Valuation of townscape improvements using a two-level stated preference and priority ranking approach

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Paper to be presented at the
International Choice Modelling Conference,
Oulton Hall, Leeds, 4-6 July 2011

Abstract

The value of streets as public spaces and places to do business is increasingly recognised (e.g. Manual for Streets, DfT et al., 2007 / CIHT, 2010). Projects to improve the pedestrian environment range from full pedestrianisation to ‘shared space’ schemes, and more modest incremental changes. This paper reports on research using a two-level stated choice (SC) and priority ranking (PR) technique to establish how much citizens are willing to pay for such improvements. Particular attention was paid to having a credible payment vehicle, and realistic presentation of options: respondents were recruited on the street concerned and the survey carried out using a hall test nearby, with computer visualisations for alternative policy options.

The decision to use a two-level experiment combining PR and SC questions was made following a literature review and assessment of approaches, which found that this technique, developed by Wardman and Bristow (2008) in the context of aircraft noise, has important advantages in this context too, i.e.:

- it introduces respondents to the trade-offs gradually, providing them with an opportunity to become familiar with the idea of townscape improvements before they encounter the more detailed SC questions;
- the priority ranking question sets townscape and pedestrianisation in the wider context of local quality of life – there is evidence from previous studies that these aspects of PR are useful in controlling embedding effects and obtaining plausible values for environmental quality.
The survey was conducted in four locations: a suburban high street in Leeds; a historic street within York city walls; a radial street near to Norwich city centre; and a main street in a West Yorkshire town of 14,000 inhabitants. All were judged by the study team to have the potential for pedestrian improvements.

758 usable responses were obtained, at a rate of approximately 100 per day. Compensation of £5 was given for participation.

The PR and SC data were analysed using multinomial logit models. WTP for townscape improvements and pedestrianisation were inferred, including confidence intervals. Despite the fieldwork being carried out during a period of financial austerity in UK towns and cities, significant positive WTP was found. Changes in street design and the use of space attracted the greatest WTP; there was also substantial WTP for high quality surfacing material in pedestrian areas, e.g. natural stone. Detailed changes in street furniture were insignificant in this wider context, although this could of course be due to deficiencies in the survey presentation rather than a fundamental lack of WTP for small changes.

The PR analysis found marginal values that were approximately one third of the values from the SC exercise at the sample mean, suggesting there may be substantial embedding effects in pure stated choice experiments. Interestingly, when willingness-to-accept and willingness-to-pay were separated in the SC data, the SC willingness-to-pay values and the PR values were found to be comparable. The values also appear consistent with previous studies (e.g. Sheldon et al, 2007) after accounting for methodological differences and the likely effect of regional income differences on WTP.

(498 words)

1. **Background**

The value of streets as public spaces and places to do business is increasingly recognised in transport planning (e.g. Manual for Streets, DfT *et al*, 2007; CIHT, 2010). Streets have ‘public realm’ functions beyond providing for the flow of traffic. These functions include: pedestrian access to homes and business premises, outdoor activities including walking and cycling, social activity and even for eating and drinking outdoors in selected locations (often squares and historic streets). High traffic levels and speeds tend to have a negative impact on the quality of the street for these other functions (e.g. Appleyard, 1969).

Projects to improve the pedestrian environment range from full ‘pedestrianisation’ to ‘shared space’ schemes, and more modest incremental changes such as: changing vehicle access regulations; widening pavements; reducing ‘clutter’; improving signposting; and so on.
‘Shared space’ means a more flexible use of the street space with fewer hard barriers between traffic and pedestrians, lower kerbs and also lower traffic speeds (MVA, 2009). Full pedestrianisation is usually only feasible when there is an alternative access for vehicles, e.g. to the rear of the street, or to parking facilities nearby.

Previous research has attempted to measure the value of high street improvements to citizens living in the locality. Buchanan used the hedonic pricing method (Colin Buchanan and Partners, 2007; Buchanan and Gay, 2009), regressing property prices on a set of explanatory variables including high street quality, socio-economic factors and variables describing the retail offer. The dataset focused on 10 localities in London. Whilst the regression results were not significant at the 95% confidence level, they suggest that a +1 point change in a high street quality score produces a 5% increase in both residential and commercial property values. The high street quality score is a PERS (Pedestrian Environment Review System) score, on a seven point scale from -3=’poor’ to +3=’good’ (TRL, 2006). In this application the hedonic pricing method can, potentially, capture residents’ willingness-to-pay (WTP) for such improvements, however is limited in its ability to address visitors’ WTP since the link between a remote high street and the home property value is probably very small or negligible in most cases.

Walker (1997) instead used the contingent valuation method (CVM) to elicit both residents’ and visitors’ WTP for street improvements in Oxford city centre. This was an exploratory study with only a small sample (117 interviewees), nevertheless it made some interesting methodological choices. The survey was undertaken using on-street interviews, which made it possible: to point to areas of the street which would be affected and to examples of which vehicles would be allowed and which not; to refer directly to conditions on the two adjoining streets (already improved); and generally to locate the exercise in the streetscape which would be affected. This is potentially helpful in avoiding hypothetical bias, and in handling embedding effects appropriately in a context where there are many attributes making up the whole streetscape package. This approach does, however, place a greater burden on the respondents to visualise (consistently) the streetscape with the changes in place.

Walker also kept the payment vehicle deliberately open, although examples were given which include Council Tax increments (for Council Tax payers) as well as possible payment vehicles for students, people on benefits, tourists and others in general. This helps to expand the sample for the choice experiment, and to bring in groups who might have systematically different preferences from resident Council Tax payers. The following is an extract from Walker’s interview protocol:

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1 Council Tax is the local property-based tax in the UK.
“You should know that there will be significant costs to bring the plan in and to police the new restrictions.

(to locals) This might be financed by a new local tax. The details of the tax are not known yet, but it might be a sales tax, or a surcharge on your Council Tax, or be taken off your wages/grant/benefit.

...you would definitely have to pay something out of your own pocket... How much would you be willing to pay?“.

Sheldon et al (2007) used a discrete choice stated preference experiment (SC) to obtain marginal utilities for 15 streetscape attributes, then used transfer pricing to investigate WTP for packages of these attributes. Three alternative payment vehicles were tested: annual Council Tax; weekly rent increases; and public transport fares per trip. The range of the results across these payment vehicles was wide: ~£15 using annual Council Tax; and ~£100-£115 using the other payment vehicles. The decision to base appraisal values on WTP through public transport fares per trip introduces a risk of overstating true WTP, if people do not carefully consider their whole annual budget when answering questions about WTP per trip. Walker (1997) found that when respondents were informed of the annual equivalent of weekly/monthly amounts, their WTP reduced.

The authors argued for a synthesis based on public transport fares, capped at £100 per respondent, and allowing for 17% of individuals with a zero value. £45 emerged as the annual WTP valuation for a package of improvements, across all high streets visited. This was a London-based study and Transport for London’s Business Case Development Manual (2008) incorporates these findings.

Transferability of this London-based value to other areas of the UK with lower per capita mean incomes and different built environments is not guaranteed – we revisit that question in the light of the results at the end of this paper. There appears to be a lack of direct evidence on willingness-to-pay for townscape improvements and pedestrianisation outside London. The UK Department for Transport (DfT) currently takes a qualitative approach to townscape assessment in its Transport Analysis Guidance (DfT, 2004).

Finally, other relevant studies include Willis et al (2005) which is concerned exclusively with WTP for street lighting improvements, uses CVM, and finds mean urban WTP of £15.91 per annum outside London.

A series of studies by Bristow and Wardman (Bristow, Wardman et al, 2003; Bristow and Wardman, 2006; Wardman and Bristow, 2008) use a two-level choice experiment combining
stated choice and ‘priority ranking’ (PR) questions to elicit marginal values for aircraft noise. This two-level approach has important advantages:

- it introduces respondents to the trade-offs gradually, providing them with an opportunity to become familiar with the concept and levels of aircraft noise (or in this study townscape improvements) before the respondent encounters the more detailed SC questions;
- the priority ranking question sets aircraft noise (or in this study townscape and pedestrianisation) in the wider context of local quality of life – there is evidence from the previous studies that these aspects of PR are useful in controlling embedding effects and obtaining plausible values for environmental quality; and
- the PR estimates provide a useful check on the WTP values emerging from the SC evidence, and allow issues such as loss aversion to be explored more fully.

Also Kelly et al (In press) examined WTP for street improvements based on a pedestrian route choice experiment. Laing et al (2009) gave many useful references on the visualisation aspects of WTP surveys relating to the built environment.

All the above studies relate to marginal WTP values, which are the main subject of this paper. Insofar as any impacts of townscape are not perceived by the individual – some aspects of health or physical fitness impacts, for example – these will presumably be omitted from estimates of WTP. The magnitude of these omissions is not yet known.

2. Survey approach and method

This section describes new primary research which obtained WTP values for townscape and pedestrianisation improvements. The aim of the study as a whole was: to review the literature and assess possible approaches to valuation of townscape and pedestrianisation (above); and to conduct a pilot study to test the feasibility of the preferred valuation technique emerging from the review.

2.1 Survey approach

The preferred technique was a two-level priority ranking (PR) and stated choice (SC) experiment, implemented using a hall test. The rationale for this combination was to ensure that WTP was anchored in the context of the respondent’s overall local quality of life (in the PR experiment), whilst picking up detailed preferences within townscape improvements/pedestrianisation schemes (in the lower level SC experiment).

There were advantages in using hypothetical choices, in particular:
• to allow multiple improvement scenarios to be tested and multiple townscape attributes to be varied per survey location, hence more useful data generated; and
• to be confident that implementation was feasible within the study timeframe – no before/after data collection was required.

Meanwhile, the study aimed to minimise the biases associated with hypothetical choice questions (e.g. strategic bias; hypothetical bias), by:

• ensuring that the payment mechanism was perceived as real by the respondents, by offering what have been demonstrated to be plausible payment options for local service improvements (Council Tax, as in Willis et al, 2005, or other local payment options as in Walker, 1997);
• making use of visualisation techniques to give respondents a clear impression of the policy scenarios in comparison with the status quo; and
• using the ‘priority ranking’ (PR) technique to measure marginal valuations for townscape in the broader context of local quality of life – aiming to control embedding effects.

Priority ranking (e.g. Wardman and Bristow, 2008) is adapted from the ‘priority evaluator’ developed by Hoinville (1977). The respondent is invited to rank a large number of alternatives: in some studies these include both improvements and deteriorations; in this study 14 improvements were offered (see Figure 1), which relate to five local quality of life variables plus the numeraire (e.g. Council Tax).

The ranking data produced by the PR experiment was used to infer a set of pairwise preferences (including different levels of the numeraire), which allowed for a logit choice model to be estimated. In their previous studies, Wardman and Bristow gathered data using both PR and SC from the same set of respondents for three European cities (200 in Manchester, 210 in Lyon and 237 in Bucharest), and found that the values for aircraft noise emerging from the PR experiment were significantly lower than the values from the SP experiment. Intuitively, this can be understood as removal of strategic bias, since in the SP exercise it may be quite apparent to some respondents that the higher the weight placed on noise the more likely are the public authorities to act on noise reduction, whilst the chances of having to pay for it are slight – meanwhile in the broad ‘quality of life’ PR exercise it is not transparent to the respondents what is the purpose of the survey.
Bristow and Wardman (2006) tested this interpretation of the evidence by conducting a third experiment in which the PR method was adopted, but the quality of life variables were replaced with many variables concerning different aspects of aircraft movement. The values found were comparable to the SP and not to the quality of life PR experiment. Thus a quality of life PR experiment can estimate monetary values for narrow attributes, such as streetscape, in a broad context: the values will not be overestimates as they could be with the focusing effect of a more typical, narrower survey design.

The second part of the experiment used a series of stated choice (SC) questions, each offering a choice between three alternatives. These questions allowed attributes of the High Street environment to be varied (Table 1).

The most important attribute to be varied in the SC questions is called priority. This can take 4 levels, defined as follows:

- priority for pedestrians/vehicles:
(i) mixed traffic – this is the status quo at all four survey sites, where the roadway is open to all forms of motorised traffic at all times of day, whilst pedestrians have priority on side pavements;

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priority</td>
<td>Mixed traffic; Shared space; Full pedestrianisation; Pedestrians, cycles &amp; limited motor vehicle access</td>
</tr>
<tr>
<td>Activities (Level of)</td>
<td>Low; High</td>
</tr>
<tr>
<td>Kerb</td>
<td>Near level; Raised</td>
</tr>
<tr>
<td>Surface</td>
<td>Good quality material, Colour contrast; Good quality material, No colour contrast; Low quality material, Colour contrast; Low quality material, No colour contrast</td>
</tr>
<tr>
<td>Lighting (Furniture)</td>
<td>Normal; Heritage (high quality)</td>
</tr>
<tr>
<td>Cost</td>
<td>Range £30 (payment) to £60 (repayment)</td>
</tr>
</tbody>
</table>

Table 1: High Street attributes and levels

(ii) shared space – a package which, overall, reallocates space and priority towards pedestrians without barring any vehicle type – comprising wide useable pavements, near-level surfaces, informal measures or potentially changed rights of way to reduce traffic speed below 20mph, within an attractive streetscape design;

(iii) full pedestrianisation – this is the complete exclusion of motor vehicles from the street during daytime; and

(iv) pedestrians, cycles and limited motor vehicle access – exclusion of most motor vehicles from the street during daytime, with the exception of disabled blue badge holders.

Note that ii), iii) and iv) are all ‘townscape improvements’ or ‘pedestrianisation’ of some form, whilst i) is the status quo or comparator. Also note that ‘priority’ is a composite attribute. A much longer list of detailed attributes of the pedestrian environment could have been provided, covering:

- Rights of way;
- Traffic levels and speeds;
- Roadway/pavement levels;
- Surfacing materials;
- Design (many detailed elements combine);
- Width of useable pavement;
- Barriers (guard rails);
• Clutter;
• Signs (for vehicular traffic or pedestrians);
• Benches;
• Street lighting (for carriageway, or pavements); and
• Use of pavement space, e.g. tables outside.

Within the confines of this pilot study, it is not possible to test how WTP responds to all attributes, and certainly not to all combinations of levels. What this study is designed to do above all is to provide WTP for a credible package of well designed streetscape improvements; hence the focus is on the package versus the status quo.

In addition, some attributes may be switched in and out to test respondents’ sensitivity to variations around that package. We have therefore set out to explore the sensitivity to:

• Near-level surfaces (minimised kerbs – the remaining kerb line provides a guide for all street users as to the difference in rights of way, and is useful for visually impaired people navigating the street) versus traditional deep kerbs;
• Surfacing (materials used – high vs low quality, i.e. natural stone vs tarmac or concrete slabs; and contrast – high or low contrast between the pedestrian versus vehicle priority zones in the street)
• Quality of lighting stands – heritage vs basic, and;
• Level of activities – denoted by tables outside on the pavement vs none.

It is important for the credibility of the questions that each option presented to respondents is a feasible combination of attribute levels, and that the do-minimum fairly reflects the current qualities of the streetscape. This has been carefully considered for all survey locations. Figure 2 shows how these combinations were presented to the respondents. Option 3 is the status quo.

2.2 Sampling strategy

The sampling strategy was driven by the goal of obtaining significant coefficients on the key attributes (Table 1), and addressing any major sources of variation in personal WTP for townscape improvements and pedestrianisation. E.g. Walker’s (1997) results suggested that annual WTP increases with frequency of visit, although surprisingly not with income. Sample sizes in comparable published studies were as follows:

• Wardman and Bristow (2008) gathered approx. 200 in each of three locations, for a total of 647;
• Sheldon et al (2007), the London study, gathered 600; and
• Willis et al (2005) gathered 1,214.
Figure 2: Stated choice question – 3 alternative townscape scenarios
Source: Atkins and ITS (2011)

Walker (1997) gathered only 117 responses and found that although it was possible to determine mean WTP, it was not possible to determine WTP by frequency of visit for all frequency categories, which then impacts on the ability to use the results in predictive mode or in cost-benefit analysis (CBA). For the purposes of this study, which was explicitly to pilot a proposed WTP approach and obtain ranges of valuations, the goal of 400 responses was deemed appropriate. In fact the outturn sample was 758.

While ideally we would capture both residents and visitors, the plausibility of any payment vehicle for visitors was a source of concern. Alternative payment vehicles were considered specifically for visitors, however Sheldon et al (2007) showed what significant biases can be introduced by differences in the payment vehicle. On balance, a judgement was made and agreed with the sponsor that individuals living outside the local council area would be excluded at the recruitment stage.

Moreover, whilst it is interesting to consider the WTP of non-users, an entirely different
survey method would be needed to reach them. Given the constraints imposed by the pilot survey and its resources, we could not afford to run a separate household survey, and the need for computer visualisations and in many cases explanations from survey staff limited the potential for postal or online questionnaires.

It was decided to focus on two core groups:

- residents who live within 10 mins walk of the street – and for whom it is therefore their ‘local high street’; and
- residents who live in the same local authority area and could therefore potentially contribute through council tax, but who are not resident nearby – i.e. not within 10 mins walk – and therefore include a range of different frequencies of visit extending down to ‘once a month or less’.

This leaves visitors from outside the local authority area, and non-users as potential targets for future research to broaden the base of the findings.

The following background variables were collected: frequency of visit; gender; age; income; employment status; residency (resident/visitor, and for residents: distance of home postcode from centre); purpose of visit; duration of visit; and main mode of access.

As part of the recruitment of respondents, the study team monitored sample characteristics to ensure broad consistency between sites and with local socio-demographics.

2.3 SC experimental design

A D-optimal efficient design was generated using the set of attributes and levels. Although the main criterion was level balancing, a compromise was made in order to impose certain constraints on the appearance of the levels of different attributes in a choice set.

The design produced has choice sets that consist of three alternatives; one of them being the status quo. Each respondent was presented with eight choice sets and asked to choose one of the three alternatives, and then to choose between the remaining two (see example of a choice set in Fig 2 above). This design reduces the number of choice sets a respondent has to evaluate (eight versus approximately 16 otherwise) and thereby minimises the fatigue effect.

2.4 Method of implementation

Respondents were recruited on the street concerned and the survey carried out using a hall test nearby, with computer-based questionnaires and visualisations for alternative policy
options. Compensation of £5 was given for participation. The stages of the hall test were: (i) Introduction; (ii) Priority questions; (iii) SC questions; (iv) Background questions. Priority questions asked for feedback on the current level of key attributes. For example, we asked ‘how satisfied are you with the current level of [attribute]?’ and then asked the respondent to rate that on a scale that is shown to them. Other questions asked at this stage were of the type: ‘what attributes are most important to you?’ and ‘what attributes are most important to improve’? The data arising from priority questions gives some support to the PR&SC results, e.g. if pedestrian priority is the most important issue for an individual, they should have the highest WTP for that issue. Also dissatisfaction with the status quo should be linked to higher WTP (ceteris paribus). This data is useful for ‘debugging’ the results.

The survey was conducted in four locations, in March* and July 2010:

- New Road Side, Horsforth* – a suburban high street within the city of Leeds, which is directly on and part of a main radial route into the city;
- Micklegate, York* – a historic street within the city walls, well known as a destination for eating, drinking and shopping activities, and for local services, but not currently pedestrianised;
- St. Benedict’s Street, Norwich – a radial street near to Norwich city centre that is not currently upgraded with any significant townscape/pedestrian improvements, but appears to have the potential to benefit from them;
- Kirkgate, Otley – one of the main streets in the centre of this town of 14,000 inhabitants in West Yorkshire, which currently has a limited amount of pedestrianised space, mainly on side streets, and which does have a bypass and alternative traffic routes to make pedestrianisation feasible.

2.5 Modelling strategy

Multinomial logit models were estimated using Biogeme (Bierlaire, 2003/2008). When estimating a model that pools data across, say, different stated preference exercises, as we have here, it is essential to allow for possible scale differences across the data sets, otherwise scale variation due to random error can be erroneously attributed to a coefficient estimate.

The modelling strategy pursued in this study was as follows:

- initially develop simple models based on the chosen policy variables, using the whole dataset;
- then explore differences between the four survey locations
- explore random taste variation within each survey location;
then explore the role of personal characteristics with a view to segmentation;
then develop a final single model incorporating incremental variables for locations,
personal characteristics (if justified by significant differences in WTP) and taste
variation – WTP will be derived from this final model.

The following sections set out the results from the modelling programme, and address the
interpretation and use of the results.

3. Results

758 usable responses were obtained in eight survey days across four locations: Horsforth;
York; Norwich; and Otley. The results comprise: logit models of individual choice behaviour
estimated on the survey data; estimates of willingness to pay for townscape improvements
and pedestrianisation based on those models; an investigation of potential segmentation of
WTP by personal characteristics; variation in WTP by locations; random taste variation; and
confidence intervals on the results.

3.1 Modelling Results (Stated Choice)

Models were estimated using data from both levels of the two-level stated choice (SC) and
priority ranking (PR) experiment. The SC results are presented first, in some depth. The PR
results and the assessment of those in relation to the SC results are given later.

The 'initial model' (Table 2) is a simple one using the full dataset, pooled across the four
locations: Horsforth; York; Norwich; and Otley. Separate models had in fact been run first
and the key coefficients and WTP had been found to be encouragingly similar – it appeared
reasonable to pool the data. Note that the model included scale parameters which capture
some site-specific variation (Table 3). Careful tests on location-specific effects were carried
out and are reported in full within the final model (Table 4).

The 'initial model' indicates that respondents are sensitive to Cost, with the expected
negative sign. Respondents are also sensitive to the streetscape policy packages, labelled
Priority in the table, in each case with a positive sign indicating a favourable response to the
'improved' pedestrian environment. Statistical performance of the 'initial model' is
acceptable, although it became clear through the modelling process that there is scope to
improve the model by adding more detail. We report on the more detailed models below.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Coefficient</th>
<th>t-ratio</th>
<th>Confidence level (*insignificant at 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>-0.0105</td>
<td>-5.84</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Activity (high)</td>
<td>-0.155</td>
<td>-2.24</td>
<td>97%</td>
</tr>
<tr>
<td>Kerb (raised)</td>
<td>-0.0203</td>
<td>-0.21</td>
<td>*17%</td>
</tr>
<tr>
<td>Lighting (heritage)</td>
<td>-0.00636</td>
<td>-0.12</td>
<td>*10%</td>
</tr>
<tr>
<td>Priority: Shared Space</td>
<td>0.298</td>
<td>1.75</td>
<td>*92%</td>
</tr>
<tr>
<td>Priority: Full Pedestrianisation</td>
<td>0.414</td>
<td>2.55</td>
<td>99%</td>
</tr>
<tr>
<td>Priority: Limited Vehicle Access</td>
<td>0.580</td>
<td>5.06</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Surface (material Lo; contrast Hi)</td>
<td>0.0487</td>
<td>0.57</td>
<td>*43%</td>
</tr>
<tr>
<td>Surface (material Hi; contrast Lo)</td>
<td>0.155</td>
<td>1.69</td>
<td>*91%</td>
</tr>
<tr>
<td>Surface (material Hi; contrast Hi)</td>
<td>0.143</td>
<td>2.19</td>
<td>97%</td>
</tr>
<tr>
<td>ASC</td>
<td>-1.220</td>
<td>-8.04</td>
<td>&gt;99%</td>
</tr>
</tbody>
</table>

Table 2: Initial model using pooled Stated Choice data for all four locations

Of the three policy packages, the greatest utility appears to be offered by Limited Vehicle Access, which is the package consisting mainly of traffic reduction achieved by making the street accessible only to selected vehicles at selected times of day. This is essentially the same package investigated by Walker (1997) in Oxford. The second package, when ranked by coefficients in this model, is Full Pedestrianisation. The third package is Shared Space, whose coefficient is significant only at an 92% confidence level. The utility associated with Shared Space is approximately half that of Limited Vehicle Access.

The effects of detailed streetscape changes around those packages are as follows:

- The Activity (high) variant included outdoor seating and eating/drinking opportunities in the street – the initial model suggests a negative utility, which surprised the research team and prompted further investigation, see later models.
- The Kerb and Lighting variables were found to be insignificant in this model.
- The coefficients on Surface suggest that respondents expect a positive utility from high quality surfacing materials, i.e. stone in place of tarmac/concrete slabs, although confidence is not consistently greater than 95%. Their response to high colour contrast between the roadway and the pavement is ambiguous.

Confidence levels are shown in Table 2. The adjusted rho-squared statistic for the model is 0.114, which is an acceptable fit for a model of this type.

There is also an alternative specific constant (ASC) on the streetscape As Now. This can be interpreted as capturing unobserved differences between the options, i.e. differences which are not explained by the attributes in the model. In this case, it may relate to the presentation
of the As Now using real photographs versus computer visualisations for the policy scenarios (albeit with many of the same elements and carefully controlled for consistency of lighting, for example), or to respondents’ generalised dissatisfaction with the As Now. It was found not to relate to the base levels of other attributes. For completeness, models without an ASC were tested and found to give implausibly high valuations for streetscape improvements, combined with insignificant cost coefficients.

The scale parameters for this model are shown in Table 3. These indicate whether there are significant differences of scale between the four survey locations: in this case there are, and the implication is that it is not ideal to use a single set of parameters across all four. Instead, we should investigate incremental variables for each attribute in each location. The reason for Norwich and Otley both having scale parameter 1.000 is that preliminary investigation found their scale parameters not to be significantly different, hence they were set to unity.

<table>
<thead>
<tr>
<th>Scale parameters by location</th>
<th>Coefficient</th>
<th>t-ratio</th>
<th>Confidence level (*insignificant at 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale 1 (Horsforth)</td>
<td>0.375</td>
<td>-13.62</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Scale 2 (York)</td>
<td>0.818</td>
<td>-2.28</td>
<td>98%</td>
</tr>
<tr>
<td>Scale 3 (Norwich)</td>
<td>1.000</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>Scale 4 (Otley)</td>
<td>1.000</td>
<td>fixed</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Scale parameters for the Initial model

Following the ‘initial model’, the modelling strategy outlined at the end of §2 was completed, step-by-step. For clarity, we next present the ‘final model’, which of all the models tested, is the one we judge gives the best representation of preferences and hence WTP. This is the main outcome of the modelling process. Later, we will discuss some of the intermediate models which give insights into particular issues en route to the final model.

The ‘final’ stated choice model is shown in Table 4. This includes a number of incremental variables whose purpose is explained below. It also includes a number of variables which were found to be insignificant and were then fixed at zero. The adjusted rho-squared statistic for this model was 0.127, indicating acceptable fit to the data. There is a substantial ASC on the As Now – our interpretation of which is the same as in the Initial Model.

In this model, incremental variables (indicated by the ‘+’ sign) are included for:

- council taxpayer status, shown as ‘non council tax’ for those who do not pay council tax or do not know – usefully, this was found to have no significant influence over utility (or WTP);
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Coefficient</th>
<th>t-ratio</th>
<th>Confidence level (*insignificant at 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (phase 2)</td>
<td>-0.0092</td>
<td>-5.16</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>+ Cost (phase 2, non council tax)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Cost (phase 2, income not revealed)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>Cost (phase 1)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Cost (phase 1, non council tax)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Cost (phase 1, income not revealed)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>Activity (high)</td>
<td>-0.280</td>
<td>-4.57</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>+ Activity (high, York)</td>
<td>0.570</td>
<td>5.35</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Kerb (raised)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>Lighting (heritage)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>Priority: Shared Space</td>
<td>0.223</td>
<td>2.10</td>
<td>96%</td>
</tr>
<tr>
<td>+ Priority: Shared Space (Hor.)</td>
<td>-0.596</td>
<td>-4.37</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>+ Priority: Shared Space (Otl.)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Priority: Shared Space (York)</td>
<td>0.411</td>
<td>3.81</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>Priority: Full Pedestrianisation</td>
<td>0.598</td>
<td>5.96</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>+ Priority: Full Ped’n (Hor.)</td>
<td>-2.21</td>
<td>-10.31</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>+ Priority: Full Ped’n (Otl.)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Priority: Full Ped’n (York)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>Priority: Limited Vehicle Access</td>
<td>0.684</td>
<td>7.66</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>+ Priority: Limit Veh’s (Hor.)</td>
<td>-1.22</td>
<td>-11.18</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>+ Priority: Limit Veh’s (Otl.)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Priority: Limit Veh’s (York)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>Surface (material Lo; contrast Hi)</td>
<td>0.151</td>
<td>1.73</td>
<td>*92%</td>
</tr>
<tr>
<td>+ Surface (Lo:Hi, Hor.)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Surface (Lo:Hi, Otl.)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Surface (Lo:Hi, York)</td>
<td>-0.236</td>
<td>-1.91</td>
<td>*92%</td>
</tr>
<tr>
<td>Surface (material Hi; contrast Lo)</td>
<td>0.275</td>
<td>3.38</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>+ Surface (Hi:Lo, Hor.)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Surface (Hi:Lo, Otl.)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Surface (Hi:Lo, York)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>Surface (material Hi; contrast Hi)</td>
<td>0.199</td>
<td>2.72</td>
<td>99%</td>
</tr>
<tr>
<td>+ Surface (Hi:Hi, Hor.)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Surface (Hi:Hi, Otl.)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>+ Surface (Hi:Hi, York)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>sig_Activity</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>sig_Priority: Shared Space</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>sig_Priority: Full Pedestrianisation</td>
<td>1.56</td>
<td>5.60</td>
<td>&gt;99%</td>
</tr>
<tr>
<td>sig_Priority: Limited Veh. Access</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>sig_Surface (Hi:Lo)</td>
<td>0</td>
<td>fixed</td>
<td></td>
</tr>
<tr>
<td>sig_Surface (Hi:Hi)</td>
<td>1.02</td>
<td>2.00</td>
<td>95%</td>
</tr>
<tr>
<td>ASC</td>
<td>-1.14</td>
<td>-13.02</td>
<td>&gt;99%</td>
</tr>
</tbody>
</table>

Table 4: Final Stated Choice model

- ‘income not revealed’, for those who chose not to reveal their income in the survey – this was also found to have no significant influence over utility (or WTP);
- location-specific effects, where the value of the coefficient is allowed to vary between
Norwich (which is used as the Base), and Horsforth, York and Otley.

These incremental variables can be interpreted by adding the coefficient on the incremental variable to the Base, e.g. the coefficient on Activity in York is equal to $-0.280+0.570 = +0.290$.

Random taste variation – i.e. variation between individuals but not related to location – is captured by including the standard deviations of key variables in the model (labelled “sig_”).

Insights provided by the final SC model are as follows:

- Utility of all the streetscape packages (labelled ‘Priority’) was found to be positive in all locations except Horsforth, where all are negative. The ranking of the three policy packages by utility in this model matches the ranking in the initial model: Limited Vehicle Access > Full Pedestrianisation > Shared Space.

- In Norwich (the Base) and in Otley, the utility of Shared Space is approximately one third that of Limited Vehicle Access. However, in York the utility of Shared Space is much higher, above Full Pedestrianisation and close to Limited Vehicle Access ($0.223+0.411=0.634$). We hypothesise that this is because York already has an extensive area in the City Centre which has features of Shared Space and Limited Vehicle Access, which is widely perceived to be successful – respondents probably perceived the Micklegate ‘scheme’ as an extension of the existing City Centre design.

- The negative Horsforth results can be interpreted as a judgement on the desirability of closing the street in question to through traffic. This case was one of two where the As Now includes a main arterial route (in that case the A65 running northwest from Leeds). Implicit in all the Do-Something options was the need for a diversionary route of some kind. Whilst the study team selected this location because the engineering challenge of such a diversion seemed modest, and the survey staff sought to reassure respondents on this point, on reflection it seems likely that this issue may have generated substantial resistance. The circumstances in Otley were different in two respects: (i) alternative routes through the town centre are already used by through traffic; and (ii) the Otley location is a town centre rather than a suburb centre straddling a radial road.

- Across individuals (rather than locations) there is significant taste variation over Full Pedestrianisation, though not over the other two policy packages. This can be interpreted as opinion being widely spread (or polarised), for example between those who strongly prefer motor vehicle access and those who do not. Full
Pedestrianisation is a rather absolute policy in this sense, whilst the developing policy area of ‘Shared Space’ and also Limited Vehicle Access are more flexible.

- The concerns over Activity in the initial model are resolved: it is clear that in the one location where there is a concentration of activities such as cafes, bars and restaurants on the street already, respondents expect a significant positive amenity for additional outdoor tables and activity on street (York, Micklegate). I.e. the streetscape improvements would be complementary to the existing activity mix. In the other three locations, other activities and street attributes likely act against this factor: an existing market in Otley (Kirkgate); dominant through traffic in Horsforth; and a narrow trafficked street in Norwich. Also in those three cases, there are other streets nearby which better fulfil the leisure/activity role fulfilled by Micklegate in York.

- Raised versus level kerbs, and Heritage versus standard lighting furniture, were found to have no significant effect on utility (or WTP), confirming the findings of the initial model and all other models tested.

- When separate Cost coefficients for the phase 1 survey and the phase 2 survey are used, the phase 1 coefficient is found to be insignificant. Setting the Cost (phase 1) coefficient to zero in the final model (Table 4) still allows phase 1 responses to other variables to contribute to the model. This makes the maximum use of the data whilst taking account of the difficulty experienced by some respondents in interpreting the sign on the money payment in the phase 1 survey questionnaire. The models including the Horsforth and York data for non-Cost variables have good statistical properties and are consistent in their results with phase 2 alone. Also, note that the final model includes site-specific parameters for every variable, and the coefficients on those indicate sensible and generally consistent results across locations.

3.2 Influence of Income, Frequency of Visit and other factors on Stated Choice results

Most of these results were either insignificant, or showed inconsistent patterns of variation by segments, despite there being a reasonable number of observations in the dataset.

For income, the following models were run:

- separate models by Income group;

- models with Cost divided by Income (equivalised, and/or raised to power of lambda – using some specific lambda values or leaving lambda to be determined by the model in recognition that it is sometimes unhelpful to impose an elasticity on the income effect);
Income dummies included as incremental variables on Cost; and
also compared Income Revealed vs Income Not Revealed (separate models) and tested an Income Not Revealed incremental variable – see the Final Model.

A fair summary of the findings with respect to income is given by the following results which are from a model similar to the Final Model but including incremental variables on Cost (Phase 2):

- The incremental variables for Income were all insignificant at the 95% confidence level.
- The Income coefficients were as shown in Table 5 – these can be interpreted as the effect of Income on the respondents’ sensitivity to Cost. The Household Income range £20,000-29,999 was used as the Base: this contains the UK median household income at approximately £23,000 original, £25,000 final income (2008/9, National Statistics data).

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Coefficient</th>
<th>t-ratio (*insignificant at 95%)</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (phase 2; Household income £20-29.9k = Base)</td>
<td>-0.0126</td>
<td>-3.42</td>
<td>85 (758 total)</td>
</tr>
<tr>
<td>+ Cost (phase 2; &gt;£50k)</td>
<td>0.00217</td>
<td>*0.42</td>
<td>104</td>
</tr>
<tr>
<td>+ Cost (phase 2; £30-49.9k)</td>
<td>0.00433</td>
<td>*0.90</td>
<td>90</td>
</tr>
<tr>
<td>+ Cost (phase 2; &lt;£20k)</td>
<td>0.00663</td>
<td>*1.68</td>
<td>157</td>
</tr>
<tr>
<td>+ Cost (phase 2; Income not Revealed)</td>
<td>-0.00445</td>
<td>*-1.17</td>
<td>322</td>
</tr>
</tbody>
</table>

Table 5: Coefficients on Income as an incremental variable

As well as being insignificant, these coefficients suggest that sensitivity to Cost is not decreasing monotonically as income rises, as would be expected. Both low income and high income groups appear less sensitive to Cost changes than the Base group containing the median income. Moreover the low income groups appear to be less Cost-sensitive than the highest income group, which is a counterintuitive result (\(| -0.0126+0.00663 < -0.0126+0.00217 |\)). We emphasise that these differences are not statistically significant at the 95% level.

- The adjusted rho-squared statistic for this model was 0.127, indicating acceptable fit to the data.
- Other coefficients were comparable to the Final Model.
For frequency of visit, the following models were run:

- separate models by Frequency of visit;
- models with incremental variables on the non-Cost variables for Frequency of visit.

The following results are representative: they suggest a pattern in which WTP rises with Frequency of visit between <3 days per week and 3/4 days per week, but then falls back for 5+ days per week; many of the incremental variables are insignificant, and the utilities do not change in a consistent proportion across the table (Table 6).

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Infrequent visits to the street (&lt;3 days per week)</th>
<th>+ Frequent visits to the street (3/4 days per week)</th>
<th>+ Very frequent visits to the street (5+ days per week)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient (*insignificant at 95%)</td>
<td>Coefficient (*insignificant at 95%)</td>
<td>Coefficient (*insignificant at 95%)</td>
</tr>
<tr>
<td>Priority: Shared Space (Base)</td>
<td>0.172 *1.01</td>
<td>0.385 1.97</td>
<td>0.0117 *0.07</td>
</tr>
<tr>
<td>Priority: Full Pedestrianisation (Base)</td>
<td>0.270 *1.51</td>
<td>0.647 3.20</td>
<td>0.340 1.99</td>
</tr>
<tr>
<td>Priority: Limited Vehicle Access (Base)</td>
<td>0.561 3.91</td>
<td>0.302 *1.69</td>
<td>0.0312 *0.20</td>
</tr>
</tbody>
</table>

Table 6: Coefficients on Frequency of Visit as an incremental variable on ‘Priority’

For the Surface attributes – high/low quality paving material and high/low contrast – all Frequency of visit variables were found to be insignificant.

Overall, we would find it hard to justify any systematic variation in WTP for Income or Frequency of Visit based on this evidence.

Finally, we examined whether there was any evidence of an effect on WTP from the sign of the cost change in each particular Stated Choice option, i.e. whether the respondent was being asked to make a money payment or being offered a money repayment. A model was run using separate Cost coefficients for payment and repayment. The finding was that the Cost coefficient for repayments was smaller and also not significantly different from zero at 95% confidence (-0.00355 with a \( t \)-ratio of -1.11 versus -0.0233 with a \( t \)-ratio of -4.52). The WTP implications of this difference are interesting and are reported at the end of the following section. The fact that the coefficient for repayments was smaller than for payments was in line with the literature on asymmetric response to gains and losses in stated preference experiments.

3.3 WTP for Townscape Improvements and Pedestrianisation (Stated Choice)

Table 7 shows the willingness-to-pay at the sample mean implied by the final model.
In order to obtain meaningful WTP values for the phase 1 locations (Horsforth and York), the marginal utility of money was taken from the Cost(phase 2) parameter (Table 4) – the consistency of many of the WTP results across the four locations gives encouragement that this approach is appropriate.

Table 8 shows the confidence intervals on WTP for main effects in the final model.

Our interpretation of these willingness-to-pay results is as follows.

There is positive willingness-to-pay for Shared Space, Full Pedestrianisation or Limited Vehicle Access in most of the locations surveyed. The exception is Horsforth, for very specific reasons – we believe as explained above (§3.1) that respondents were strongly
resistant to any scheme which involved closing this road to through traffic and their negative
WTP reflects this.

In Norwich and Otley, WTP for Shared Space was lower than for Limited Vehicle Access, but
in York WTP for Shared Space was very similar to WTP for Limited Vehicle Access. We
believe that this is because in York the city centre has a well-established and popular (based
on respondents' comments) scheme in place, with characteristics of Shared Space and
Limited Vehicle Access, i.e. pedestrians and vehicles mix on many streets, kerbs are often
low or absent, vehicular access is limited to disabled badge holders and other very specific
user types for much of the day. Since most York residents are familiar with these
arrangements, we believe they were better informed about the meaning of Shared Space,
can see how it works and would be less inclined to scepticism. The idea of Shared Space
does still create some resistance in localities which have yet to implement it.

There was evidence of positive WTP for high quality surfacing materials, such as natural
stone, across the four locations. Focusing on the York results, we believe the evidence
indicates that WTP for high quality surfacing is equal to approximately one third to one half
of WTP for one of the Priority improvements.

In the one location where there is a concentration of activities such as cafes, bars and
restaurants on the street already, positive WTP was found for additional outdoor tables and
activity on street (York, Micklegate). i.e. the streetscape improvements would be
complementary to the existing activity mix. Although not shown in Table 8, the 95%
confidence interval for Activity (high,York) is also in positive territory. In the other three
locations, other activities and street attributes likely act against the success of this
townscape element, and WTP was negative.

Two other attributes tested – Kerb height high/low and Lighting furniture 'heritage'/standard –
were found to have no significant value. Nor was there a significant WTP for high contrast
surfacing to distinguish the roadway from the pavement, in the absence of high quality
surfacing materials (at 95% confidence).

Each of the four survey locations was chosen because it appeared to the study team to offer
potential gains from pedestrian improvements. It should not be expected that any street
randomly selected would offer such large gains. Thus for the application of these values one
approach would be to set criteria for the street in question, alternatively WTP fieldwork could
be carried out on a case-specific basis (with cost implications).

Overall, these results give confidence that WTP for the townscape improvement packages
(labelled ‘Priority’ in the tables), and additionally for high quality surfacing, is greater than zero in carefully-chosen locations outside London.

### 3.4 Willingness-to-Pay or -Accept, distinguishing Payments and Repayments

Table 9 shows the consequences of distinguishing money payments from money repayments in a model similar to the final model, at the sample mean. It is expected, *a priori*, that willingness-to-accept (WTA) for deteriorations will exceed WTP for improvements. This is what is shown in Table 9. An important caveat is that the coefficients for Repayment on which the WTPs are based are not significant at 95%, so those figures should be treated with caution, and we would not recommend using them in any applied work at this stage.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Willingness-to-pay, £ per annum</th>
<th>Willingness-to-accept, £ per annum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Payment</td>
<td>Repayment</td>
</tr>
<tr>
<td></td>
<td>Norwich (Base)</td>
<td>York</td>
</tr>
<tr>
<td>Priority: Shared Space</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>Priority: Full Pedestrianisation</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Priority: Limited Vehicle Access</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Activity (high)</td>
<td>-13</td>
<td>12</td>
</tr>
<tr>
<td>Surface (material Hi; contrast Lo)</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Surface (material Hi; contrast Hi)</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 9: WTP and WTA Estimates Distinguishing Payments and Repayments (Stated Choice)

### 3.5 Modelling and WTP Results (Priority Ranking)

The purpose of the Priority Ranking question was to encourage respondents to evaluate townscape improvements in the wider context of their local quality of life.

As explained in §2 above, if we were comparing a Priority Ranking-based quality of life survey with a pure Stated Choice survey focused on Townscape attributes, we would expect *a priori* that the PR survey would lead to lower estimates of WTP. In this particular study, the quality of life (PR) question was scheduled just before the stated choice (SC) questions. Hence, this was an opportunity to assess whether the contextualising (or ‘anchoring’) effect of PR flowed through to the SC, or whether the ‘framing effect’ reasserted itself, with higher
WTP results arising from the SC exercise.

The Priority Ranking model results from York and Horsforth are shown in Table 10.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>York</th>
<th>Horsforth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>-0.0452</td>
<td>-0.0409</td>
</tr>
<tr>
<td>Priority: Shared Space (Base)</td>
<td>0.304</td>
<td>0.221</td>
</tr>
<tr>
<td>+ Priority: Shared Space (York)</td>
<td>0.558</td>
<td>0.82</td>
</tr>
<tr>
<td>Priority: Full Pedestrianisation (Base)</td>
<td>-0.713</td>
<td>-0.792</td>
</tr>
<tr>
<td>+ Priority: Full Ped. (York)</td>
<td>1.14</td>
<td>0.82</td>
</tr>
<tr>
<td>Priority: Limited Veh. Access (Base)</td>
<td>0.0450</td>
<td>0.0365</td>
</tr>
<tr>
<td>+ Priority: Limited Veh. Acc. (York)</td>
<td>1.12</td>
<td>0.14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Coefficient</th>
<th>t-ratio</th>
<th>Confidence level (*insignificant at 95%)</th>
<th>WTP, £ per annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>-0.0452</td>
<td>-4.92</td>
<td>&gt;99%</td>
<td></td>
</tr>
<tr>
<td>Priority: Shared Space</td>
<td>0.304</td>
<td>1.31</td>
<td>*81%</td>
<td></td>
</tr>
<tr>
<td>Priority: Full Pedestrianisation</td>
<td>-0.713</td>
<td>-2.81</td>
<td>99%</td>
<td></td>
</tr>
<tr>
<td>Priority: Limited Veh. Access</td>
<td>0.0450</td>
<td>0.19</td>
<td>*15%</td>
<td></td>
</tr>
</tbody>
</table>

Table 10: Models and WTP based on the Priority Ranking question

We need to explain briefly how these results were derived, and note two caveats. The survey data give each respondent’s ranking of the improvement options offered in Question 5, which include – amongst other quality of life improvements – townscape improvements to the local High Street and changes in local tax. By comparing the ranking of each of the townscape improvements versus each of the council tax changes, it is possible to create a set of binary choices, which can modelled using the same logit technique as the Stated Choice data.

The questionnaire design was changed between Phase 1 and Phase 2 of the study, so that in Phase 2 there was only one townscape improvement offered instead of three. In the modelling, it was found that this made it difficult to extract meaningful results from the data available. The results in Table 10 are therefore based on Phase 1. A second caveat is that checks were made for illogical responses, by focusing on the ranking of the three council tax changes offered. Only respondents living within 10 minutes’ walk of the street were asked Question 5, and of the 386 total responses to this question 224 were logical. The remaining 'illogical' responses were removed from the data for modelling purposes, and it was found that this did make a material difference to the results. The adjusted rho-squared statistics on these models are 0.176 for Horsforth, which is acceptable, and 0.028 for a York-only model,
which is not. Another model run on the combined dataset, with incremental variables for York, produced broadly comparable WTP results for York, with an acceptable adjusted rho-spared of 0.129. This is the York model reported in the table above.

In broad terms, the implied WTP in York from the Priority Ranking analysis is around one third that from the Stated Choice final model (Table 7), comparing the results for Shared Space and Limited Vehicle Access, i.e. in the region of £20 rather than £70. This suggests that the ‘framing effect’ becomes an issue in Stated Choice even if the wider quality of life question is asked immediately beforehand.

3.6 Synthesis of the valuation evidence

In this Chapter, willingness-to-pay values have been reported to the nearest £ per annum – we think that is appropriate to avoid implying greater accuracy than exists in these results.

We think there are good reasons to believe people’s response to Payments are a suitable basis for appraisal values – these are most likely to be relevant in a world where the costs of streetscape improvements will need to be financed (Table 9). The evidence indicates that these values are substantially lower than for Repayments, and approximately one third of the values in the Stated Choice final model (Table 7).

Also, we think there are good reasons to believe the Priority Ranking/Quality of Life values are better at anchoring WTP in wider context, the individual being less likely to suffer a framing effect which we think is observed in the results of this pilot study, despite running the Stated Choice exercise just after the Priority Ranking question. The PR/QoL values are substantially lower than the Stated Choice values from the final model, but are much more in line with those for Payments (Table 9).

Comparing the Priority Ranking values (York) with the Stated Choice (Payments, York) with the Stated Choice (final model, York, scaled down by a factor of 3 for Payments (≈26/74)) we obtain Table 11.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Willingness-to-pay, £ per annum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Priority Ranking</td>
</tr>
<tr>
<td>Priority: Shared Space</td>
<td>19</td>
</tr>
<tr>
<td>Priority: Full Pedestrianisation</td>
<td>9</td>
</tr>
<tr>
<td>Priority: Limited Vehicle Access</td>
<td>26</td>
</tr>
<tr>
<td>Surface (material Hi; contrast Lo)</td>
<td></td>
</tr>
<tr>
<td>Surface (material Hi; contrast Hi)</td>
<td></td>
</tr>
<tr>
<td>Activity (high)</td>
<td></td>
</tr>
</tbody>
</table>

Table 11: WTP for Townscape Improvements and Pedestrianisation, comparison of models, York

### 4. Conclusions

Despite the fieldwork being carried out during a period of financial austerity in UK towns and cities (03.2010-07.2010), significant positive WTP was found for packages of townscape improvements and pedestrianisation. Changes in street design and the use of space attracted the greatest WTP; there was substantial additional WTP for high quality surfacing material in pedestrian areas, e.g. natural stone.

Detailed changes in street furniture were insignificant in this wider context, although it was a limitation of the survey that kerbs and lighting stands/light projection could not be shown in much detail/at all in the visualisations. Given the opportunity we would recommend that future research revisits these details, in context of valuation of a package and within the context of local quality of life.

The PR analysis found marginal values that were approximately one third of the values from the SC exercise at the sample mean, highlighting that there may be substantial embedding effects in pure stated choice experiments. Interestingly, when willingness-to-accept and willingness-to-pay were separated in the SC data, the SC willingness-to-pay values and the PR values were found to be comparable. Further experiments would be helpful to establish whether this is a typical or exceptional finding.
The values also appear consistent with previous studies (e.g. Sheldon et al, 2007) after accounting for methodological differences and the likely effect of regional income differences on WTP. This is encouraging, given the use of a novel combination of techniques, and the small amount of existing literature. Referring back to Walker (1997), to Willis et al (2005) and to the London research (Sheldon et al, 2007). WTP values arising from those were as follows:

- Sheldon et al (2007) adopted a value of £45 per person per annum for a package of High Street improvements in London, although if the Council Tax is taken as the payment vehicle instead of public transport fares, WTP is in the region of £17 at Edgware Road and £15 at Holloway Road. Allowing for CPI inflation from 2006 to mid-2010, these amounts would be expected to be:
  - £50 if surveyed today, using public transport fares as payment vehicle – note that given the regulated structure of public transport in London, fares may be a more natural and credible payment vehicle than outside London, where public transport was largely deregulated in the 1980s. It is worth bearing in mind the income differential between London and our four survey locations: gross domestic household income is approximately 13% lower in York than in London, and 20% lower in Leeds (Horsforth, Otley) than in London.
  - £19 and £17 if surveyed today for Edgware Road and Holloway Road specifically, using Council Tax as payment vehicle.

- Willis et al (2005) found WTP of £11 to £16 per annum in 2003 for improved street lighting in towns and cities, equivalent to £13 to £18 in 2010 – note that this policy affects both residential streets and ‘High Streets’, so that value of the ‘High Streets’ element may be much smaller.

- Walker (1997) found an average WTP of around £25 per annum for something comparable to the Limited Vehicle Access package on two streets in central Oxford in the mid-1990s, which is approximately equivalent to £37 per annum in 2010. Summing the WTP values for Limited Vehicle Access and Surface (Hi quality) from Table 11 gives a very comparable amount.

Acknowledgement

The authors wish to acknowledge funding by the UK Department for Transport (DfT) under the research project “Valuation of Townscapes and Pedestrianisation”. The conclusions and views expressed in the paper are the authors’ alone and do not imply any endorsement on the part of the DfT. The authors also wish to acknowledge our collaboration with Atkins on this work: Atkins undertook the overall project management, townscape visualisations,
computer questionnaire implementation, and many other elements of the study. Jeremy Shires (ITS) was the Market Research Manager for the final phase of the survey, and we gratefully acknowledge his highly efficient contribution.

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