conservation of the historic buildings in the city / the cathedral (Table 6-3 and Table 6-4).

- In valuation scenario one, 52% respondents were willing to pay in principle a one-off donation to preserve the historic character of the city (yes or maybe). 48% were not willing to pay in principle (and were assigned a £0 bid).
- In valuation scenario two, 52% respondents were willing to pay in principle a one-off donation to preserve the historic character of the cathedral (yes or maybe). 48% were not willing to pay in principle (and were assigned a £0 bid).

Table 6-3 WTP City/Cathedral in principle – Yes/Maybe/No

	WTP City in principle		WTP Cathedral in principle	
	%	Count	%	Count
Yes	20.00%	8	25.00%	10
Maybe	32.50%	13	27.50%	11
No	47.50%	19	47.50%	19
Total	100%	40	100%	40

Table 6-4 Mean WTP– Including those who answered No in principle recoded as £0

	Count	Mean (£)	Max (£)	Zero (count)
City Visitor/Resident	6	£12.00	£30	1
City Non-visitor	32	£5.78	£30	19
Cathedral Visitor	5	£19.00	£50	0
Cathedral Non-visitor	35	£5.14	£30	20

Note: visitor sample sizes are not yet sufficient to break down mean WTP by site.

Mean WTP a one-off donation is higher for visitors (£12 for cities, £19 for cathedrals) than for non-visitors (£5.78 for cities, £5.15 for cathedrals) which aligns with prior expectations. Those not willing to pay in principle have been recoded as £0 bids.

Zero bids (mostly made up of those not WTP in principle) are higher for non-visitor samples (around two-thirds of the non-visitor samples) which is within prior expectations.

These initial estimates are based only on pilot data of n=40 answers to the WTP question. The values they are based on are actual WTP bids, and have not been converted to midpoints as occurs in the final analysis and the purpose of the pilot was to assess whether the range provided is sufficient. The low sample sizes of the pilot mean that its WTP figures reported above should not be used for the purpose of estimation.

6.3.4 WTP: Range

We tested the range provided in the payment ladder though the pilot survey **Table 6-5 shows the range of values given by respondents**.

These findings lead us to conclude that the WTP payment ladder range is set realistically.

Table 6-5 WTP Value Range

City Visitor/Resident	City Non-visitor	Cathedral Visitor	Cathedral Non-visitor
£0	£0	£5	£0
£1	£2	£10	£1
£5	5	£20	£2
£10	£8	£50	£4
£20	£10		£5

£30	£15		£10
	£25		£15
	£30		£18
			£20
			£30

Note. Frequency of amount selected not shown here.

6.3.5 WTP: Recurring annual donation

We asked respondents "Would you prefer to pay an annual recurring donation" after the main WTP question.

The results below show those who were willing to pay a recurring annual donation for the historic city/cathedral.

- 7 respondents were willing to pay a recurring annual donation for the city instead of the one-off donation
- 6 respondents were willing to pay a recurring annual donation for the cathedral instead of the one-off donation

Table 6-6 Willingness to pay recurring annual donation to support historic city / cathedral

	Count	Mean (£)	Max (£)	Zero (count)
City recurring donation	7	£21.43	£50	NA
Cathedral donation	6	£19.17	£35	NA

Three respondents gave inconsistent answers, whereby the annual recurring figure was higher than the one-off donation (Table 7). One of these respondents gave inconsistent answers twice. This inconsistency suggests that the value they gave initially for the one-off donation was not their actual maximum WTP, or that the annual donation question was not fully understood.

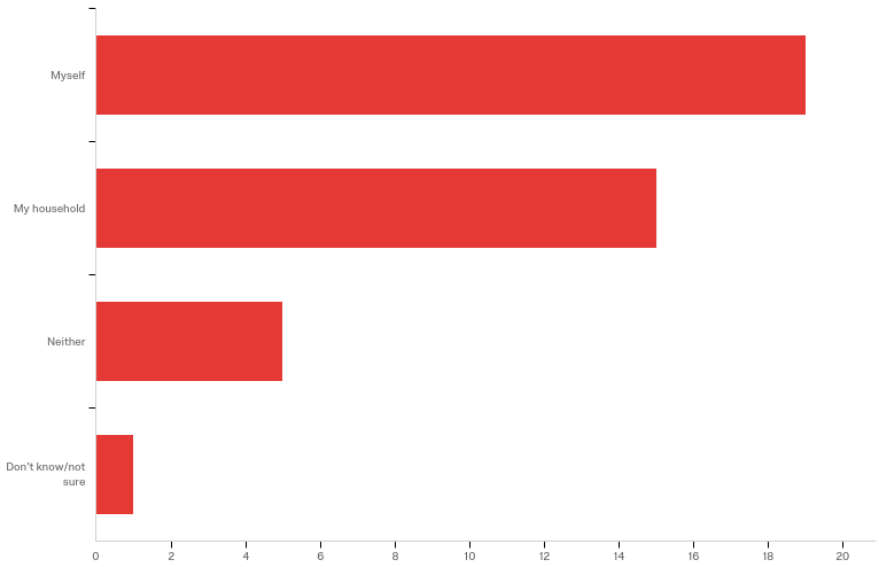
Table 6-7 Inconsistent response: One-off and recurring annual donation

	Inconsistent responses: City		Inconsistent responses: Cathedral		
ID	One off donation	Recurring donation	ID	One off donation	Recurring donation
100006	£ 30.00	£ 50.00	100006	£ 50.00	£ 35.00
100027	£ 25.00	£ 40.00	100027	£ 18.00	£ 35.00
100024	£ 10.00	£ 10.00	100024	£ 5.00	£ 15.00

6.3.6 Household vs individual WTP

In follow-up questions we asked if the WTP that they stated was for themselves (as an individual) or for their whole household. Note that the WTP questions clearly state "What is the maximum you would be willing to pay, on behalf of your household…?"

Figure 6-2 Household vs individual WTP



- Household WTP = 48% (n=19)
- Individual WTP = 38% (n=15)
- Neither = 13% (n=5)

The follow-up questions suggested that respondents are inconsistent in whether they think their WTP is for them as an individual or for their household.

6.3.7 Independence of city and cathedral questions

The nested nature of the survey design requires that the WTP for the cathedral and WTP for the cathedral are considered as two independent payments by the respondent. Text was provided to that effect throughout the survey:

- "We will ask you to value two alternative (either/or) scenarios: one where we ask how much it is worth to you and your household to protect all the city's historic heritage (including the cathedral); or instead an alternative scenario where we ask how much it is worth to you and your household to protect just the [CATHEDRAL] alone. Suppose that only one of these scenarios will go ahead, so you would not be asked to contribute to both simultaneously."
- "Remember, under this scenario, you would no longer be asked to pay for to support the Friends of [CITY]"

In follow up questions we asked: "Which of the following statements best describes your answers to the two valuation questions you were asked (the donation to support the Friends of [CITY] group and the donation to support the Friends of [CATHEDRAL] group:

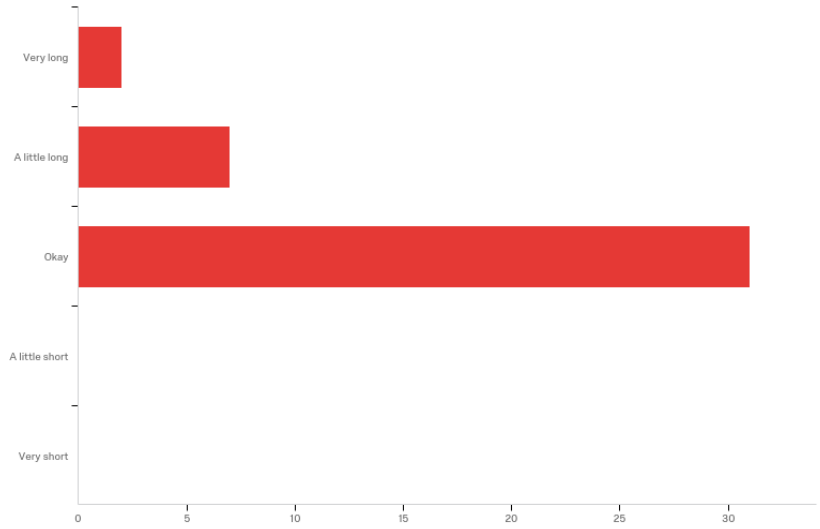
- 35% considered the two WTP payments to be independent
- 40% (n=16) considered the two WTP payment to be connected, and that the WTP for the city influenced their subsequent WTP for the cathedral.

Table 6-8 Independence of city and cathedral WTP

Answer	%	Count
The two valuation questions were independent: The amount I paid for the [CITY] had no bearing on the [CATHEDRAL]	35.00%	14
The two valuation questions were connected: The amount I paid for the [CITY] influenced how much I paid for the [CATHEDRAL]	40.00%	16
I do not remember	15.00%	6
I did not answer two valuation questions	10.00%	4

6.3.8 Survey length

Figure 6-3 Length: Did you find the survey:



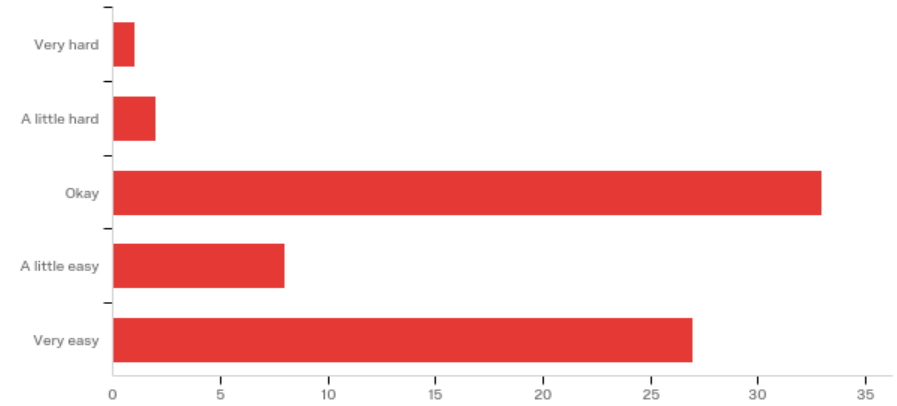
- In terms of **length**, 78% (n=31) found the survey length okay. 18% (n=7) found the pilot survey a little long, while a minority of 5% (n=2) found the survey very long.
- Average survey length was 17 minutes (we estimated 15 minutes during internal tests). However, this was driven by outliers who responded in over 25 minutes (n=6)

Table 6-9 Survey length data

Average (mins)	0:17:20
Max (mins)	0:39:07
Min (mins)	0:07:03
Outliers >20 mins	11
Outliers >25 mins	6

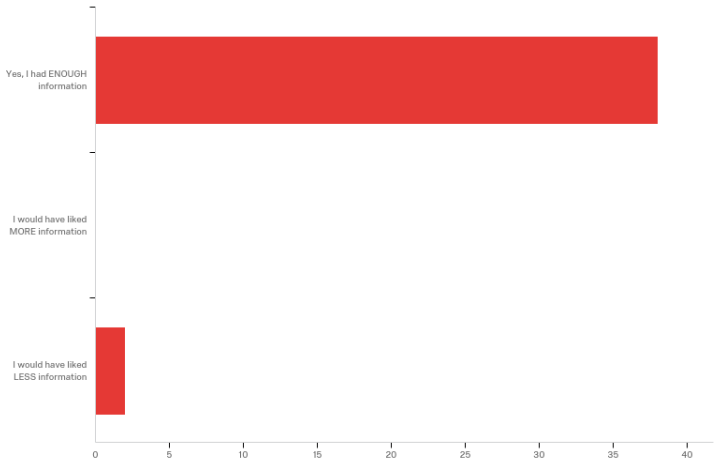
6.3.9 Survey difficulty

Figure 6-4 Difficulty: Did you find the survey:



- In terms of **difficulty**, 95% (n=38) found the survey either okay or easy.

Figure 6-5 Information: Did we provide sufficient information on the purpose and aims of the survey?



- 95% of respondents (n=38) indicated that they had **enough information** on the purpose and aims of the survey.
- 89% of respondents (n=35) found the **images** helpful for answering this survey.

In terms of **sensitivity**, 4 respondents indicated that they found some of the questions personal or sensitive. These respondents did not provide any further information when given an opportunity to do so with an open text box.

6.4 Description of variables

Table 6-10 Variable labels and description

Variable name	Variable label	Variable categories
city_user	City user	0 = City non-user 1 = City user
cath_user	Cathedral user	0 = Cathedral non-user 1 = Cathedral user

city_visitor	City visitor in past 3 years	0 = Resident 1 = Visitor
city_resident	City current or past 3 years resident	0 = Visitor 1 = Current or past 3 years resident
resident_10years	Lived in the city for more than 10 years	0 = Lived in city for fewer than 10 years 1 = Lived in city for more than 10 years
lage	Log age, using age midpoint	Continuous variable ranging from 2.89 to 4.31
lhhincome	Log income, using income midpoints	Continuous variable ranging from 8.92 to 11.91
female	Female	0 = Male 1 = Female
degree	With a degree	0 = Without a degree 1 = With a degree
dep_child	With dependent children	0 = No dependent children 1 = With dependent children
married	Married or in a civil partnership	0 = Not married or in a civil partnership 1 = Married or in a civil partnership
employed	Employed	0 = Not employed 1 = Employed
bame	Black Asian Minority Ethnic Group	0 = White 1 = Black Asian Minority Ethnic Group
religious	Belongs to a religion	0 = Does not belong to a religion 1 = Belongs to a religion
live_london	Lives in London	0 = Does not live in London 1 = Lives in London
good_health	In good health	0 = Not in good health 1 = In good health
region	In which region of England are you currently living?	1 = East Midlands 2 = East of England 3 = Greater London 4 = North East 5 = North West 6 = South East 7 = South West 8 = West Midlands 9 = Yorkshire and the Humber
org_member	Member of heritage, conservation or environmental organisation	0 = Not a member 1 = Member of heritage conservation or environmental organisation
visit_cultural	Been on a cultural visit in last 12 months	0 = Not visited in last 12 months 1 = Been on a recreational/educational visit in last 12 months
visit_entertainment	Been on an entertainment visit in last 12 months	0 = Not visited in last 12 months 1 = Been on an entertainment visit in last 12 months

spending_her_art_env	Selected heritage or arts in Top 5 of public spending	0 = Did not select 1 = Selected heritage or arts in Top 5 of public spending
cathedral_agree	Agree to '[CATHEDRAL] is a national treasure to be preserved for future generation	0 = Disagree with statement 1 = Agree that the cathedral is a national treasure to be preserved for future generations
historic_agree	Agree to 'The historic character of [CITY] has a value even for those who do not	0 = Disagree with statement 1 = Agree that the historic character of the city has a value even for those who do not visit
spending_agree	Agree to 'There are more important things to spend money on than preserving heritage	0 = Disagree with statement 1 = Agree that there are more important things to spend money on than preserving heritage
wellbeing_agree	Agree to 'Visiting heritage sites increases one's wellbeing (happiness)'	0 = Disagree with statement 1 = Agree that visiting heritage sites increases one's wellbeing
city_familiar	Familiarity with city information (very or extremely familiar)	0 = Moderately/Slightly/Not familiar at all 1 = Very or extremely familiar
city_visit_3	City visitor - Seen outside of cathedral during visit	0 = No 1 = Yes
cath_1	Cathedral - Visited in lifetime	0 = No 1 = Yes
visits_4	Taken to museums, etc. when growing up	0 = No 1 = Yes
wtp_city_efu	WTP a one-off donation (City)	Continuous variable ranging from 0 to 175
wtp_city_4	Willing to pay	0 = No 1 = Yes 2 = Maybe
ldistance	Log distance to allocated cathedral	Continuous variable ranging from -1.14 to 7.66
wtp_cath_5	Willing to pay	0 = No 1 = Yes 2 = Maybe
wtp_cath_efu	WTP a one-off donation (Cathedral)	Continuous variable ranging from 0 to 131.25

6.5 Sensitivity analysis: Certainty questions

6.5.1 Mean certainty levels

As discussed in Section 2.5.1, the effect of certainty on WTP has been found in some previous studies to be negative, suggesting that it is easier to be certain about paying small amounts Bedate et al. 2009. However, this may not always be the case: it may equally be that those responding with a large amount have thought more deeply about the true value of the change being proposed, and that their higher value responses are therefore more considered and thoughtful than the lower value responses of others.

Table 6-11 shows the mean level of certainty given by each study group related to their stated willingness to pay (measured as a percentage).

City user: The average level of certainty across the pooled city user sample was 73%, with the highest levels of certainty recorded for Lincoln (75%) and lowest certainty for Winchester (70%).

City non-user: The average level of certainty across the pooled city non-user sample was lower compared to city users (69%), with the highest level of certainty recorded for York (73%) and lowest certainty again for Winchester (65%).

Cathedral user: The average level of certainty across the pooled cathedral user sample was higher (76%), with low variation from this mean across the four cathedral sites.

Cathedral non-user: The average level of certainty across the pooled cathedral non-user sample was 74%, with the highest levels of certainty recorded for the Lincoln and York (76%) and lowest certainty for Winchester (71%).

Table 6-11 Historic city/ cathedral user/ non-user: Level of respondent certainty of their actual willingness to pay (%)

	Canterbury	Lincoln	Winchester	York	Pooled
City user Certainty %	72.9%	75.2%	69.6%	72.9%	72.7%
City non-user Certainty %	68.7%	70.1%	65.2%	72.5%	69.1%
Cathedral user Certainty %	73.6%	76.9%	75.8%	75.3%	75.4%
Cathedral non-user Certainty %	72.1%	75.6%	70.5%	76.0%	73.5%

Sample restricted to residents in England aged 16 and over. Sample excludes speedsters, and inconsistent follow-up responses at the museum-level ('I do not believe I would have to pay in reality'). Sample weighted by user or non-user weights accordingly.

6.5.2 City users

Table 6-12 shows the association between certainty (measured as a percentage) and mean WTP for city users. Note that we tested for the effects of certainty only on respondents who were presented with the payment card, since those who indicated that they were not willing to pay in principle were not presented with either the certainty question or the payment card.

The association between certainty and mean WTP is significant within the pooled city user regression, indicating that certainty is significantly and positively associated with higher mean use WTP among historic city users. This positive and significant association is also found in two of the city user models (Canterbury and York). As hypothesized above, it may be that those responding with a large amount have thought more deeply about the true value of the change being proposed, and that their higher value responses were therefore more considered and thoughtful than the lower value responses of others.

Table 6-12 Certainty levels associated with city users WTP, as a one-off donation to preserve the historic city

	Canterbury	Lincoln	Winchester	York	Pooled historic city
Certainty (%)	0.004*	0.003	0.001	0.006**	0.004***
Female	-0.275**	0.022	0.272*	-0.066	-0.020
Log age, using age midpoint	0.231	0.767***	0.580***	0.092	0.488***
Log income, using income midpoints	0.214***	0.118	0.290***	0.112	0.201***
Degree and above	-0.060	0.155	-0.201	0.231**	0.041
With dependent children	0.301**	0.269*	0.139	0.109	0.204***

Selected heritage or arts in Top 5 of public spending	0.233*	0.237	0.349**	0.088	0.254***
Familiarity with city information (very or extremely familiar)	0.111	-0.004	0.231	0.325**	0.175**
Agree to 'Visiting heritage sites increases one's wellbeing (happiness)'	0.355**	0.019	0.151	0.275	0.197**
Log distance: Home postcode to cathedral	-0.056	-0.082	-0.022	-0.178	-0.064**
Constant	-1.215	-1.881	-3.183***	0.947	-1.960***
Observations	251	244	233	291	1019
Adjusted R2	0.211	0.131	0.223	0.131	0.156

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Reference group: for gender ref = male; for BAME ref = white; for education Degree and above ref = all qualifications under Degree; for Dependent children ref = no children; for Familiar with city information: Very/Extremely ref = not at all – moderately familiar. Gross annual household income; averages computed using the midpoints of the income and age categories. Heteroskedasticity-robust standard errors. All VIF scores <2 in pooled regression.*

6.5.3 City non-users

The association between certainty and mean WTP is not significant within the pooled city non-user regression, or for any individual city non-user models.

Table 6-13 Factors associated with non-user willingness to pay, as a one-off donation to preserve the historic city

	Canterbury	Lincoln	Winchester	York	Pooled city regression
Certainty (%)	0.006	0.001	0.001	0.003	0.002
Female	0.118	-0.399**	-0.138	-0.133	-0.153*
Log age, using age midpoint	0.357	0.254	-0.238	0.089	0.129
Log income, using income midpoints)	0.102	0.242*	0.073	0.085	0.156**
Degree and above	-0.131	-0.105	0.004	0.131	-0.086
With dependent children	-0.297	0.135	-0.156	0.125	-0.015
Selected heritage or arts in Top 5 of public spending	-0.075	0.073	0.323**	0.393**	0.206**
Member of heritage, conservation or environmental organisation	0.368*	0.056	0.342**	0.453*	0.317***
Familiarity with city information (very or extremely familiar)	0.584**	-0.821**	-0.126	0.436	0.191
Agree to 'There are more important things to spend money on than preserving heritage'	-0.172	-0.698**	-0.136	-0.087	-0.180
Constant	-0.688	-1.158	2.289*	0.420	-0.102
Observations	163	166	191	134	654
Adjusted R2	0.075	0.115	0.096	0.029	0.064

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Reference group: for gender ref = male; for BAME ref = white; for education Degree and above ref = all qualifications under Degree; for Dependent children ref = no children; for Familiar with city information: Very/Extremely ref = not at all – moderately familiar. Sample restricted to residents in England aged 16 and over. Sample weighted by city non-user*

weights. Gross annual household income; averages computed using the midpoints of the income and age categories. Heteroskedasticity-robust standard errors. All VIF scores <2 in pooled regression.

6.5.4 Cathedral users

The association between certainty and mean WTP is significant within the pooled cathedral user regression, indicating that certainty is significantly and positively associated with higher mean use WTP among cathedral users. This positive and significant association is also found in all of the cathedral user models. As hypothesized above, it may be that those responding with a large amount had thought more deeply about the true value of the change being proposed, and that their higher value responses are therefore more considered and thoughtful than the lower value responses of others.

Table 6-14 Certainty level associated with cathedral users WTP, as a one-off donation to help preserve the cathedral

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster	Pooled cathedral regression
Certainty (%)	0.012***	0.011***	0.010***	0.010***	0.011***
Dummy for cathedral elicitation method: 1=Allocation of city WTP; 0=Independent cathedral WTP	-0.460	-0.001	-0.282	0.227	-0.103
Female	-0.202	-0.111	0.220	-0.083	-0.069
Log age, using age midpoint	0.197	0.356*	0.362**	0.118	0.257***
Log income, using income midpoints)	0.124	0.152	0.342***	0.129	0.184***
Degree and above	0.219*	-0.167	0.158	0.079	0.066
With dependent children	0.377***	-0.036	0.093	0.467***	0.233***
Selected heritage, arts, or environment in Top 5 of public spending	0.096	0.236	0.527***	0.346**	0.304***
Cathedral - # of visits in lifetime	0.030	0.115*	0.058	-0.010	0.029
Familiarity with cathedral information (very or extremely familiar)	0.006	0.323	0.099	0.312	0.151
Agree to 'Visiting heritage sites increases one's wellbeing (happiness)'	0.254**	0.169	-0.143	0.248	0.174**
Log distance: Home postcode to cathedral	-0.088*	0.115	0.087	-0.049	-0.011
Constant	-0.618	-2.735*	-4.306***	-1.267	-2.118***
Observations	199	181	174	193	747
Adjusted R2	0.215	0.109	0.290	0.244	0.185

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Reference group: for gender of audio information ref = male; for gender ref = male; for BAME ref = white; for education Degree and above ref = all qualifications under Degree; for Dependent children ref = no children; for Familiar with city information: Very/Extremely ref = not at all – moderately familiar. Sample restricted to residents in England aged 16 and over. Gross annual household income; averages computed using the midpoints of the income and age categories. Heteroskedasticity-robust standard errors. All VIF scores <2 in pooled regression.*

6.5.5 Cathedral non-users

The association between certainty and mean WTP is not significant within the pooled cathedral non-user regression. A positive and significant association is found in one of the city user models (Canterbury).

Table 6-15 Certainty level associated with cathedral non-users WTP, as a one-off donation to preserve the cathedral

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster	Pooled cathedral regression
Certainty (%)	0.005*	0.003	0.001	0.000	0.002
Dummy for cathedral elicitation method: 1=Allocation of city WTP; 0=Independent cathedral WTP	-0.106	-0.085	0.137	0.250	0.048
Female	-0.018	-0.084	0.050	0.005	-0.022
Log age, using age midpoint	0.214	0.182	0.046	0.236*	0.188**
Log income, using income midpoints)	0.283***	0.116	0.120	0.187*	0.178***
Degree and above	-0.264*	-0.195	-0.045	0.209	-0.060
With dependent children	-0.070	0.082	-0.123	0.290*	0.034
Member of heritage, conservation or environmental organisation	0.322**	0.091	0.125	0.265*	0.206***
Familiarity with cathedral information (very or extremely familiar)	-0.218	0.360	0.483	0.280	0.080
Agree to 'There are more important things to spend money on than preserving heritage'	-0.362**	-0.224	-0.124	0.191	-0.138
Constant	-2.208**	-0.269	0.033	-1.619*	-1.101**
Observations	208	209	232	197	846
Adjusted R2	0.135	0.009	-0.012	0.108	0.055

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Reference group: for gender ref = male; for BAME ref = white; for education Degree and above ref = all qualifications under Degree; for Dependent children ref = no children; for Familiar with city information: Very/Extremely ref = not at all – moderately familiar. Sample restricted to residents in England aged 16 and over. Gross annual household income; averages computed using the midpoints of the income and age categories. Heteroskedasticity-robust standard errors. All VIF scores <2 in pooled regression.*

6.6 Follow-up questions: Reasons willing / not willing to pay

Table 6-16 City user: Reason willing to pay donation

Reason	N	Mean	Median	Min	Max
I like visiting/I enjoy CITY	206	£11.33	£5.5	£0.13	£175
I think visitor enjoyment could be improved if CITY had more funds	59	£14.50	£8.5	£0.625	£52.5
I may want to visit CITY in the future	83	£9.64	£5.5	£1.25	£67.5
CITY is an important site of cultural heritage that should be protected	360	£15.51	£11	£0.13	£175
The historic character of CITY is an important source of local pride	109	£18.02	£11	£0.625	£112.5
I would not actually pay the amounts stated	0				
My willingness to pay is not just for conservation of historic buildings in CITY but also for the conservation of historic buildings elsewhere.	267	£13.92	£8.5	£0.13	£112.5
Other	14	£11.19	£11	£1.25	£52.5
Don't know / rather not say	6	£5.67	£5.5	£2.25	£11

Table 6-17 City non-user: Reason willing to pay donation

Reason	N	Mean	Median	Min	Max
I like visiting/I enjoy CITY	16	£14.02	£5.5	£0.13	£112.5
I think visitor enjoyment could be improved if CITY had more funds	38	£10.22	£5.5	£0.13	£175
I may want to visit CITY in the future	142	£9.62	£5.5	£0.625	£112.5
CITY is an important site of cultural heritage that should be protected	195	£13.69	£11	£0.625	£112.5
The historic character of CITY is an important source of local pride	32	£12.90	£5.5	£0.625	£112.5
I would not actually pay the amounts stated	0				
My willingness to pay is not just for conservation of historic buildings in CITY but also for the conservation of historic buildings elsewhere.	226	£10.70	£5.5	£0.13	£112.5
Other	12	£6.82	£4.5	£1.25	£22.5
Don't know / rather not say	24	£10.62	£5.5	£1.25	£45

Table 6-18 Cathedral user: Reason willing to pay donation

Reason	N	Mean	Median	Min	Max
I would not actually pay the amounts stated	0				
My willingness to pay is not just for conservation of CATHEDRAL but also for the conservation of historic buildings elsewhere	120	£12.32	£4.4	£0.034	£131.25
I like visiting/I enjoyed my visit to CATHEDRAL	84	£6.59	£3.85	£0.36	£111.37
I think visitor enjoyment could be improved if CATHEDRAL had more funds	21	£6.67	£5.5	£0.38	£15.39
I may want to visit CATHEDRAL in the future	61	£7.74	£3.46	£0.04	£73.12
CATHEDRAL is an important historic building that should be protected	233	£8.41	£4.87	£0.07	£78.75
CATHEDRAL is an important religious building that should be protected	84	£10.62	£4.56	£0.01	£93.37
CATHEDRAL is an important source of local pride	41	£14.22	£5.61	£1.12	£124.25
The cathedral contributes to the attractiveness of the city	38	£9.40	£3.35	£0.55	£108.5
Other	0				
Don't know / rather not say	2	£2.82	£2.82	£0.02	£5.61

Table 6-19 Cathedral non-user: Reason willing to pay donation

Label	N	Mean	Median	Min	Max
I would not actually pay the amounts stated	0				
My willingness to pay is not just for conservation of CATHEDRAL but also for the conservation of historic buildings elsewhere	175	£6.30	£4.45	£0.07	£45
I like visiting/I enjoyed my visit to CATHEDRAL	22	£7.00	£5.5	£0.72	£22.5
I think visitor enjoyment could be improved if CATHEDRAL had more funds	33	£5.70	£3.3	£0.38	£32.55
I may want to visit CATHEDRAL in the future	106	£5.23	£3.19	£0.26	£45
CATHEDRAL is an important historic building that should be protected	293	£6.71	£4.5	£0.02	£112.5

CATHEDRAL is an important religious building that should be protected	81	£8.34	£3.69	£0.14	£90
CATHEDRAL is an important source of local pride	26	£9.32	£5.2	£0.40	£67.5
The cathedral contributes to the attractiveness of the city	51	£4.95	£2.75	£0.27	£43.05
Other	9	£4.27	£2.80	£0.62	£11
Don't know / rather not say	23	£4.98	£4.12	£0.01	£13.5

6.7 Data sources for weighting

For both city non-user and cathedral non-user weights, the target population was the total adult population of England (aged 16 and above). This was taken from the 2011 UK Census, broken down by age categories, gender and region (downloaded from Nomis Web and presented in the table below).

Table 6-20 Total adult population of UK broken down by gender, age category and region

gender	age	East Midlands	East	London	North East	North West	South East	South West	West Midlands	Yorkshire
Male	< 16	429072	568093	830271	237236	678574	842832	476037	560670	508890
Female	< 16	409383	540539	794497	225201	645974	799252	453641	533772	488902
Male	16-19	122217	146671	191281	70179	187920	222528	134968	152184	143448
Female	16-19	117518	138628	186779	68011	181033	212240	129106	145305	139423
Male	20-24	154922	180048	310403	93423	245080	270841	170390	192838	192459
Female	20-24	152754	172926	319569	90595	244560	263446	162776	188071	190220
Male	25-29	138864	180892	412188	81454	233143	263534	155191	182037	173233
Female	25-29	139717	181751	420778	82849	233439	264523	151968	181249	174071
Male	30-34	133906	180748	403225	74912	214455	266024	149106	170956	161571
Female	30-34	133897	183060	393663	76240	215230	272447	147685	172339	159757
Male	35-39	144433	192051	336264	77110	222369	284695	159569	180186	168905
Female	35-39	147419	195600	327782	80039	227680	293316	162795	179917	168986
Male	40-44	165981	213707	304686	89591	254350	318221	185029	201570	190306
Female	40-44	169902	218807	305334	93641	260452	326575	190509	204677	192596
Male	45-49	168881	215729	273747	96191	257533	324463	192130	200724	190360
Female	45-49	171351	219972	282909	99829	264818	328795	197453	203306	191624
Male	50-54	148896	189313	228084	89282	230877	282878	172599	174851	170949
Female	50-54	149829	191056	233206	92097	234263	284956	177834	176270	172855
Male	55-59	134434	167417	181543	79385	204381	245086	157923	159216	152360
Female	55-59	135497	173209	190393	81560	205247	250679	165275	160469	152918
Male	60-64	144616	181519	165592	82644	218521	261924	176244	165509	160571
Female	60-64	146785	191047	176998	85932	221123	273475	185263	169756	164758
Male	65-69	113882	143691	121114	62647	166900	205415	144901	136850	122565
Female	65-69	118278	150638	135658	65864	175340	218875	152539	142954	130043

Male	70-74	87782	113333	100729	51571	134704	160646	112610	107641	98937
Female	70-74	94771	123731	115557	59160	150798	178759	122852	118244	112304
Male	Over 75	146607	202595	174162	84078	215878	290211	203911	177955	163524
Female	Over 75	211628	290194	257529	126165	327535	428114	298631	262331	247198

For city user weights, the target population was the sum of the resident and visitor population of the respective city. The resident population is taken from the 2011 UK Census, broken down by age categories and gender (downloaded from Nomis Web). The population of visitors in the past 3 years was derived from the Great Britain Tourism Survey for 2014-2016 and downloaded from Visit England. The breakdown by age, gender and local origin (defined as from within the same region) was calculated using the demographic statistics for the visitors of York (York visitor Survey), Kent Country visitor demographics for Canterbury, South East visitor demographics for Winchester and East Midlands visitor demographics for Lincoln.

Table 6-21 Resident/visitor population broken down by gender, age category and city

gender	age	resident	local	Canterbury	Lincoln	Winchester	York
Male	< 16	resident	Local	12984	7966	11172	16192
Female	< 16	resident	Local	12190	7385	10313	15584
Male	16-24	resident	Local	13470	8320	6795	15527
Male	16-24	visitor	Local	4822.272	25306.1	25631.97	26075.26
Male	16-24	visitor	non-Local	25316.93	9170.876	6367.994	42543.84
Female	16-24	resident	Local	14300	9598	7401	16277
Female	16-24	visitor	Local	4451.328	27196.18	22913.43	23123.34
Female	16-24	visitor	non-Local	23369.47	9855.838	5692.601	37727.56
Male	25-34	resident	Local	7912	7249	5803	13515
Male	25-34	visitor	Local	5511.168	25665.9	28871.18	33186.69
Male	25-34	visitor	non-Local	28933.63	9301.268	7172.74	54146.71
Female	25-34	resident	Local	8004	7029	6063	13196
Female	25-34	visitor	Local	5087.232	27582.86	25809.09	29429.71
Female	25-34	visitor	non-Local	26707.97	9995.968	6411.995	48016.89
Male	35-44	resident	Local	8318	5893	7751	13024
Male	35-44	visitor	Local	5855.616	14392.1	17322.71	35557.17
Male	35-44	visitor	non-Local	30741.98	5215.664	4303.644	58014.33
Female	35-44	resident	Local	9066	5590	8028	13242
Female	35-44	visitor	Local	5405.184	15467.02	15485.45	31531.83
Female	35-44	visitor	non-Local	28377.22	5605.216	3847.197	51446.67
Male	45-54	resident	Local	8994	5727	8298	12683
Male	45-54	visitor	Local	6200.064	19069.53	23660.28	45039.08
Male	45-54	visitor	non-Local	32550.34	6910.755	5878.148	73484.82
Female	45-54	resident	Local	9419	5838	8586	13031
Female	45-54	visitor	Local	5723.136	20493.81	21150.86	39940.32

Female	45-54	visitor	non-Local	30046.46	7426.911	5254.708	65165.78
Male	55-64	resident	Local	8707	4808	7184	10902
Male	55-64	visitor	Local	5166.72	12713.02	17745.21	37927.65
Male	55-64	visitor	non-Local	27125.28	4607.17	4408.611	61881.95
Female	55-64	resident	Local	9336	4812	7422	11463
Female	55-64	visitor	Local	4769.28	13662.54	15863.14	33633.95
Female	55-64	visitor	non-Local	25038.72	4951.274	3941.031	54876.45
Male	65+	resident	Local	12253	5810	9626	14411
Male	65+	visitor	Local	6888.96	22787.48	27603.66	28445.74
Male	65+	visitor	non-Local	36167.04	8258.135	6857.839	46411.46
Female	65+	resident	Local	16192	7516	12153	19004
Female	65+	visitor	Local	6359.04	24489.46	24676	25225.46
Female	65+	visitor	non-Local	33384.96	8874.925	6130.493	41157.34

6.8 Sensitivity analysis: Cathedral WTP coded as £0 if not willing to allocate their city WTP specifically to the cathedral

As outlined in Section 3.3, subjective analytical judgement had to be taken when considering how to deal with those respondents (n=175) who gave a positive value to the city WTP question, but indicated when asked that they would not be willing to allocate a specific proportion of their overall city WTP towards the maintenance and preservation of the cathedral. 72 of those respondents were cathedral users and 103 were cathedral non-users. The original decision was made to code these respondents as 'missing' for the purposes of cathedral WTP analysis, to account for the fact that we do not know if these individuals had a zero value for the cathedral, or were simply happy for the cathedral to be protected as part of the automatic allocation of funds to the cathedral from the overall city-wide preservation measures. This was chosen as the best available approach given the incomplete information we had about their preferences. However, we acknowledge that this may introduce some upward bias in the WTP results. We therefore perform sensitivity analysis to explore how cathedral WTP results would have differed if we had taken a stricter interpretation and assumed that respondents who were not willing to allocate actually had a zero value for the preservation of the cathedral.

In this annex, we included these respondents and coded their WTP for the cathedral to be £0.

6.8.1 Cathedral users

6.8.1.1 WTP summary statistics (cathedral use values)

Table 6-22 shows the proportion of cathedral users who indicated that they were in principle willing to reduce the damage caused by climate change, improve the maintenance and conservation of the cathedral, and reduce the risk of irreparable damage and closure of the building. Recall that in the main report (n=72) those who had given a positive WTP value for the historic city, but indicated that they did not wish to allocate any of that value to the cathedral (termed 'Allocation=No' in this Annex) were coded as missing. In this annex, we included them and coded their WTP to be £0. Table 6-22 shows two values in each cell. The first one is the value presented in the main report. The second value is the one obtained under the new assumption (coding the cathedral WTP of respondents stating they are not willing to allocate part of their city WTP to the cathedral as £0).

In all cases, this recoding of 'Allocation=No' responses of £0 has for the effect of increasing the percentage of "No" responses compared to Section 3.3.4), as we would expect.

Table 6-22 Cathedral user willingness to pay in principle

WTP	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Yes	37.2% → 35.6%	39.7% → 37.7%	36.4% → 34.7%	33.5% → 30.8%
Maybe	38.7% → 37.0%	38.2% → 36.3%	36.4% → 34.7%	38.7% → 35.7%
No	24.1% → 27.4%	22.1% → 26.0%	27.3% → 33.5%	27.7% → 29.4%

Notes: The first value is the value from the main report (Allocation = No coded as missing). The second value is the value obtained under the new assumption (Allocation = No coded as £0). All summary WTP statistics calculated as combination of allocation and independent WTP. Sample weighted by cathedral user weights. Respondents (n=72) who had given a positive value for the historic city indicated that they did not have any preference for allocation of that value to the cathedral were coded as a £0 value for the cathedral.

The mean WTP values across the four cathedrals are now lower (Table 6-23), ranging between £6.13 to £7.64 with the recoding of Allocation=No as £0, compared to a WTP range of £6.66 to £8.05 with recoding of Allocation=No as missing as in the main report.

Specifically:

- Mean WTP for Canterbury Cathedral is now £6.69 (median £3.13) compared to £7.00 (median £3.30) previously
- Mean WTP for Lincoln Cathedral is now £7.64 (median £3.02) for York Minster compared to £8.05 (median £3.33) previously.
- Mean WTP for Winchester Cathedral is now £7.61 (median £3.30) for Winchester Cathedral compared to £7.98 (median £3.66) previously.
- Mean WTP for York Minster is now £6.13 (median £2.30) for York Minster compared to £6.66 (median £2.81) previously.

Overall, we see that all the values have decreased slightly. This is explained by the increased proportion of zero responses (including those not willing to pay in principle) (28-34% compared to 22%-29%). The proportion of 'payment card' zero WTP answers is still low, at 1% or below.

Table 6-23 Cathedral user mean and median use Willingness to pay (one-off donation): Combined allocation and independent elicitation methods

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Mean (standard error)	£7.00 (£0.76) → £6.69 (£0.73)	£8.05 (£1.05) → £7.64 (£1.00)	£7.98 (£1.48) → £7.61 (£1.42)	£6.66 (£1.08) → £6.13 (£1.00)
95% CI low	£5.51 → £5.26	£5.98 → £5.66	£5.06 → £4.82	£4.53 → £4.15
95% CI high	£8.48 → £8.12	£10.12 → £9.62	£10.89 → £10.40	£8.78 → £8.10
Median	£3.30 → £3.13	£3.33 → £3.02	£3.66 → £3.30	£2.81 → £2.30
Max	£111.4 → £111.4	£124.3 → £124.3	£131.3 → £131.3	£87.8 → £87.8
Zeros (including those not WTP in principle)	25.1% → 28.4%	22.6% → 26.5%	28.6% → 31.9%	28.8% → 34.5%
Payment card zeros (among respondent who state that they are WTP in principle)	1.0% → 0.9%	0.5% → 0.5%	1.3% → 1.3%	1.0% → 1.0%

Notes: The first value is the value from the main report (Allocation = No coded as missing). The second value is the value obtained under the new assumption (Allocation = No coded as £0). Allocation WTP values are calculated from the city WTP as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Independent WTP values are calculated as the midpoint

interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Sample weighted by cathedral user weights.

6.8.1.2 Validity testing: WTP determinants

Table 6-24 shows the results for cathedral visitor use WTP in terms of their willingness to pay a one-off donation to help preserve the cathedral, controlling for a range of factors, under the new assumption (coding not willing to allocate part of their city WTP to the cathedral as a £0 WTP for the cathedral).

Sample sizes are increased throughout with a total of an additional 65 respondents[126] included in these regressions (279, 246, 260, 300 and 1085 vs. 268, 233, 246, 273 and 1020).

Overall the goodness of fit of the cathedral WTP regression models has decreased compared to the original model (0.455, 0.336, 0.478, 0.398 and 0.400 vs. 0537, 0.420, 0.550, 0.539 and 0.495). The statistical significance of the predictors, on the other side, hasn't been affected but the size of the coefficients has reduced in magnitude in most cases.

The type of elicitation method is still significant and positive in all models. The size of the coefficients are however smaller (1.536***, 1.535***, 1.582***, 1.310*** and 1.464*** vs. 1.665***, 1.657***, 1.706***, 1.544*** and 1.612***). Age (log) which was previously insignificant in all models is now significant and positive in one cathedral model (Winchester) and in the pooled model (0.311* and 0.142* vs. 0.265 and 0.112). The same models contain significant income coefficients but these coefficients are now slightly higher (0.118*, 0.204** and 0.118** vs. 0.115*, 0.189** and 0.104**). The sole significant coefficient (Canterbury) for degree is also slightly higher (0.263** vs. 0.220**). Having dependent children is still significantly positively associated with WTP in two cathedral models (Canterbury and York) and the pooled model but coefficients are slightly lower (0.259**, 0.372*** and 0.183*** vs. 0.236**, 0.410*** and 0.177***). Selecting heritage in the Top 5 of public spending is also still associated with a higher WTP in the same models (Winchester, York and pooled) and as for other coefficients, the effect is a bit reduced (0.483***, 0.267** and 0.240*** vs. 0.423***, 0.346*** and 0.237***). The number of visits of the cathedral is as well associated with higher WTP in the same models (Lincoln and pooled) and the size of the coefficient is slightly smaller for the cathedral model while virtually unchanged in the pooled one (0.115* and 0.058** vs. 0.130** and 0.053**). Familiarity with cathedral information is no longer significant in any model while it was for York Minster previously (0.311 vs. 0.325*). Agreeing that visiting heritage sites increases one's wellbeing is no longer significant in the one cathedral model (Canterbury) while it is still in the pooled model (0.141 and 0.124* vs. 0.223** and 0.138**). Distance to cathedral isn't significant in the one cathedral model (Canterbury) anymore (-0.047 vs. -0.072*). The constant is significantly affected with one additional cathedral model significant (Canterbury) and the size of the two other significant coefficient non-marginally affected (-1.736**, -3.039*** and -1.863*** vs. -1.071, -2.928** and -1.573***).

In conclusion, it appears that our regression models are not producing better results for the purposes of validity testing after adding these 65 respondents. Goodness of model fit also reduces, which fits our hypothesis that those individuals who state they do not wish to allocate their city WTP are less uniform and less predictable.

Table 6-24 Factors associated with cathedral users WTP, as a one-off donation to help preserve the cathedral

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster	Pooled cathedral regression
Dummy for cathedral elicitation method: 1=Allocation of city WTP; 0=Independent cathedral WTP	1.536***	1.535***	1.582***	1.310***	1.464***

[126] Note that out of the 72 individuals who were excluded previously, only 65 provided enough information about themselves to be included in the regression models.

Female	-0.107	-0.130	0.291**	0.104	0.025
Log age, using age midpoint	0.164	0.311*	0.015	-0.027	0.142*
Log income, using income midpoints)	0.118*	0.037	0.204**	0.112	0.118**
Degree and above	0.263**	-0.143	-0.009	0.135	0.068
With dependent children	0.259**	-0.014	0.103	0.372***	0.183***
Selected heritage, arts, or environment in Top 5 of public spending	0.138	0.129	0.483***	0.267**	0.240***
Cathedral - # of visits in lifetime	0.015	0.115*	0.096	0.078	0.058**
Familiarity with cathedral information (very or extremely familiar)	0.059	0.165	0.216	0.311	0.152
Agree to 'Visiting heritage sites increases one's wellbeing (happiness)'	0.141	0.253	-0.087	0.076	0.124*
Log distance: Home postcode to cathedral	-0.047	0.020	0.099	0.057	-0.010
Constant	-1.736**	-1.688	-3.039***	-1.679	-1.863***
Observations	279	246	260	300	1085
Adjusted R2	0.455	0.336	0.478	0.398	0.400

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Reference group: for gender of audio information ref = male; for gender ref = male; for BAME ref = white; for education Degree and above ref = all qualifications under Degree; for Dependent children ref = no children; for Familiar with city information: Very/Extremely ref = not at all – moderately familiar. Sample restricted to residents in England aged 16 and over. Gross annual household income; averages computed using the midpoints of the income and age categories. We control for random differences in audio-visual information (use of male vs female voice). Heteroskedasticity-robust standard errors. All VIF scores <2 in pooled regression. Respondents (n=72) who had given a positive value for the historic city indicated that they were not willing to allocate part of that value to the cathedral were coded as £0. Regression models significant at p<0.005.*

6.8.1.3 Transfer errors summary: Cathedral use WTP

Table 6-25 summarises the transfer errors under the new assumption (Allocation = No coded as £0) compared to the main report (Allocation = No coded as missing). The first value reports the transfer error from the main report. The second value is the benefit transfer error under the new assumption.

A comparison of transfer errors shows that the maximum observed transfer error across all three methods (now 19.7%) still falls below the 40% threshold for transfer errors suggested in the literature (see Section 2.6.3).

Maximum transfer errors are around 19.5% for all three methods. This represents the greatest change for the simple unit transfer (max TE in main report = 15.5%). However, the simple unit transfer continues to perform best overall (with the lowest mean TE and only +0.1 difference in max TE compared to the adjusted method).

Table 6-25 Benefit transfer errors (TE) – Cathedral use values – summary

	Canterbury	Lincoln	Winchester	York	Mean |TE|	Max |TE|
i) Simple pooled unit transfer	8.0% → 6.4%	10.4% → 10.9%	9.3% → 10.4%	15.3% → 19.4%	10.8% → 11.8%	15.3% → 19.4%
ii) Adjusted for income	20.3% → 18.6%	19.8% → 19.3%	4.4% → 6.1%	9.0% → 12.3%	13.4% → 14.1%	20.3% → 19.3%
iii) Pooled Function transfer	4.6% → 1.5%	18.5% → 19.7%	13.4% → 15.7%	8.9% → 10.7%	11.4% → 11.9%	18.5% → 19.7%

Notes: The first value is the value from the main report (Allocation = No coded as missing). The second value is the value obtained under the new assumption (Allocation = No coded as £0).

6.8.2 Cathedral non-users

6.8.2.1 WTP summary statistics (non-use values)

Table 6-26 shows the proportion of cathedral non-users who indicated that they are in principle willing to pay a one-off donation to reduce the damage caused by climate change, improve the maintenance and conservation of the cathedral, and reduce the risk of irreparable damage and closure of the building. Recall that in the main report (n=103) who had given a positive WTP value for the historic city but indicated that they do not wish to allocate any of that value to the cathedral (termed 'Allocation=No' in this Annex) were coded as missing.

In all cases, again the recoding of 'Allocation=No' responses to £0 has the effect of increasing the percentage of "No" responses compared to Section 3.4.3 (as we now accept in the study respondents who were not willing to allocate part of their WTP for the city to the cathedral).

Table 6-26 Cathedral non-user willingness to pay in principle

WTP	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster
Yes	23.0% → 22.1%	20.0% → 18.4%	23.4% → 21.5%	25.2% → 23.9%
Maybe	36.7% → 36.0%	32.9% → 31.1%	37.1% → 35.3%	34.3% → 32.3%
No	40.3% → 41.9%	47.1% → 50.5%	39.4% → 43.2%	40.5% → 43.8%

Notes: The first value is the value from the main report (Allocation = No coded as missing). The second value is the value obtained under the new assumption (Allocation = No coded as £0). Sample weighted by cathedral non-user weights.

The mean WTP values of non-users are now lower, ranging between £3.07 to £3.91 with the recoding of Allocation=No as £0, compared to a WTP range of £3.27 to £4.20 with recoding of Allocation=No as missing as in the main report.

Specifically:

- Mean WTP for Canterbury cathedral is now £3.58 (median £1.10) compared to £3.63 (median £1.13) previously.
- Mean WTP for Lincoln Cathedral is now £3.07 (median £0.00) compared to £3.27 (median £0.55) previously.

- Mean WTP for Winchester Cathedral is now £3.64 (median £0.90) compared to £3.89 (median £1.10) previously.
- Mean WTP for York Minster is now £3.91 (median £1.10) compared to £4.20 (median £1.38) previously.

Again, overall we see that values have decreased slightly. This is explained by the increased proportion of zero responses (including those not willing to pay in principle) (43.6%-50.8% compared to 41.0%-47.5%). The proportion of 'payment cards' zero WTP answers are still low and under 2%.

Table 6-27 Cathedral non-user mean and median use Willingness to pay (one-off donation): Combined allocation and independent elicitation methods

	Canterbury	Lincoln	Winchester	York
Mean (standard error)	£3.63 (£0.38) → £3.58 (£0.38)	£3.27 (£0.35) → £3.07 (£0.34)	£3.89 (£0.40) → £3.64 (£0.37)	£4.20 (£0.51) → £3.91 (£0.48)
95% CI low	£2.89 → £2.84	£2.59 → £2.40	£3.11 → £2.91	£3.19 → £2.97
95% CI high	£4.37 → £4.32	£3.96 → £3.73	£4.67 → £4.36	£5.21 → £4.86
Median	£1.13 → £1.10	£0.55 → £0.00	£1.10 → £0.90	£1.38 → £1.10
Max	£67.5 → £67.5	£57.4 → £57.4	£112.5 → £112.5	£90.0 → £90.0
Zeros (including those not WTP in principle)	42.0% → 43.6%	47.5% → 50.8%	41.0% → 44.5%	41.5% → 44.8%
Payment card zeros (among respondent who state that they are WTP in principle)	1.8% → 1.8%	0.4% → 0.4%	1.5% → 1.3%	1.0% → 1.0%

Notes: The first value is the value from the main report (Allocation = No coded as missing). The second value is the value obtained under the new assumption (Allocation = No coded as £0). All summary WTP statistics calculated as combination of allocation and independent WTP. Allocation WTP values are calculated from the city WTP as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Allocation WTP statistics calculated with 'No' at allocation principle coded missing. Independent WTP values are calculated as the midpoint interval between the selected payment amount in the payment card and the next highest response on the payment card (except £0 bids). Summary statistics calculated with inclusion of 'No' at payment principle (coded £0). Sample weighted by cathedral non-user weights.

6.8.2.2 Validity testing: WTP determinants

Table 6-28 shows the results for cathedral non-users WTP in terms of their willingness to pay a donation, controlling for a range of factors, under the new assumption (coding not willing to allocate part of their city WTP to the cathedral as £0 WTP for the cathedral).

Sample sizes are increased throughout with a total of an additional 92 respondents[127] included in these regressions (407, 402, 422, 370 and 1601 vs. 392, 382, 392, 343 and 1509).

Overall the goodness of fit of the cathedral non-user WTP regression models has decreased compared to the original model (0.441, 0.456, 0.385, 0.469 and 0.436 vs. 0.495, 0.578, 0.511, 0590 and 0.537). The statistical significance of the predictors, on the other hand, has not been affected but the size of the coefficients has reduced in magnitude in most

The type of elicitation method is still significant and positive in all models. The size of the coefficients is however smaller (1.244***, 1.276***, 1.285***, 1.294*** and 1.278*** vs. 1.313***, 1.465***, 1.453***, 1.482*** and 1.313***, 1.465***, 1.453***, 1.482*** and 1.426***). Gender which was before insignificant in all models is now significant and positive in one cathedral model (York) (0.207** vs. 0.125). Age (log) which was before significant in only two models

[127] Note that out of the 103 individuals who were excluded previously, only 92 provided enough information about themselves to be included in the regression models.

(Canterbury and pooled model) is now significant and positive also in York model (0.214**, 0.192** and 0.175** vs. 0.208*, 0.122 and 0.112**).

The same models contain significant income coefficients, but the coefficient for Canterbury Cathedral is now slightly higher (0.179** vs. 1.169**) while the coefficients for York Minster and the pooled model are smaller (0.108* and 0.093*** vs. 0.152** and 0.121***). Having a degree is now significant and positively correlated with WTP in the York Minster model (0.214** vs. 0.148) while having dependent children is no longer significant for that same cathedral model (0.177 vs. 0.253*). Being a member of a heritage organisation is only slightly affected, with one model (York) no longer significant and the two others (Canterbury and pooled) virtually unchanged (0.224*, 0.178 and 0.140** vs. 0.229**, 0.249** and 0.148***). Agreeing with the negative statement that there are more important things to spend money on than preserving heritage is still negatively and significantly associated with WTP in the same three models (Canterbury, Lincoln and pooled) but in two different directions with the size of the effect decreasing in Canterbury while increasing in the two other (-0.257***, -0.211** and -0.146*** vs. -0.294***, -0.143** and -0.123**).

In conclusion, it appears that our regression models are not producing better results for the purposes of validity testing after adding these 92 respondents. Goodness of model fit also reduces, which fits our hypothesis that those individuals who state they do not wish to allocate their city WTP are less uniform and less predictable.

Table 6-28 Factors associated with cathedral non-users WTP, as a one-off donation to preserve the cathedral

	Canterbury Cathedral	Lincoln Cathedral	Winchester Cathedral	York Minster	Pooled cathedral regression
Dummy for cathedral elicitation method: 1=Allocation of city WTP; 0=Independent cathedral WTP	1.244***	1.276***	1.285***	1.294***	1.278***
Female	-0.001	-0.056	0.006	0.207**	0.034
Log age, using age midpoint	0.214*	0.190	0.026	0.192**	0.175***
Log income, using income midpoints)	0.179**	0.019	0.069	0.108*	0.093***
Degree and above	-0.124	-0.027	0.051	0.214**	0.032
With dependent children	-0.032	0.037	-0.095	0.177	0.015
Member of heritage, conservation or environmental organisation	0.224*	0.114	0.026	0.178	0.140**
Familiarity with cathedral information (very or extremely familiar)	-0.009	0.177	0.125	0.221	0.115
Agree to 'There are more important things to spend money on than	-0.257***	-0.211**	-0.135	0.014	-0.146***

preserving heritage'					
Constant	-2.305***	-0.716	-0.613	-1.895***	-1.455***
Observations	407	402	422	370	1601
Adjusted R2	0.441	0.456	0.385	0.469	0.436

*Notes: *** significance at <1%; ** significance at <5%; * significance at <10%. Reference group: for gender ref = male; for BAME ref = white; for education Degree and above ref = all qualifications under Degree; for Dependent children ref = no children; for Familiar with city information: Very/Extremely ref = not at all – moderately familiar. Sample restricted to residents in England aged 16 and over. Gross annual household income; averages computed using the midpoints of the income and age categories. We control for random differences in audio-visual information (use of male vs female voice). Heteroskedasticity-robust standard errors. All VIF scores <2 in pooled regression. Respondents (n=103 across all cathedral non-users) who had given a positive value for the historic city indicated that were not willing to allocate part of that value to the cathedral were coded as £0. Regression models significant at p<0.005.*

6.8.2.3 Transfer errors summary: Cathedral non-use WTP

Table 6-29 summarises the transfer errors under the new assumption (Allocation = No coded as £0) compared to the main report (Allocation = No coded as missing). The first value reports the transfer error from the main report. The second value is the benefit transfer error under the new assumption.

A comparison of transfer errors shows that the maximum observed transfer error across all three methods increases after sensitivity analysis (from 25.3% to 26.6%) but still falls below the 40% threshold for transfer errors suggested in the literature (see Section 2.6.3).

Maximum transfer errors are at 21% for the simple pooled unit transfer and around 26.5% for the two other methods. Overall, the transfer errors are only marginally affected. The simple unit transfer continues to perform best overall (with the lowest mean TE and lowest max TE compared to the adjusted method).

Table 6-29 Benefit transfer errors (TE) – Cathedral non-use values – summary

	Canterbury	Lincoln	Winchester	York	Mean |TE|	Max |TE|
i) Simple pooled unit transfer	4.4% → 1.1%	19.3% → 20.8%	4.9% → 3.3%	14.3% → 12.5%	10.7% → 9.4%	19.3% → 20.8%
ii) Adjusted for income	1.6% → 4.3%	25.3% → 26.5%	2.4% → 0.7%	18.4% → 15.7%	11.9% → 11.8%	25.3% → 26.5%
iii) Pooled Function transfer	2.4% → 8.5%	10.8% → 10.0%	13.6% → 13.5%	27.9% → 26.6%	13.7% → 14.7%	27.9% → 26.6%

Notes: The first value is the value from the main report (Allocation = No coded as missing). The second value is the value obtained under the new assumption (Allocation = No coded as £0).