

Digital radio switchover: Consumer research to inform the cost benefit analysis

Report for the Department for Culture Media and Sport

Prepared by

London Economics in association with YouGov



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Contents

Page

Glossary	iv
Executive summary	v
1 Background and introduction	1
1.1 Background	1
1.2 Aims of the current project	1
1.3 Overview of research methodology	2
2 Consumers' radio ownership, listening habits and attitudes towards digital radio	5
2.1 Radio ownership	5
2.2 Listening habits	7
2.3 In-car radio listening	11
2.4 Attitudes towards digital radio	13
3 Willingness-to-pay for attributes of digital radio	20
3.1 What is willingness-to-pay?	20
3.2 Attributes of digital radio	20
3.3 Average WTP	23
3.4 Willingness-to-pay among key demographic groups	24
3.5 Observed willingness-to-pay	26
4 Disposal habits and costs of disposal	27
4.1 Disposal habits and attitudes towards disposal	27
4.2 Disposal cost modelling	28
5 Conclusions	37
6 Further Research	40
6.1 Research dedicated to the impact of the switchover on vulnerable consumers	40
6.2 Refining the parameters in the disposal cost modelling	40
6.3 Complementary face-to-face survey	40
6.4 Observed willingness-to-pay	40
References	41
Annex 1 Details of survey samples, methodologies	42
Annex 2 Questionnaires	44
Annex 3 Willingness-to-pay technical annex	58
Annex 4 Details of disposal cost calculations	60



Tables, Figures & boxes

Page

Table 1:	Attribute descriptions used in the choice experiment	ix
Table 2:	WTP for the attributes of digital radio (£)	xi
Table 3:	Number of radios disposed of through different channels	xiii
Table 4:	Total disposal costs by stakeholder group	xiii
Table 5:	Radio ownership	7
Table 6:	How likely people are to buy a digital radio in the next year?	9
Table 7:	Listening habits	10
Table 8:	In-car radio listening	12
Table 9:	Consumer perceptions of digital radio (percentage of respondents)	16
Table 10:	Consumer perceptions of digital radio by age band	17
Table 11:	Likelihood that consumers will get a digital radio in the next year (% of respondents)	18
Table 12:	Share who are likely to buy a digital radio in the next year and opinions on digital radio	19
Table 13:	Attribute descriptions used in the choice experiment	23
Table 14:	WTP for the attributes of digital radio (£)	24
Table 15:	WTP for the attributes of digital radio by age group (£)	24
Table 16:	WTP for the attributes of digital radio by gender (£)	25
Table 17:	WTP for the attributes of digital radio by socio-economic group (£)	25
Table 18:	WTP for the attributes of digital radio by type of region (£)	25
Table 19:	WTP for the attributes of digital radio by ethnicity (£)	26
Table 20:	Recycling site visits	28
Table 21:	Consumer attitudes towards disposal	28
Table 22:	Number of radios disposed of through different channels	29
Table 23:	Disposal costs for consumers	32
Table 24:	Disposal costs for Local Authorities	33
Table 25:	Phase 2 DTS fees for existing members rejoining the scheme	34
Table 26:	Disposal costs for retailers	36
Table 27:	Disposal costs for producers	36
Table 28:	Groups classed as unwilling to switch to digital radio	39
Table 29:	Unweighted online survey sample breakdown against national population statistics	42
Table 30:	Online survey sample breakdown (other demographics)	43
Table 32:	Attributes included in the choice experiment	58
Table 33:	Parameters used in the model of disposal costs for consumers	61
Table 34:	Parameters used in the model of disposal costs for Local Authorities	63
Table 35:	Parameters used in the model of disposal costs for retailers	65
Table 36:	Parameters used in the model of disposal costs for producers	66
Figure 1:	Consumer disposal habits	xii
Figure 2:	Reasons given for having and not having DAB radios in cars (% of respondents)	13
Figure 3:	Factors that prompted people to buy a digital radio (% of respondents)	14
Figure 4:	Factors that prevented people from buying a digital radio (% of respondents that listed the factor)	15

Tables, Figures & Boxes

Page

Figure 5:	Consumer disposal habits	27
Box 1:	Example choice card	23
Box 2:	Cost modelling approach - Costs to consumers	31
Box 3:	Cost modelling approach - Costs to Local Authorities	33
Box 4:	Cost modelling approach - Costs to retailers	35
Box 5:	Cost modelling approach - Producers	36

Glossary

Terminology abbreviations

CBA	Cost benefit analysis
EEE	Electrical and electronic equipment
RNIB	Royal National Institute of Blind People
WEEE	Waste electrical and electronic equipment
WTP	Willingness-to-pay

Executive summary

Background and aims of the project

Government launched the Digital Radio Action Plan in July 2010, which set out the process for allowing Ministers to make a well-informed decision on a Digital Radio Switchover. Government has stated that a decision on switchover would be triggered once 50% of all radio listening is digital; national DAB coverage is comparable to FM; and local DAB reaches 90% of the population and all major roads.

A key element of the Action Plan process is the development of an Impact Assessment of a radio switchover, including a Cost Benefit Analysis. Recent studies¹ have identified that before such an assessment is made further evidence is required on consumers' attitudes and behaviour towards radio and, in particular, consumers' willingness-to-pay (WTP) for digital radio.

The present study aims to provide the quantitative and qualitative evidence that can be used to inform the Government's cost-benefit analysis of the digital radio switchover policy. To that end, the aims of the project are to:

- **Explore consumers' behaviour and attitudes towards radio**, since it is essential to the switchover-decision process that Government has a clear understanding of consumers' radio ownership, listening habits and attitudes towards digital radio.
- **Measure consumers' WTP for the attributes of digital radio** in order to address the information gap identified by previous reports, and provide evidence to inform Government on the consumer benefits of digital radio.
- **Model the costs of disposal of obsolete radios following the switchover**, covering the costs to consumers, retailers and producers of radios and Local Authorities, in order to inform the Government's cost-benefit analysis.

Overview of research methodology

Data and information for the study was collected using three different fieldwork techniques: an online consumer survey; focus groups; and face-to-face interviews.

Online consumer survey

The online survey was administered by YouGov and included: questions intended to elicit consumers' WTP for the attributes of digital radio (via a choice experiment); questions on consumers' behaviour and attitudes towards radio; and questions on consumers' attitudes towards the disposal of unwanted radios. The sampling approach used was to apply stratified random sampling to the YouGov research panel of over 315,000 UK adults. The online survey was answered by 5,099 respondents in total.

¹ See PricewaterhouseCoopers (2009) "Cost Benefit Analysis of Digital Radio Migration", and Consumer Expert Group (2010), "Digital Radio Switchover – what is in it for consumers?"

Focus groups

Two sets of focus groups were undertaken for the study. The first set was undertaken early in the project in order to inform the language and content of the WTP choice experiment. They were run online with eight participants per group and included digital radio owners (in one group) and non-digital radio owners (in the other group). The second set comprised of four different focus groups, each involving particular types of participants:

- pensioners aged 70 or over;
- analogue listeners with strong intention to purchase a digital radio;
- analogue listeners without intention to purchase a digital radio; and
- rural listeners (including a mix of digital radio converts and non-converts).

These four focus groups were done face-to-face and undertaken in order to ensure that the study acquires an in-depth understanding of consumer attitudes and behaviour towards radio and to validate findings of the online survey, and to ensure that the views of these important groups are included in the evidence base.

Face-to-face interviews

Face-to-face interviews were undertaken with 100 pensioners covering the same topics as the online survey, with a representative split between single person and joint households. These were conducted specifically to ensure that the views of this particular vulnerable group were fully covered by the fieldwork. In addition, in order to ensure that the views of another particular vulnerable group were captured during the fieldwork, five face-to-face in-depth interviews were undertaken with blind radio listeners.

Willingness-to-pay choice experiment

In order to assess consumers' WTP for the attributes of digital radio, a consumer choice experiment was conducted. Survey respondents were asked to choose between two bundles of attributes relating to aspects of their radio listening experience. For each choice, one bundle contained a single digital attribute alongside two other analogue attributes, whilst the other bundle contained only the corresponding analogue attributes. Each bundle also carried an associated cost.

The answers to these survey questions provide data indicating whether, given the difference in associated prices, consumers would generally choose bundles with a particular digital attribute ahead of bundles with the corresponding analogue attribute. The data was then used to assess consumers' WTP by econometrically estimating a binary choice model.

Assessment of disposal costs

The assessment of the costs of disposing of obsolete radios following the switchover is based on survey information regarding consumers' disposal habits and data from government and industry. The costs to several different stakeholder groups were modelled, including: consumers, retailers, producers, and Local Authorities.

Consumers' radio ownership, listening habits and attitudes towards digital radio

Radio ownership

Radio ownership and take-up of digital radio are important indicators of how close consumers are to being ready for a digital switchover. According to the online survey results just over half of survey respondents own a digital radio, although this is still well below the share who own an analogue radio (which stands at 79%).

However, the extent of digital radio ownership varies between different groups. In particular, those in the working class and lowest grade socio-economic groups (i.e. National Readership Survey groups D and E)² and those under the age of 30 are less likely to own a digital radio. Conversely, over 60% of those in the middle and upper middle class socio-economic groups own a digital radio.

The fact that the survey was conducted on-line may be a factor in the higher-than-expected percentage of households owning a digital radio set. However, it is consistent with other research which shows that take-up of digital radio amongst internet users is higher than average.

Listening habits

According to the survey data, average radio listening time across all consumers is just over 10 hours per week and, excluding in-car listening, consumers most commonly listen using an analogue radio set, followed by a digital radio set and then the internet. Around a quarter of consumers listen to four or more stations (including analogue and digital stations) at least once a month, whereas just under a third listens to stations which are only broadcast on digital.

The online survey and the focus group with those over 70 suggest that young listeners are more likely to listen on the internet and less likely to listen using an analogue radio set, whereas older listeners tend to use an analogue radio. Young listeners also tend to listen less in terms of hours, but listen to more digital-only stations.

The interviews and focus groups found interesting differences between the listening habits of different vulnerable groups: many pensioners listen using an analogue radio, whereas blind consumers were often found to listen to a digital radio.

In-car radio listening

The survey shows that, across all consumers, 67% listen to radio in a car or van, although this share is noticeably higher among those living in rural areas. Fourteen percent of those who have a car have digital radio in their car, and in most cases the digital radio came already installed in the car when they bought it. Of those who don't have in-car digital radios, in just over 14% of cases this is because they are too expensive.

² The socio-economic groups refer to the National Readership Survey social grades: A (upper middle), B (middle), C1 (lower middle), C2 (skilled working), D (working), E (lowest). These are defined as: A: Higher managerial, administrative or professional. B: Intermediate managerial, administrative or professional. C1: Supervisory or clerical and junior managerial, administrative or professional. C2: Skilled manual workers. D: Semi and unskilled manual workers. E: Casual or lowest grade workers, pensioners and others who depend on the welfare state for their income.

Why consumers buy digital radios

Every strand of fieldwork (including the online survey, interviews and focus groups) found that the most common reason for getting a digital radio was that they have clear and high sound quality. This finding supports the WTP analysis which established through a choice experiment that, of all the attributes of digital radio, clear sound free of interference is the one for which consumers will pay the most (see below).

The second most common reason for getting a digital radio was the wide choice of stations, and this finding also supports the WTP analysis which found consumers have a positive WTP for having a greater number of stations and more speciality stations.

Conversely, the most common reason for not buying a digital radio was that consumers are happy with the existing analogue service. Both the online survey and focus groups with analogue radio listeners yielded such an observation. Pensioners were especially likely to say that they are happy with their current analogue radio.

Attitudes of digital radio owners vs. non-digital radio owners

Most of those who do not currently own a digital radio are of the view that digital radio provides benefits in terms of more stations of interest, clear sound, ease of tuning, useful functions and reduced energy consumption, but a high proportion of these consumers also believe that digital radio is too expensive at present.

Those who do own digital radios also generally agree that they provide a range of benefits, but the major difference is that fewer of these consumers perceive digital radio to be too expensive.

Digital radio take-up in the future

Since take-up of digital radio is a key criterion in the switchover decision, it is useful to assess the likelihood that consumers who do not currently have a digital radio will get one in the future: according to the survey around a fifth of survey respondents are likely to get a digital radio in the next 12 months.

Those in their 50s and those living in town and fringe areas are most likely to get a digital radio over the next year, and digital radio ownership among consumers not of white British origin could be set to catch up with ownership levels among white British consumers. On the other hand, those in working class socio-economic groups are less likely to get a digital radio in the next 12 months.

Willingness-to-pay for attributes of digital radio

The WTP analysis focussed on six attributes of digital radio relating to: how the radio is tuned, information which is displayed on the radio, functionality (specifically pause/rewind of broadcasts), the total number of stations available, number of speciality stations available, and sound quality.

The attributes of digital radio were identified during the discussions in the initial focus groups, where participants were asked to talk about what they see as the characteristics of digital radio and how they would describe these characteristics. The descriptions of the attributes of digital radio

and those of the corresponding attributes of analogue radio which were used in the choice experiment are presented in Table 1.

Table 1: Attribute descriptions used in the choice experiment

Digital attributes	Analogue attributes
Tuning:	
D1: "You can scroll through the names of all the available stations without hearing them and select the one you want to listen to from this list. If you wish to, you can re-order the list to suit you."	A1: "The radio skips through all the available stations from one to the next, playing each one briefly, and you can stop it at the one you want. Alternatively you can turn a dial to find reception manually."
Information display:	
D2: "Information is continuously provided identifying the station you are listening to, what programme is on, and what song is playing or who is being interviewed."	A2: "The only information provided on the radio set is the identification of the station you are listening to."
Functionality:	
D3: "You can listen live, and pause / rewind broadcasts using your radio set."	A3: "You can only listen to live radio as it is broadcast."
Number of stations:	
D4: "You have a choice of 20 national stations and between 5 to 40 local stations depending on your area."	A4: "You have a choice of 10 national stations and between 5 to 25 local stations depending on your area."
Speciality stations:	
D5: "You have a choice of around 20 to 30 speciality radio stations, such as stations in different languages, ethnic stations, stations for different religions, and speciality entertainment, sports and music stations"	A5: "You have a choice of around 5 to 10 speciality radio stations, such as stations in different languages, ethnic stations, stations for different religions, and speciality entertainment, sports and music stations."
Sound:	
D6: "You have clear sound and no background interference."	A6: "You may experience sound interference."

During the choice experiment, each respondent was asked to make eight choices in total. Each time, respondents were asked to choose between two bundles of attributes, where one bundle contained a single digital attribute alongside two analogue attributes, whereas the alternative bundle contained the three corresponding analogue attributes. Every bundle also carried an associated cost. The choices that were made can then be combined in an econometric model to estimate consumers' WTP for each attribute of digital radio.

The analysis shows that, on average across all consumers, the WTP for each of the attributes of digital radio ranges from £4.75 to £9.88 (Table 2). WTP is highest for the sound attribute, namely that sound is clear with no background interference (D6), followed by the option to pause and rewind broadcasts using the radio set (D3). On the other hand, WTP is lowest for the attribute of additional speciality stations (D5).

The overall WTP for all the attributes stands, on average across all consumers, at £41.82 (calculated by summing the WTP figures for the individual attributes), although it should be noted that this assumes that the level of the combined WTP for all the attributes together is not significantly influenced by interactions between the attributes, the budget constraint facing households is the same when valuing individual attributes and bundles of attributes, and the weighting of each attribute is the same for all households.

In practice, studies show that consumers tend to give a less high value to a bundle of specific attributes than the sum of the values of the attributes included in the bundle.

Therefore, the sum of the WTP for the individual attributes is best viewed as providing a useful upper-bound baseline measure of the combined WTP unless some the attributes are complements which, in combination, attract a higher WTP than the sum of the WTPs of the attributes separately. Since interactions between the attributes may influence the combined WTP in either direction, it is sensible to include some sensitivity analysis around this measure when undertaking an impact assessment and potentially, consider using a contingent valuation approach in a further survey which would query households directly about their WTP for digital radio.

Table 2: WTP for the attributes of digital radio (£)

	D1: Tuning	D2: Information display	D3: Pause/ rewind	D4: Number of stations	D5: Speciality stations	D6: Sound
All consumers	6.34	7.22	7.82	5.80	4.75	9.88
By age group:						
18-29	5.65	6.62	6.78	5.99	5.37	7.64
30-39	6.74	7.41	7.55	6.49	5.95	8.76
40-49	6.25	7.24	8.05	6.38	4.76	10.12
50-59	6.71	7.28	8.27	5.66	3.97	11.25
60-69	6.66	6.54	7.84	4.28	2.56	10.99
70+	5.27	7.37	8.47	3.46	3.16	12.64
By gender:						
Female	5.40	6.94	7.55	5.05	4.05	9.68
Male	7.28	7.53	8.11	6.59	5.48	10.10
By socio-economic group:						
Upper middle	6.74	6.41	7.61	4.77	4.08	9.42
Middle	6.75	7.22	7.84	5.66	4.55	9.74
Lower middle	6.51	7.21	7.49	6.32	5.23	9.13
Skilled working	5.55	6.63	6.59	5.52	4.66	8.48
Working	5.25	7.32	8.33	5.39	4.00	10.91
Lowest	5.70	7.12	8.52	5.07	4.36	11.36
By region:						
Rural	6.94	7.59	9.32	5.38	4.37	12.41
Town/ fringe	6.49	6.48	7.63	5.50	4.71	9.45
Urban	6.20	7.22	7.62	5.87	4.78	9.61
By ethnicity:						
Not white British	5.57	6.74	6.79	5.32	5.49	8.76
White British	6.48	7.32	8.01	5.90	4.62	10.11

Note: 1. The socio-economic groups refer to the National Readership Survey social grades: A (upper middle), B (middle), C1 (lower middle), C2 (skilled working), D (working), E (lowest). These are defined as: A: Higher managerial, administrative or professional. B: Intermediate managerial, administrative or professional. C1: Supervisory or clerical and junior managerial, administrative or professional. C2: Skilled manual workers. D: Semi and unskilled manual workers. E: Casual or lowest grade workers, pensioners and others who depend on the welfare state for their income.

Source: London Economics calculations based on online survey data.

The analysis also shows that WTP varies between different groups of consumers. In particular:

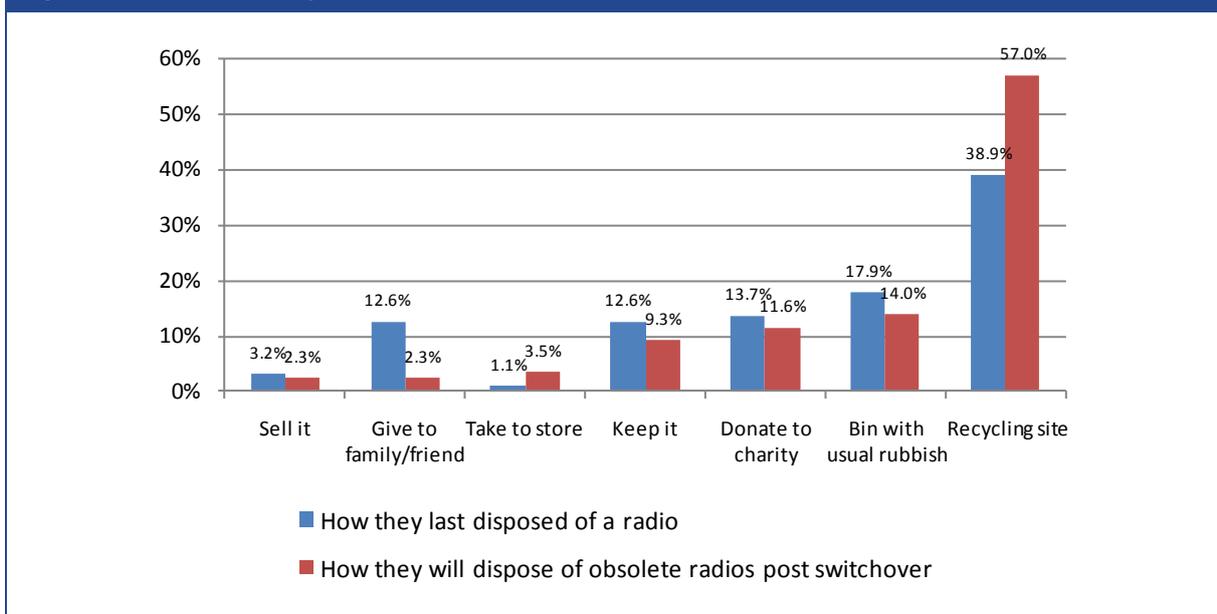
- Older consumers have a higher WTP for the sound attribute of digital radio (D6) than younger consumers, but a lower WTP for additional stations (D4) and speciality stations (D5). WTP for the option to pause and rewind broadcasts using the radio set (D3) generally increases with the age of consumers.
- Men have a higher WTP for each of the attributes of digital radio, especially the tuning attribute (D1), additional stations (D4), and speciality stations (D5).

- Rural consumers have higher WTP for the sound attribute of digital radio (D6) and also for the option to pause and rewind broadcasts using the radio set (D3).
- Speciality stations (D5) is the only attribute of digital radio for which consumers not of white British origin have a higher WTP than those of white British origin.

Disposal habits and costs of disposal

The online survey explored how consumers last disposed of a radio and how they think they will dispose of obsolete radios after the switchover. In both cases, the most common method was disposal at a recycling site (Figure 1). The second most common response was that consumers would dispose of radios in the bin alongside their usual rubbish.

Figure 1: Consumer disposal habits



Note: The percentages in the chart exclude those who answered 'other', 'not sure' or 'can't remember' to questions 15) and 16) of the survey (see Annex 2).

Source: Online survey.

The study combined the information on disposal habits from the consumer survey with data on disposal costs provided by Government and industry in order to model the costs that would arise from the disposal of analogue radios which would become obsolete after the digital switchover. The costs arising for several different stakeholder groups were modelled, including consumers, retailers of radios, producers of radios, and Local Authorities (LAs).

On the basis of the survey results, we estimate households own around 44.5 million analogue radio sets.³ We assume that, as a result of the switchover, all of these will be disposed of through one of the nine methods listed in Table 3 below, and the shares of each different disposal method (available from the survey) enable us to calculate the total number of radios disposed of through

³ This figure does not include analogue radios in motor vehicles.

each channel. The numbers of radios causing costs for the different stakeholder groups are also presented in the table.

Table 3: Number of radios disposed of through different channels

Disposal method:	Share of radios disposed	Radios disposed of (000s)	Number of radios causing costs for:			
			Consumers (000s)	LAs (000s)	Retailers (000s)	Producers (000s)
Bin with usual rubbish	14%	6,215	-	6,215	-	-
Store at same time as purchase	2%	1,036	55	-	259	-
Store after purchase	1%	518	518	-	129	-
Recycling site with an extra trip	4%	1,813	1,813	1,813	-	1,813
Recycling site without an extra trip	53%	23,565	-	-	-	23,565
Keep it and store it away	9%	4,143	-	-	-	-
Sell it	2%	1,036	-	-	-	-
Donate it to charity	12%	5,179	363	-	-	-
Give it to family/friends	2%	1,036	-	-	-	-
Total	100%	44,540	2,748	8,028	388	25,377

The analysis found that the costs to consumers are the largest, at around £5.1m, equivalent to £1.84⁴ for each radio causing disposal costs to consumers (Table 4). The second highest costs are those to producers, at £2.8m, although these are only equivalent to 11p per radio causing disposal costs.

The costs to local authorities and retailers are relatively low in comparison, at £647,000 and £452,000 respectively, although, in the case of retailers, the costs per radio are larger at £1.16 per radio causing disposal costs.

Table 4: Total disposal costs by stakeholder group

Stakeholder group	Total disposal costs (£000s)	Disposal costs (£/radio)
Consumers	5,069	1.84
Local Authorities	647	0.08
Retailers	452	1.16
Producers	2,779	0.11

⁴ This is calculated by dividing the total costs to consumers by the total number of radios causing costs for consumers from Table 3 above.

Further research

Looking ahead, it would be useful to refine the research into the impact of the digital switchover and the estimates of the disposal costs on vulnerable groups by engaging in in-depth consultations with relevant stakeholders.

It would also be useful to complement the on-line survey with a greater number of face-to-face surveys in order to assess whether use of such a survey results in an upward bias of the population-wider WTP for digital radio attributes.

Finally, regarding the observed willingness-to-pay, only a very high level analysis was undertaken and it would be worthwhile to undertake a more in-depth analysis of data on sales of digital radio sets in order to obtain more detailed estimates of the observed willingness-to-pay.

1 Background and introduction

1.1 Background

The Government launched the Digital Radio Action Plan in July 2010, which seeks to inform a future decision on a Digital Radio Switchover. At the point of a switchover it has been proposed that all services delivered on national and local DAB multiplexes will cease to be broadcast on analogue. Simultaneously, a new tier of ultra-local radio, consisting of small local commercial and community stations, will occupy the vacated FM spectrum. Radio services on MW will either upgrade to DAB or, if they are within the ultra-local tier, to FM.

In the Digital Radio Action Plan, the Government set out criteria which should be met before a final switchover decision can be made: namely that 50% of all radio listening is digital, national DAB coverage is comparable to FM, and local DAB reaches 90% of the population and all major roads. In addition, the timetable of the Action Plan supports a target date for the switchover by the end of 2015.

In the Action Plan, the Government acknowledged industry's wish for an early switchover in order to minimise the burden of dual-transmission, and also acknowledged that a faster transition has benefits for consumers, including a reduction in the price of digital receivers due to economies of scale. However, the Consumer Expert Group, which is part of the Action Plan programme structure and involves a range of consumer representative groups⁵, notes that setting a date or a firm commitment to a particular date would have the effect of "scaring consumers to switch". Hence, although the target switchover date of 2015 is included in the Action Plan timetable, this target date is secondary to the migration criteria.

In addition, reports⁶ have identified that before a decision is taken on digital switchover further evidence is required on consumers' attitudes and behaviour towards radio and, in particular, consumers' willingness-to-pay for digital radio. Therefore, DCMS have commissioned the present study to provide such evidence.

1.2 Aims of the current project

The project is intended to provide quantitative and qualitative evidence that can be used to inform the Government's cost benefit analysis (CBA) of the digital radio switchover policy. To that end, the aims of the project are to:

1. Explore consumers' behaviour and attitudes towards radio

Firstly, the project aims to examine consumers' radio ownership, listening habits and attitudes towards digital radio. It is essential to the switchover decision making process that Government has a clear understanding of consumer behaviour towards radios and radio listening. Thus, this

⁵ Including Citizens' Advice, Voice of the Listener and Viewer, RNIB, British Wireless for the Blind, Consumer Focus, Age UK and Which?

⁶ See PricewaterhouseCoopers (2009) "Cost Benefit Analysis of Digital Radio Migration", and Consumer Expert Group (2010), "Digital Radio Switchover – what is in it for consumers?"

part of the project provides contextual information. It also provides useful background and context for the other elements of the study, which aim to provide quantitative evidence that could be used in any future assessment of the costs and benefits of the switchover policy.

2. Measure consumers' willingness-to-pay for the attributes of digital radio

Secondly, the study aims to set out the various attributes of digital radio and the corresponding attributes of analogue radio, and quantitatively estimate consumers' willingness-to-pay for the attributes of digital radio through a choice experiment. This part of the work addresses an information gap identified by previous reports that look at the potential impact on consumers of a digital radio switchover.⁷ The results of the willingness-to-pay experiment provide evidence that could be used to inform the consumer benefits of digital radio in a prospective CBA of the switchover policy.

3. Model the costs of the disposal of radios

Finally, the project also aims to assess the costs of disposal of unwanted radios by consumers. The assessment covers disposal costs to consumers themselves, and also costs to retailers of radios, producers of radios, and Local Authorities. The study monetises the costs to consumers, including time and travel costs, which would need to be taken into account in any future CBA of the switchover policy. Retailers and producers have obligations concerning the collection and treatment of radios under the Waste Electrical and Electronic Equipment (WEEE) Regulations, so it is important that the study also informs on the costs to these stakeholders.

These three project aims are addressed in turn in the next three chapters of the report, whilst the fifth chapter concludes.

1.3 Overview of research methodology

Here we provide an overview of our research methodology including our fieldwork approach, the willingness-to-pay choice experiment, and the assessment of the costs of disposal of unwanted radios. Further information on the precise methodology is also provided in the following chapters and in Annex 2, Annex 3 and Annex 4.

1.3.1 Data collection fieldwork

Data and information for the study was collected using three different fieldwork techniques: an online consumer survey; focus groups; and face-to-face interviews.

Online survey

The online survey was administered by YouGov and included questions for the choice experiment (described further below) and consumer research questions on behaviour and attitudes towards radio. It also explored consumers' attitudes towards the disposal of unwanted radios. Data and

⁷ See PricewaterhouseCoopers (2009) "Cost Benefit Analysis of Digital Radio Migration", and Consumer Expert Group (2010), "Digital Radio Switchover – what is in it for consumers?"

information from the online survey are used in the analysis in each of the following chapters. The full online survey questionnaire is provided in Annex 2.

The sampling approach used was to apply stratified random sampling to the YouGov research panel of over 315,000 UK adults. The online survey was answered by 5,099 respondents in total. A weighted breakdown of the survey sample is provided in Annex 1.

Focus groups

Two sets of focus groups were undertaken for the study. The first set was undertaken early in the project in order to inform the language and content of the willingness-to-pay choice experiment. They were run online with eight participants per group and included digital radio owners (in one group) and non-digital radio owners (in the other group).

The second set of focus groups involved four different groups, each including particular types of participants:

- 1) pensioners aged 70 or over;
- 2) analogue listeners with strong intention to purchase a digital radio;
- 3) analogue listeners without intention to purchase a digital radio; and
- 4) rural listeners (including a mix of digital radio converts and non-converts).

These four focus groups were done face-to-face and each included five or six participants. They were undertaken to ensure that the study acquires an in-depth understanding of consumer attitudes and behaviour towards radio and to validate findings of the online survey. In addition, they also ensure that the views of these important groups are included in the evidence base.

Face-to-face interviews

Face-to-face interviews were undertaken with 100 pensioner households, with a representative split between single person and joint households. These interviews covered the same topics as the online survey and were conducted specifically to ensure that the views of this particular vulnerable group were fully covered by the fieldwork.

In addition, in order to ensure that the views of another particular vulnerable group were captured during the fieldwork, five face-to-face interviews were undertaken with blind radio listeners, although it should be noted that this is a very small sample size. Participants for these interviews were sourced with help from the RNIB. These interviews were in-depth discussions that followed a semi-structured topic guide.

1.3.2 Willingness-to-pay choice experiment

Consumers' willingness-to-pay for the attributes of digital radio was assessed through a choice experiment which was administered through the online survey.

Survey respondents were asked to choose between two bundles of attributes relating to aspects of their radio listening experience. For each choice, one bundle contained a single digital attribute alongside two other analogue attributes, whilst the other bundle contained only the

corresponding analogue attributes. These attributes are described in detail in section 3.2. Each bundle also carried an associated cost.

It is important to note that the questions relating to willingness-to-pay came at the beginning of the online survey and did not refer to 'digital' or 'analogue' radio specifically. This was to ensure that respondents' answers were not preconditioned by an earlier question or influenced by what they see as the actual price difference between an analogue and a digital radio.

The answers to these survey questions provide data indicating whether, given the difference in associated prices, consumers would generally choose bundles with a particular digital attribute ahead of bundles with the corresponding analogue attribute. This data was used to assess consumers' willingness-to-pay by econometrically estimating a binary choice model.

Further description of willingness-to-pay is provided in section 3.1, whereas technical details on the econometric approach are provided in Annex 3.

1.3.3 Assessment of disposal costs

The assessment of the costs of disposal of unwanted radios used the results of the online survey which asked consumers about how they would dispose of unwanted radios. For example, the survey established the proportions of consumers who would dispose of obsolete radios alongside general rubbish, deliver them to a recycling site, or return them to a store when purchasing a new radio.

Findings from the survey were combined with data and cost estimates, such as estimates of the cost per tonne of transporting and treating waste electrical equipment, from industry and secondary sources such as previous Government impact assessments.

The costs for several different stakeholder groups are provided later in the report: consumers, retailers of radios, producers of radios, and Local Authorities.

2 Consumers' radio ownership, listening habits and attitudes towards digital radio

This chapter presents findings from the consumer survey on consumers' radio ownership, listening habits and attitudes towards digital radio. In addition, useful evidence from the other strands of fieldwork, including the focus groups and the face-to-face interviews, is presented and used to verify and expand upon the survey analysis. The chapter also provides useful background and context for the following chapters of the report.

2.1 Radio ownership

First, it is useful to understand the current level of radio ownership by UK consumers, covering both digital and analogue radio ownership. This is important because it demonstrates the extent that digital radio take-up has progressed so far, which is an important indicator of how close consumers are to being ready for a digital switchover. Further, it is informative to examine how radio ownership differs between particular groups in society, such as different age groups, men and women, different ethnicities etc.

The survey results from the present study suggest that digital radio ownership has now reached more than 50%, although this is still well below the level of analogue radio ownership (79%) (see Table 5).

This figure is high compared to the latest figure from OFCOM, which put DAB digital radio ownership at 34% of the households at large and 42% of the people who listen to radio⁸ in the fourth quarter of 2010. Among Internet users, the DAB ownership rate is 46%.

Another recent survey estimate comes from YouGov's *Media Consumption Screener* survey (from September 2010), which found digital radio ownership by at least one household member to be 44% (36% of respondents to this survey owned a digital radio themselves, whereas 8% said another member of their household owns one).

The differences in the digital radio ownership rates found by the various surveys may be a consequence of the alternative ways in which the question was phrased. For example, the survey for the present study asked respondents "how many radio sets do you own in each of the following categories? a) analogue radio sets – i.e. AM/FM/LW, b) digital radio sets – i.e. DAB".⁹ On the other hand, the Media Screener survey asked respondents "which, if any, of the following devices do you own or anyone in your household own?".¹⁰

⁸ Based on a survey undertaken in the fourth quarter of 2010. See http://stakeholders.ofcom.org.uk/binaries/research/statistics/tech_Tracker_Q4_2010.pdf.

⁹ Respondents were told to include only radio sets and not other ways of listening to the radio, such as in-car radios, computers, mobile phones and television sets. The full questionnaire is presented in Annex 2.

¹⁰ The full question in the Media Screener survey was: "Which, if any, of the following devices do you own or anyone in your household own and which do you intend to purchase/upgrade in the next 12 months? Please select all that apply: - Personally own. - Someone else in my household owns. - Personally plan to purchase/upgrade in next 12 months. - Don't personally own or plan to purchase/upgrade."

The fact that the survey was conducted on-line may lead to an over-representation of households owning a digital radio set if the 73% of households using Internet¹¹ are on average more inclined to adopt new technologies than the 17% of households not using the Internet.

The extent of digital radio ownership varies between different groups. In particular, those in the working class and lowest socio-economic groups (i.e. National Readership Survey groups D and E)¹² and those under the age of 30 are less likely to own a digital radio. Conversely, over 60% of those in the upper middle and middle socio-economic groups own a digital radio. These findings suggest that the typically higher prices of digital radios may be dissuading those with lower incomes from purchasing them. The issue of expensiveness is further examined in the section on attitudes towards digital radio below (section 2.4).

Other findings relating to the radio ownership are:

- Slightly more men than women own a digital radio.
- Those of white British origin are more likely to own a digital radio than other ethnicities.
- Those living in urban areas are slightly more likely to own a digital radio than those in rural areas.
- The share with a digital radio is higher in England and Scotland than other countries.

These findings agree with the results of the *Media Screener* survey, which also shows that men and those in the upper middle and middle socio-economic groups have higher levels of digital radio ownership, whereas younger consumers have lower levels of ownership.

¹¹ See Ofcom, *The Communications Market*, 2010

¹² The socio-economic groups refer to the National Readership Survey social grades: A (upper middle), B (middle), C1 (lower middle), C2 (skilled working), D (working), E (lowest). These are defined as: A: Higher managerial, administrative or professional. B: Intermediate managerial, administrative or professional. C1: Supervisory or clerical and junior managerial, administrative or professional. C2: Skilled manual workers. D: Semi and unskilled manual workers. E: Casual or lowest grade workers, pensioners and others who depend on the welfare state for their income.

		Analogue radios		Digital radios	
		Average number owned per respondent	% who own at least one	Average number owned per respondent	% who own at least one
All		1.7	78.7	0.8	53.7
Age bands	18-29	1.3	66.8	0.8	46.9
	30-39	1.4	76.7	0.8	54.6
	40-49	1.7	82.0	0.9	57.6
	50-59	1.9	84.2	0.9	53.7
	60-69	2.2	84.2	1.0	61.0
	70+	2.0	83.0	0.7	51.2
Gender	Male	1.8	79.0	0.9	55.2
	Female	1.6	78.5	0.8	52.3
Ethnicity	White British	1.7	79.1	0.8	53.8
	Other	1.8	75.3	1.0	50.4
Social class ¹	Upper middle	2.3	84.0	1.1	63.0
	Middle	1.9	83.0	1.0	62.5
	Lower middle	1.6	76.7	0.9	54.4
	Skilled working	1.7	81.0	0.8	54.4
	Working	1.5	73.8	0.7	44.1
	Lowest	1.8	78.5	0.7	48.6
Location	Urban	1.7	77.6	0.9	54.3
	Town/fringe	1.8	81.8	0.8	53.1
	Rural	1.9	83.5	0.8	51.7
Country	England	1.8	79.4	0.8	54.2
	Wales	1.9	82.0	0.6	42.8
	Scotland	1.7	79.6	0.8	51.8
	N. Ireland	1.7	85.3	0.7	43.1

Note: 1. The socio-economic groups refer to the National Readership Survey social grades: A (upper middle), B (middle), C1 (lower middle), C2 (skilled working), D (working), E (lowest). These are defined as: A: Higher managerial, administrative or professional. B: Intermediate managerial, administrative or professional. C1: Supervisory or clerical and junior managerial, administrative or professional. C2: Skilled manual workers. D: Semi and unskilled manual workers. E: Casual or lowest grade workers, pensioners and others who depend on the welfare state for their income.

Source: *Online survey*.

2.2 Listening habits

The second area of interest is consumers' listening habits including how much consumers listen to radio, how they typically listen, and how many different radio stations they listen to. The survey data shows that average listening time across all consumers is just over 10 hours per week (Table 7). Respondents most commonly listen using an analogue radio set, followed by a digital radio set and then the internet.¹³ Just over a quarter of consumers listen to four or more stations (including analogue and digital stations) at least once a month, whereas just under a third listens to stations which are only broadcast on digital.

¹³ Note that this only refers to listening other than in the car, which is covered in the next section.

Examining how listening habits vary across different groups, young listeners are more likely to listen on the internet than other groups, and less likely to listen using an analogue radio set. Young listeners also tend to listen less in terms of hours, but listen to more stations which are only broadcast on digital (Table 7). Conversely, around two thirds of those over 50 listen using an analogue radio. This is supported by evidence from the focus group of listeners over 70, which found that the majority of whom choose to listen using an analogue radio, despite some also owning a digital radio.

The face-to-face interviews and focus groups found interesting differences between the listening habits of different vulnerable groups. On average, almost three quarters of respondents from one-pensioner households listen using an analogue radio, whereas this proportion is slightly lower (64%) for pensioners living with someone else. On the other hand, blind consumers often listen to a digital radio rather than on analogue radio (although it is important to acknowledge the small sample size for blind consumers). This may be because they switched to digital radio earlier than other consumers, since radio is likely to be more important to them than other media such as television.

Other observations that emerge are that:

- more men than women listen using a digital radio;
- those of white British origin listen using a digital radio more often than other ethnicities;
- those in the middle and upper middle class socio-economic groups listen using a digital radio more often; and
- the share who listens using a digital radio is higher in England and Scotland than in Wales and Northern Ireland.

An advantage of digital radio is that it provides more space for a greater number of stations. There are currently around 18 digital (DAB) only stations¹⁴ which are not broadcast on analogue. Therefore, consumers who want to listen to many different stations are likely to have a higher demand for digital radio. We see some evidence of this in the survey data, since among those who do not own a digital radio at present, the likelihood that they will buy a digital radio in the next 12 months increases with the number of channels that they currently listen to (see Table 6).

In addition, those who listen to very little radio (no more than 2 hours per week) are less likely to buy a digital radio in the next 12 months, whereas those who listen to the most radio (more than 28 hours per week) are slightly more likely to buy a digital radio than others (Table 6).

¹⁴ These are: Absolute 80s, Absolute 90s, Absolute Classic Rock, BBC 1Xtra, BBC Radio 5 Live Sports Extra, BBC Radio 6 Music, BBC Radio 7, BBC Radio Asian Network, Chill, Heat, Jazz FM, NME Radio, Planet Rock, Punjab Radio, Q, Smash Hits Radio, Smooth UK, The Hits

Table 6: How likely people are to buy a digital radio in the next year?

		Likely (%)	Unlikely (%)
Hours spent listening to radio in a typical week	No more than 2	16.3	83.7
	3 to 4	26.3	73.7
	5 to 7	25.2	74.8
	8 to 14	24.9	75.1
	15 to 28	25.4	74.6
	More than 28	28.2	71.8
Number of radio stations listened to, for over 30 minutes, in a typical week	0	6.3	93.7
	1	17.3	82.7
	2 or 3	24.6	75.4
	4 or more	30.4	69.6

Note: Base: Those that do not already own a digital radio.

Source: *Online survey.*

Table 7: Listening habits															
		Average listening time (hrs)	Listening methods (percentage who listen in that way)					Total number of radio stations listened to (percentage of respondents)				Digital radio stations listened to (percentage of respondents)			
			Analogue radio set	Digital radio set	Digital TV	Through the internet	Via another device	0	1	2 or 3	4 +	0	1	2 or 3	4 +
All		10.1	56.8	44.1	31.3	37.0	13.9	13.7	22.2	37.4	26.7	68.6	21.1	8.9	1.4
Age bands	18-29	7.5	45.3	36.2	26.2	45.3	24.1	18.7	23.3	32.7	25.3	68.5	20.1	9.6	1.9
	30-39	9.8	52.7	43.5	32.1	43.0	19.8	11.1	20.8	37.2	30.9	65.9	19.6	11.9	2.6
	40-49	10.8	58.1	46.0	33.3	37.1	13.7	12.9	22.9	36.4	27.8	62.4	24.6	10.8	2.2
	50-59	10.8	62.2	44.7	35.4	39.5	10.5	9.6	21.3	40.3	28.8	66.2	22.8	10.2	0.8
	60-69	11.2	63.1	53.6	36.7	30.2	6.8	11.0	20.5	40.5	28.0	73.2	20.0	6.6	0.3
	70+	10.9	64.3	44.0	25.4	22.0	3.5	17.2	23.6	39.9	19.4	77.8	18.8	3.2	0.3
Gender	Male	10.1	58.1	46.6	31.0	41.7	16.4	12.3	19.9	36.9	30.9	62.7	24.7	11.0	1.7
	Female	10.0	55.7	41.8	31.6	32.4	11.5	15.0	24.3	37.9	22.8	74.2	17.7	7.0	1.2
Ethnicity	White British	10.2	57.4	45.0	31.5	37.1	13.4	13.5	22.5	37.6	26.4	69.0	21.0	8.8	1.3
	Other	9.1	49.0	34.4	29.4	40.0	25.3	16.4	17.9	30.2	35.6	60.2	23.8	11.7	4.2
Social class	Upper middle	11.3	65.1	55.6	36.4	43.3	13.3	7.8	14.0	44.4	33.8	67.8	22.7	8.2	1.3
	Middle	10.2	60.5	53.9	33.7	41.3	13.8	8.1	19.1	39.4	33.4	66.8	20.7	11.1	1.5
	Lower middle	9.6	54.1	45.3	32.5	41.4	16.9	11.9	21.2	38.6	28.3	66.4	23.1	9.4	1.1
	Skilled working	9.9	55.5	41.8	28.0	33.8	13.0	13.1	23.3	38.1	25.5	65.5	23.3	9.3	1.8
	Working	9.6	51.7	35.1	27.3	30.2	14.9	17.4	28.5	32.6	21.5	72.2	18.8	7.2	1.8
	Lowest	10.8	59.5	37.9	30.4	30.7	9.2	20.8	24.3	34.0	20.9	73.5	17.4	7.8	1.4
Location	Urban	9.8	54.5	44.1	31.0	37.2	15.0	14.1	22.1	37.1	26.7	67.4	22.0	9.2	1.4
	Town/fringe	10.1	65.6	44.3	31.9	33.9	10.7	13.1	22.1	39.2	25.6	71.2	18.4	9.6	0.8
	Rural	11.5	64.3	43.9	32.7	38.0	10.5	12.0	23.0	37.2	27.7	73.0	18.5	6.7	1.8
Country	England	10.2	58.4	45.9	30.8	34.4	12.5	13.0	23.0	37.9	26.0	69.3	21.1	8.6	1.0
	Wales	11.0	59.8	32.4	31.9	36.3	11.0	15.0	28.4	34.0	22.6	75.8	18.1	4.7	1.5
	Scotland	9.6	57.0	39.1	34.4	36.6	15.9	20.7	26.0	34.6	18.7	73.8	17.7	7.2	1.2
	N. Ireland	9.9	59.6	33.6	28.0	33.9	16.8	29.5	25.3	25.2	20.0	72.6	19.0	6.4	2.1

Note: Base: All respondents.

Source: Online survey.

2.3 In-car radio listening

A key consumer issue concerning the digital switchover is the use of radios in cars, since the need to replace car radios could lead to significant extra costs for consumers, especially if take-up prior to the switchover is low.

The survey data shows that, across all consumers, 67% listen to radio in a car or van. Fourteen percent of those who have a car have digital radio in their car, and among these, the majority reported that the digital radio came already installed in the car when they bought it (Table 8).

Examining the differences across groups, noticeably more of those living in rural areas reported that they listen to radio in the car compared to those living in urban areas, which may be due to increased reliance on car travel in rural areas. However, take-up of in-car digital radio in rural areas is still similar to other areas. Interestingly, a notably higher share of respondents in Scotland reported that they have an in-car digital radio than for any other country.

Since a concern is that the switchover could lead to significant costs for consumers when they need to replace their car radios, it is interesting to examine the reasons why many consumers do not yet have in-car digital radios, and in particular whether cost is an important factor. The survey data shows that of those who don't have a digital radio in their car, in just over 14% of cases this is because they are too expensive (Figure 2).

The views expressed in the focus group with analogue listeners who are positively disposed towards digital radio and the focus group with rural listeners also suggest that the cost deters these groups from getting digital radios in their cars. In the case of rural listeners, around half of the focus group participants also thought that digital radios would be more distracting whilst driving due to the on-screen information.

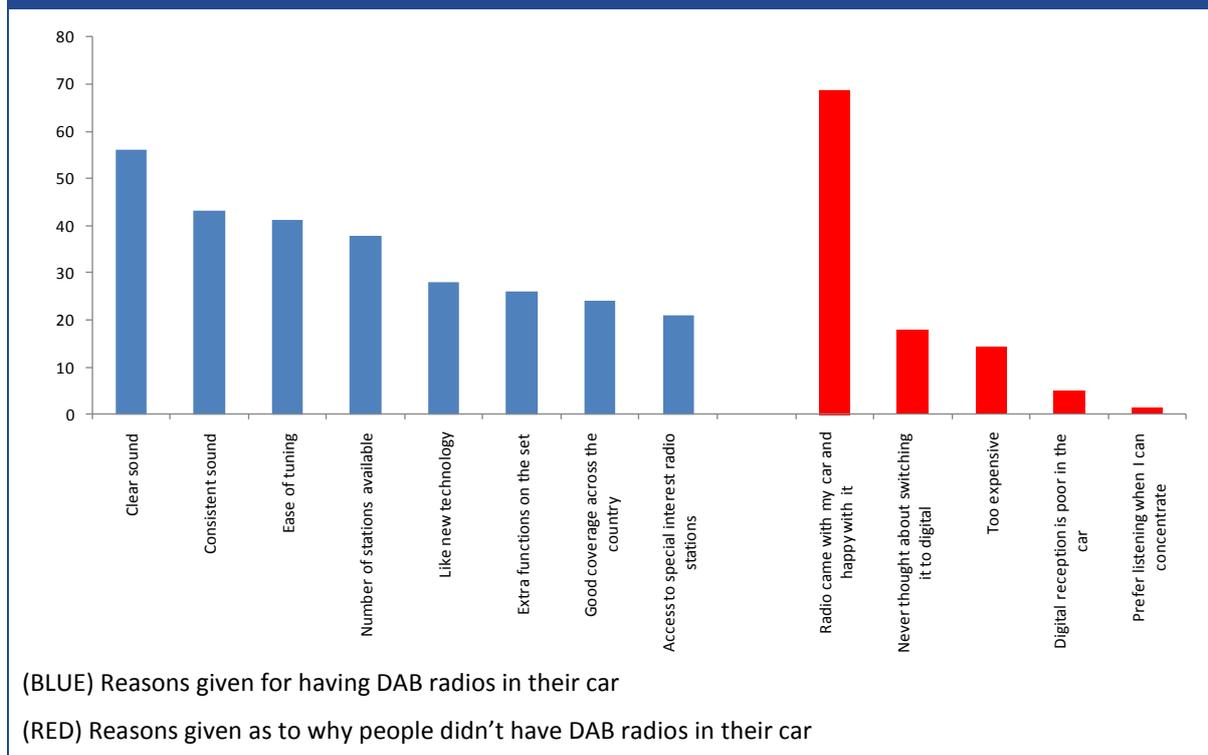
Table 8: In-car radio listening

		How did the DAB radio come to be in the car:					
		Listen to radio in car/van (%) ¹	Have DAB radio in their car (%) ²	Chose it when buying new car (%) ³	Already installed when bought (%) ³	Replaced original analogue radio (%) ³	Other (%) ³
All		67.4	14.2	8.6	79.1	8.0	4.3
Age bands	18-29	58.0	13.9	10.8	73.9	12.0	3.2
	30-39	63.9	13.7	11.0	71.4	9.9	7.7
	40-49	68.5	13.0	9.8	73.3	11.9	5.0
	50-59	78.1	13.9	12.3	78.5	4.1	5.1
	60-69	75.7	15.4	7.2	82.4	6.3	4.1
	70+	63.1	15.8	1.0	94.1	4.0	1.0
Gender	Male	68.1	12.3	11.0	73.4	9.4	6.1
	Female	66.7	16.1	6.9	83.2	6.9	3.0
Ethnicity	White British	68.3	13.8	8.9	79.4	8.0	3.7
	Other	52.1	21.2	10.8	70.4	10.8	8.1
Social class	Upper middle	81.1	17.1	18.4	70.3	7.1	4.2
	Middle	76.9	11.9	12.7	76.0	5.6	5.7
	Lower middle	68.1	14.0	10.6	75.3	7.1	7.0
	Skilled working	70.7	12.9	6.0	84.4	8.5	1.2
	Working	61.2	14.5	6.5	77.9	13.0	2.7
	Lowest	53.8	15.9	0.0	89.5	7.7	2.8
Location	Urban	64.6	14.2	8.6	78.1	9.1	4.3
	Town & Fringe	74.4	14.3	4.7	84.5	6.2	4.6
	Rural	78.2	14.8	11.1	80.0	4.5	4.5
Country	England	67.4	12.6	8.0	78.8	8.9	4.3
	Wales	69.2	12.6	9.5	85.8	0.0	4.7
	Scotland	67.1	17.3	2.1	87.2	4.3	6.4
	N. Ireland	66.2	12.6	0.0	88.5	11.5	0.0

Note: 1. Percentage of all respondents. 2. Percentage of those who do have a car. 3. Percentage of those who have a DAB in their car.

Source: Online survey.

Figure 2: Reasons given for having and not having DAB radios in cars (% of respondents)



Source: Online survey.

2.4 Attitudes towards digital radio

2.4.1 Why consumers decide to buy digital radios

An issue of consumer behaviour which is closely linked to the issue of willingness-to-pay is what prompted the consumers to purchase a digital radio.

From a pre-determined list of features,¹⁵ the most common reason given for getting a digital radio was that they have clear and high sound quality (Figure 3). This finding is supported by the evidence from the other strands of fieldwork. Sound was the most-cited reason for getting a digital radio among the pensioner interviewees and the small number of blind consumers who were interviewed, and was also frequently mentioned by participants in every focus group.

The finding also corroborates the results of the willingness-to-pay analysis presented in the next chapter, which establishes through a choice experiment that, of all the attributes of the digital radio, clear sound free of interference is the one for which consumers are willing to pay the most (see section 3.3).

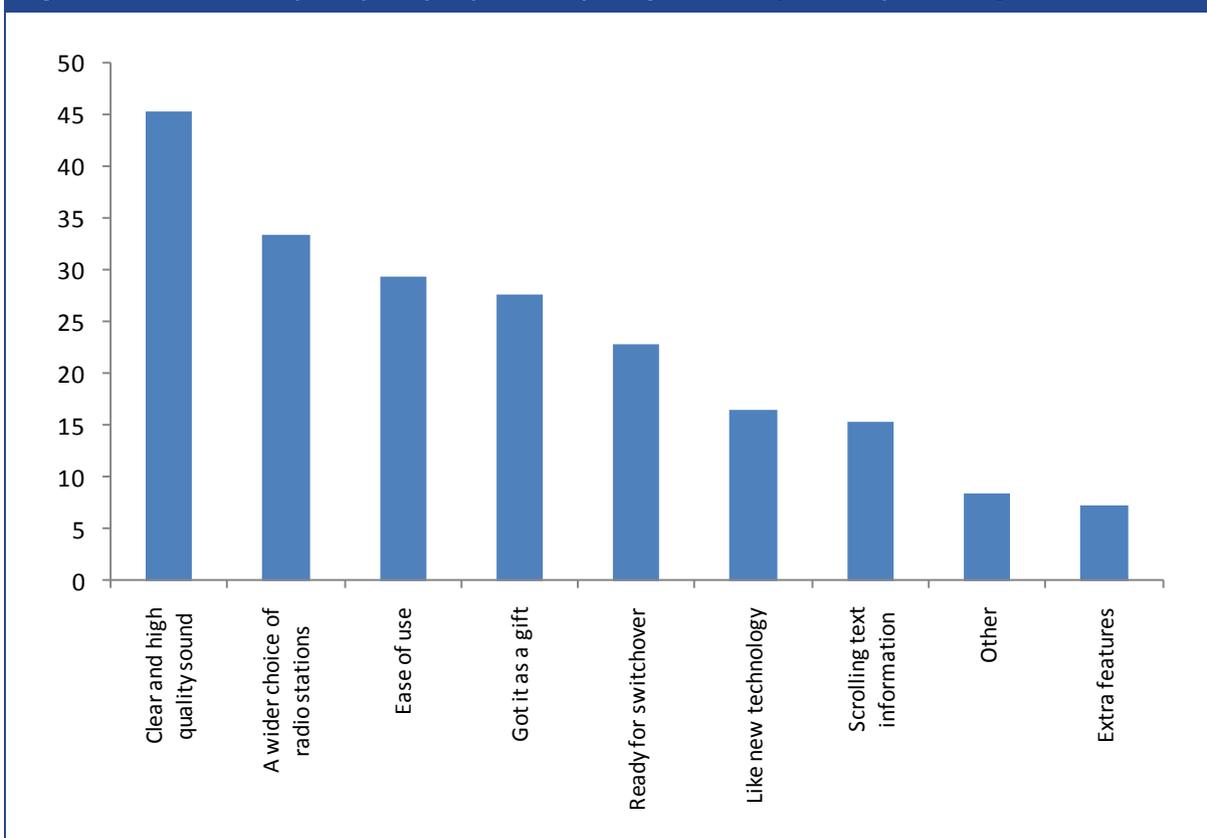
The second most common reason for purchasing a digital radio was the wide choice of stations. In the willingness-to-pay choice experiment this was covered by two attributes of digital radio, total

¹⁵ The list of different features presented to respondents can be seen in survey questionnaire which is in Annex 2.

number of stations and range of speciality stations. The analysis found that consumers have a willingness-to-pay for the both of these attributes (see section 3.3).

According to the online survey, in almost 23% of cases, the decision to get a digital radio was influenced by the need to be ready for the switchover. However, the other fieldwork suggests that this was less of a motivation for vulnerable consumers, since no pensioners who live alone and only nine percent of those living with someone else stated that this was a reason why they bought a digital radio. Further, almost 60% of pensioners living alone were given a digital radio as a gift, rather than buying it for themselves.

Figure 3: Factors that prompted people to buy a digital radio (% of respondents)



Note: Percentage of respondents that reported each factor as a reason for buying a digital radio.

Source: Online survey.

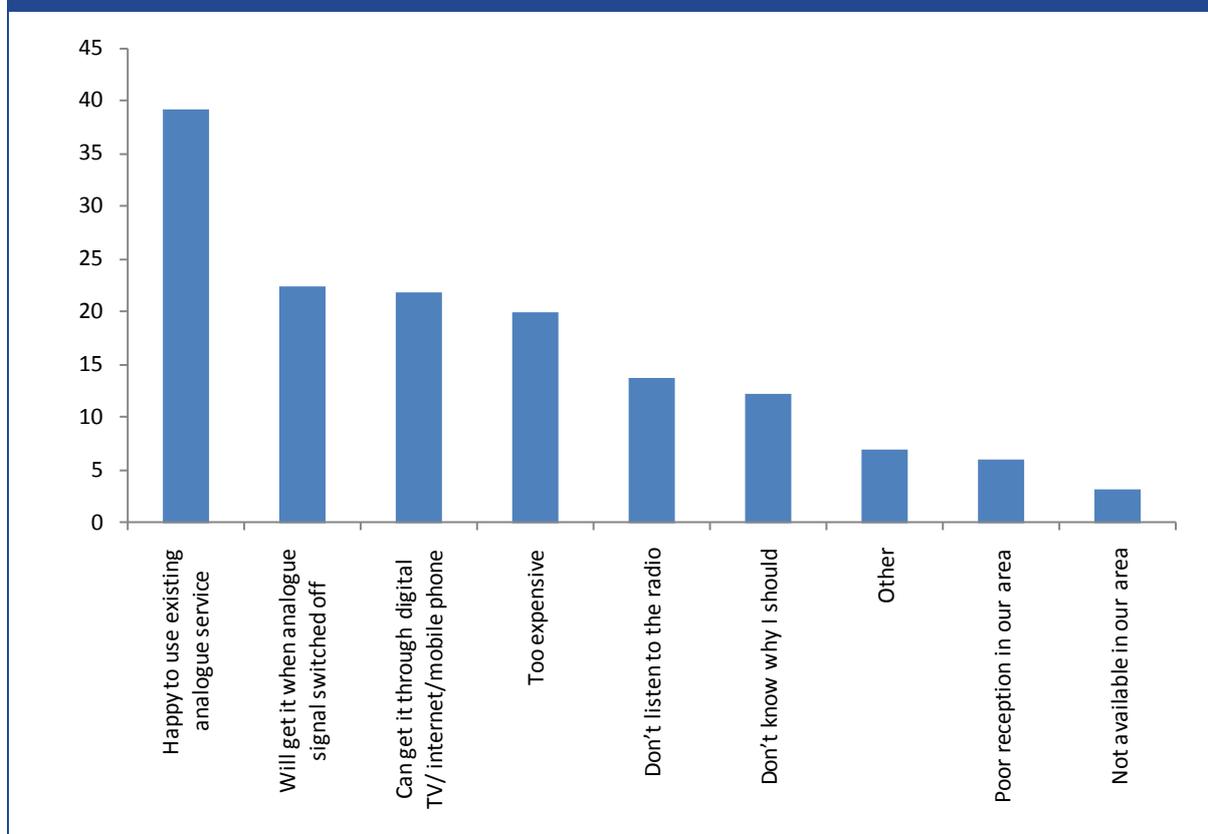
Conversely, it is also informative to explore the reasons given by consumers for not buying digital radios. The most common reason given was that consumers are happy with the existing analogue service (Figure 4).

The interviews suggest that this is even more common among vulnerable consumers: approximately two-thirds of pensioners living with someone else are happy with their existing analogue radio, while almost three-quarters of pensioners are content with their analogue sets.

Similarly, the focus group with analogue listeners who are positively disposed towards digital radio and also the focus group with analogue listeners who are negative about digital radio both showed that these groups are generally happy with their existing analogue service, and do not see the need to upgrade if their existing radios are still working.

The survey data also suggests that around one fifth of consumers believe that digital radios are too expensive. The other fieldwork elements found varying views on this: only four percent of pensioners who live alone feel that digital radios are too expensive; whereas the focus group with consumers who are negative about digital radio found that the high prices of digital radios, as well as their high power usage, discourage them from buying one.

Figure 4: Factors that prevented people from buying a digital radio (% of respondents that listed the factor)



Source: Online survey.

2.4.2 Attitudes of digital radio owners vs. non-digital radio owners

It is interesting to compare the attitudes of those who have purchased a digital radio to the attitudes of those who have not. Most of those who do not currently own a digital radio still perceive that digital radio provides benefits in terms of clearer sound, ease of tuning, useful functions and catching up with missed programmes (Table 9).

However, a high proportion of those who do not have a digital radio also believe that digital radio is too expensive at present (81% either agree or strongly agree with this statement). This is an interesting result because the willingness-to-pay analysis presented in the next section shows that consumers do in fact have a positive willingness-to-pay for the attributes of digital radio, which should compensate for at least some of the extra price. It is even possible that some consumers perceive digital radios to be more expensive than they actually are. On the other hand, a much lower share of those who do own a digital radio perceive digital radio to be too expensive.

Just under half of consumers, including digital radio owners and non-owners, agreed that digital radio sets use less energy. Participants in the focus group with analogue listeners who are positively disposed towards digital radio and also some of those in the over 70s focus group believe that digital radio sets in fact use more energy than analogue sets, with some saying they experience a shorter battery life with their digital sets.

Participants in the over 70s focus group who are also owners of digital radio sets believe that the reception is poorer compared to analogue, although this may be because DAB coverage is still developing in some areas.

This focus group also found that having a greater number of stations is not very attractive. There were two main reasons for this. Firstly, respondents are loyal to three or four particular stations, and are not very interested in moving to more niche stations. Secondly, they feel that digital radio, and in particular the types of channels available, is targeted more towards the younger generation.

To some extent, this finding supports the willingness-to-pay analysis presented in the next chapter, which shows that willingness-to-pay for an increased number of stations is significantly lower among older consumers than for other consumers, although the analysis does show that overall even older consumers have a positive willingness-to-pay for this characteristic.

Table 9: Consumer perceptions of digital radio (percentage of respondents)

	Digital radio owners				Non-digital radio owners			
	Strongly disagree	Disagree	Agree	Strongly agree	Strongly disagree	Disagree	Agree	Strongly agree
Digital radio has more stations of interest	6.2	24.6	43.2	26.0	14.2	35.8	37.8	12.1
Digital radio has less reliable reception	14.3	43.2	29.5	13.1	7.7	37.3	37.6	17.5
Digital radio has a clearer sound	4.4	11.0	50.2	34.4	4.1	12.5	63.1	20.2
Digital radio is easier to tune	3.6	13.0	49.0	34.4	4.1	15.3	60.5	20.1
Digital radio is too expensive at current time	10.0	45.4	35.6	9.0	2.0	17.0	53.7	27.4
Digital radio sets have more useful functions	2.2	11.7	58.6	27.6	4.3	15.3	64.9	15.5
With digital radio it is easy to catch-up if you miss a programme	6.3	25.9	54.3	13.4	3.3	16.3	66.9	13.6
Digital radio sets use less energy	21.8	30.3	38.9	9.1	17.0	33.8	42.1	7.1

Note: The percentages in the table exclude those who responded that they do not know whether they agree or disagree with the relevant statement. The bases for the percentages depend on how many respondents answered both the question on whether they have a digital radio and also the question on whether they agree or disagree with the relevant statement. The bases, from the first row to the last, are: 3,622; 3,421; 3,995; 3,767; 3,941; 3,524; 2,408; and 1,434.

Source: Online survey.

It is also interesting to note that the survey found differences in consumer perceptions of digital radio on the basis of age (Table 10). In particular, younger consumers more often agreed that:

- digital radio has more stations that are of interest to them than analogue radio;
- digital radio has a clearer sound than analogue radio;
- digital radio is easier to tune/find stations than on analogue radio;
- digital radio sets have more useful functions than an analogue radio; and
- with digital radio it is easy to catch-up if you miss a programme.

Table 10: Consumer perceptions of digital radio by age band

Statement:	Share who agree by age band (percentage of respondents):					
	18-29	30-39	40-49	50-59	60-69	70+
Digital radio has more stations of interest	54	53	47	41	32	32
Digital radio has less reliable reception	28	29	30	35	37	31
Digital radio has a clearer sound	70	70	69	65	61	59
Digital radio is easier to tune	72	68	64	56	53	46
Digital radio is too expensive at current time	45	44	45	50	46	45
Digital radio sets have more useful functions	66	66	61	59	51	41
With digital radio it is easy to catch-up if you miss a programme	40	39	35	32	31	25
Digital radio sets use less energy	17	14	14	11	10	15

Source: Online survey.

2.4.3 Digital radio take-up in the future

Take-up of digital radio, by virtue of its impact on digital radio listening, will be an important factor in the switchover decision. Therefore, it is useful to assess the likelihood that consumers who do not currently have a digital radio will get one in the future. The survey results show that around a fifth of survey respondents are likely to get a digital radio in the next 12 months (including those who are 'certain, 'likely' and 'very likely') (Table 11).

Those in their 50s and those living in town and fringe areas are most likely to get a digital radio over the next year. On the other hand, those in lower socio-economic groups are less likely to do so. This finding is supported by results from face-to-face interviews, which found that almost 60% of pensioners are 'very unlikely' to or 'certainly not' going to purchase a digital radio in the next year. This figure was marginally higher for pensioners living alone, compared to those living with someone else.

Those not of white British origin are more likely to get a digital radio in the next 12 months. This suggests that digital radio ownership among this group could be set to catch-up with ownership levels among consumers of white British origin (ownership level are shown in Table 5 above).

It is also informative to compare the likelihood that consumers will buy a digital radio with their perceptions of digital radio. Those who perceive that digital radio has qualities such as a greater number of interesting stations, clearer sound, easier tuning, more useful functions and reduced energy consumption report slightly more often that they are likely to purchase a digital radio in the next 12 months (see Table 12).

Finally, the consensus among the small sample of blind consumers who participated in the interviews was that, despite digital radios providing a number of benefits, there was no digital radio currently available on the market with a speech reader. A speech reader makes the digital radio easier to use for blind consumers because they cannot read the information on the screen and therefore are sometimes unaware of the station they are listening too. This may prevent blind consumers from purchasing digital radios in the future.

Table 11: Likelihood that consumers will get a digital radio in the next year (% of respondents)

		Certain	Very likely	Likely	Unlikely	Very unlikely	Certainly not
All		1.1	4.0	14.8	31.8	30.9	17.4
Age bands	18-29	0.7	2.0	14.3	29.3	34.9	18.9
	30-39	1.9	4.1	14.5	35.7	29.3	14.5
	40-49	0.9	3.2	15.5	35.1	28.9	16.3
	50-59	1.0	6.0	18.3	32.2	26.9	15.6
	60-69	2.2	2.7	14.1	32.5	28.9	19.7
	70+	0.6	6.5	12.7	27.5	33.4	19.4
Gender	Male	0.7	3.8	13.7	32.2	29.5	20.0
	Female	1.5	4.0	15.9	31.5	32.2	14.9
Ethnicity	White British	1.2	3.8	14.7	32.4	30.8	17.2
	Other	1.0	4.9	18.4	25.2	31.9	18.6
Social class	Upper middle	1.4	6.3	15.6	33.4	29.8	13.5
	Middle	0.9	5.0	14.1	39.8	27.5	12.6
	Lower middle	0.9	3.4	15.1	32.0	29.9	18.7
	Skilled working	1.4	3.8	17.3	29.5	31.5	16.6
	Working	0.9	3.4	14.8	29.7	33.3	17.9
	Lowest	1.5	3.9	12.8	30.0	32.3	19.6
Urban	Urban	1.2	3.7	14.1	31.2	32.7	17.1
	Town & fringe	1.0	3.9	20.7	34.9	23.5	16.1
	Rural	0.8	5.0	14.6	31.9	27.3	20.4
Country	England	0.7	3.9	14.4	31.9	31.3	18.0
	Wales	3.1	2.0	11.3	33.8	30.5	19.4
	Scotland	2.3	4.5	16.7	28.1	28.0	20.1
	N. Ireland	0.0	2.2	11.0	28.1	43.6	15.1

Source: Online survey.

Table 12: Share who are likely to buy a digital radio in the next year and opinions on digital radio

Statement:	% likely to buy if disagree	% likely to buy if agree
Digital radio has more stations that are of interest to me than analogue radio	11.3%	30.8%
Digital radio has less reliable reception than analogue radio	27.5%	17.4%
Digital radio has a clearer sound than analogue radio	10.6%	27.0%
Digital radio is easier to tune/find stations than on analogue radio	13.6%	27.4%
Digital radio is too expensive at the current time compared to an analogue radio	28.5%	21.1%
Digital radio sets have more useful functions than an analogue radio	15.3%	25.3%
With digital radio it is easy to catch-up if you miss a programme	17.1%	25.8%
Digital radio sets use less energy than analogue radios	15.6%	33.5%

Note: A respondent is counted as being likely to buy a digital radio in the next 12 months if they said 'certain', 'likely' or 'very likely' in response to question 8) of the consumer survey (see Annex 2). A respondent is counted as agreeing with a particular statement if they said that they either agree or strongly agree with that statement in response to question 13) of the consumer survey.

Source: *Online survey.*

3 Willingness-to-pay for attributes of digital radio

In this chapter the results of the willingness-to-pay (WTP) analysis are presented. In sections 3.1 and 3.2 the concept of WTP in the context of the attributes of digital radio is discussed and the choices presented to the participants in the choice experiment are described. The other sections of this chapter provide the results of the WTP analysis, both on average for all consumers and for particular key demographic groups.

3.1 What is willingness-to-pay?

WTP is a measure of the price a consumer would be willing to pay for a particular item, either an attribute of a good or service or a good or service itself. For this project, the approach used to assess consumers' WTP is based on a choice experiment (administered via the online survey).

Participants in the choice experiment were asked to choose between two options which differ in terms of a just one particular attribute, and where each option has an associated price. The choices made by participants indicate whether, given the difference in associated prices, consumers generally prefer an option with a particular attribute over an option with another attribute.

Patterns in the choices made by participants are recorded in a dataset which can be used to assess (in a statistical model) the likelihood that a consumer will choose a particular option given its attributes and associated price. This revealed choice is a measure of what the consumer would be WTP for a particular attribute. Technical details of the estimation method are provided in Annex 3.

In this study, the options that participants were asked to choose between were two alternative bundles of attributes relating to aspects their radio listening experience. These attributes are described below in section 3.2.

3.2 Attributes of digital radio

The WTP analysis considers six different attributes of digital radio. These attributes relate to: how the radio is tuned, information which is displayed on the radio, functionality (specifically pause/rewind of broadcasts), total number of stations available, number of speciality stations available, and sound quality.

The attributes of digital radio were identified through the discussions at the initial focus groups, where participants were asked talk about what they see as the characteristics of digital radio and how they would describe these characteristics.

In the survey, the sound attribute of digital radio was defined as “you have clear sound and no background interference”, rather than referring to “sound quality”. This terminology was used by participants in the initial focus groups to describe the characteristics of digital radio sound.

In particular, when the focus group with digital radio listeners were asked “thinking about ‘digital radio’, what words, thoughts, images or associations come to mind”, five participants said “clear sound”. In a follow-up question which asked “a few of you mentioned sound quality - can you expand on this, how do you define clear sound”, four said “no interference”, whereas another said

“no hissing”. Further, in response to the question “why do you associate [modern] with digital radio”, one participant said “it is mostly the clarity of the sound”. Finally, six participants mentioned “clear sound” in response to either the question “how would you describe digital radio to someone who has never had it” or the question what are “the top 3 characteristics of digital radio”.

During the focus group with analogue radio listeners when asked to “generate a list of what you understand the main characteristics (or attributes/features) of digital radio to be” participants mentioned “clear sound”, “clear signal”, “clear reception” and “broadcast clarity” (one respondent said “good sound quality” but did not expand on what they meant by this). In a follow-up question where participants were asked “some of you have mentioned 'good sound quality' - again can you expand on this, what do you mean by good sound quality”, three respondents mentioned no interference. When asked “how would you expect the sound quality to compare to analogue one respondent said “no crackling, consistent clarity”, and another later mentioned that “analogue radio can suddenly fade and crackle”.

When participants in the focus group with digital radio listeners were asked about “niche stations” and if there is “any appeal in e.g. special interest/languages/niche music”, they spoke specifically about particular stations which are important to them which are available on digital only, and did not confuse this with the total number of stations available.

One participant mentioned “range of stations available” as a main characteristic of digital radio, but also said “there isn't really anything niche that I have found or got into”, indicating he sees that there is a difference between number of stations and speciality stations.

Another participant highlighted the importance of individual speciality stations, explaining that her reason for switching to digital radio was that a particular Chinese language station migrated to digital, meaning that her parents needed to switch due to their poor English.

This was supported by a further participant who mentioned that there is a Christian station UCB which otherwise would not be available in Northern Ireland. The same participant referred to the “amount of ad free stations” as an advantage of digital radio in response to an entirely different question on the characteristics of digital radio.

Participants in the focus group with analogue radio listeners also acknowledged the benefits of niche stations as opposed to the total number of stations. In particular, one participant mentioned that she likes the idea of “BBC stations for niche audiences” and might listen to a particular music station (6 Music) if she had a digital radio. However, this contrasted with her views on the benefits of a large number of stations, since she also thinks that digital radio will provide many stations that she doesn't want to listen to.

The attributes were then further elaborated and agreed by the project team and the steering group.

A key requirement for undertaking the WTP analysis was to provide descriptions of the attributes of digital radio and descriptions of the corresponding attributes of analogue radio so that these descriptions clearly articulate the differences between the two in a way that consumers understand. Hence, the language and terminology used by consumers during the initial focus

groups was used to develop these descriptions. The attribute descriptions used during the choice experiment are presented in Table 13.

During the choice experiment, each respondent was asked to make eight choices in total. Each time, respondents were asked to choose between two bundles of attributes, where one bundle contained a single digital attribute alongside two analogue attributes, whereas the alternative bundle contained the three corresponding analogue attributes. Every bundle also carried an associated cost. The various possible combinations of attributes from Table 13 were randomly assigned across the respondents. An example choice card from the experiment is shown in Box 1 below.

The choice experiment focuses separately on each of the attributes of digital radio, and in theory, the individual values (WTP) of the attributes can be summed to an aggregate value of a bundle of attributes.¹⁶ However, one has to take care when combining the WTP estimates for each of the individual attributes in order to get an overall measure of consumers' WTP for all the attributes together.

This is because there may be some interaction between the different attributes: that is, the benefit to consumers of a particular attribute may be greater (or less) if it is also combined with other attributes. Thus, what consumers would pay in order to have two digital attributes may be different from the sum of their WTP for each attribute individually. Further, in addition to any potential interactions between the attributes, consumers may also give different weightings to the various attributes in terms of their importance for consumers.

Therefore, when adding the estimates of WTP for the individual attributes in order to derive the overall WTP for the attributes combined, we must make the following assumptions:

- there are no interactions between the attributes (i.e. the attributes are not significant substitutes or complements);
- the extent and the manner in which the households' budget constraint affects the valuation of individual attributes would be the same if households evaluated a bundle of the attributes; and
- the weightings consumers give to the different attributes are all equal.

In practice, studies show that consumers tend to give a less high value to a bundle of specific attributes than the sum of the values of the attributes included in the bundle.

Therefore, the sum of WTP for the individual attributes is best viewed as a useful upper-bound measure of the combined WTP unless some the attributes are complements which, in combination, attract a higher WTP than the sum of the WTPs of the attributes separately. Since interactions between the attributes may influence the combined WTP in either direction, it is sensible to include some sensitivity analysis around this measure when undertaking an impact assessment and potentially, consider using a contingent valuation approach in a further survey which queries households directly about their WTP for digital radio.

¹⁶ See, for example, EFTEC, *PR09 Willingness to Pay Customer Survey*, Final Report to United Utilities Water, 2009 and Accent. *Expectations of DNOs & Willingness to Pay for Improvements in Service*, Final Report to Ofgem, 2008

Box 1: Example choice card

Please choose between the two options:

The only information provided on the radio set is the identification of the station you are listening to.

You can only listen to live radio as it is broadcast.

You have a choice of 10 national stations and between 5 to 25 local stations depending on your area.

Price: £31

(tick box)

Information is continuously provided identifying the station you are listening to, what programme is on, and what song is playing or who is being interviewed.

You can only listen to live radio as it is broadcast.

You have a choice of 10 national stations and between 5 to 25 local stations depending on your area.

Price: £35

(tick box)

Table 13: Attribute descriptions used in the choice experiment

Digital attributes	Analogue attributes
Tuning:	
D1: "You can scroll through the names of all the available stations without hearing them and select the one you want to listen to from this list. If you wish to, you can re-order the list to suit you."	A1: "The radio skips through all the available stations from one to the next, playing each one briefly, and you can stop it at the one you want. Alternatively you can turn a dial to find reception manually."
Information display:	
D2: "Information is continuously provided identifying the station you are listening to, what programme is on, and what song is playing or who is being interviewed."	A2: "The only information provided on the radio set is the identification of the station you are listening to."
Functionality:	
D3: "You can listen live, and pause / rewind broadcasts using your radio set."	A3: "You can only listen to live radio as it is broadcast."
Number of stations:	
D4: "You have a choice of 20 national stations and between 5 to 40 local stations depending on your area."	A4: "You have a choice of 10 national stations and between 5 to 25 local stations depending on your area."
Speciality stations:	
D5: "You have a choice of around 20 to 30 speciality radio stations, such as stations in different languages, ethnic stations, stations for different religions, and speciality entertainment, sports and music stations"	A5: "You have a choice of around 5 to 10 speciality radio stations, such as stations in different languages, ethnic stations, stations for different religions, and speciality entertainment, sports and music stations."
Sound:	
D6: "You have clear sound and no background interference."	A6: "You may experience sound interference."

3.3 Average WTP

This section presents the results of the WTP analysis calculated across all consumers. The analysis shows that, on average across all consumers, they have a WTP for each of the attributes of digital radio ranging from £4.75 to £9.88 (Table 14).

WTP is highest for the sound attribute, namely that sound is clear with no background interference (D6), followed by the option to pause and rewind broadcasts using the radio set (D3). On the other hand, WTP is lowest for the attribute of additional speciality stations (D5).

The overall WTP is £41.82 (calculated by summing the WTP figures for the individual attributes), although, as discussed above, this assumes that the combined WTP for all the attributes together is not significantly influenced by interactions between the attributes.

Table 14: WTP for the attributes of digital radio (£)

	D1: Tuning	D2: Information display	D3: Pause/ rewind	D4: Number of stations	D5: Speciality stations	D6: Sound	Overall WTP
All consumers	6.34	7.22	7.82	5.80	4.75	9.88	41.82

Source: London Economics calculations based on online survey data.

3.4 Willingness-to-pay among key demographic groups

In the following sections, WTP among certain key demographics is presented.

3.4.1 WTP by age group

The analysis shows that older consumers (aged 50 and over) have a higher WTP for the sound attribute of digital radio (D6) than younger consumers (Table 15), but a lower WTP for the attributes of additional stations (D4) and speciality stations (D5). WTP for the option to pause and rewind broadcasts using the radio set (D3) generally increases with the age of consumers.

Table 15: WTP for the attributes of digital radio by age group (£)

	D1: Tuning	D2: Information display	D3: Pause/ rewind	D4: Number of stations	D5: Speciality stations	D6: Sound	Overall WTP
18-29	5.65	6.62	6.78	5.99	5.37	7.64	38.06
30-39	6.74	7.41	7.55	6.49	5.95	8.76	42.91
40-49	6.25	7.24	8.05	6.38	4.76	10.12	42.80
50-59	6.71	7.28	8.27	5.66	3.97	11.25	43.15
60-69	6.66	6.54	7.84	4.28	2.56	10.99	38.86
70+	5.27	7.37	8.47	3.46	3.16	12.64	40.38

Source: London Economics calculations based on online survey data.

3.4.2 WTP by gender

The analysis found that men have a higher WTP for each of the attributes of digital radio (Table 16). The largest differences in WTP between men and women were for the tuning attribute (D1) and the attributes of additional stations (D4) and speciality stations (D5).

Table 16: WTP for the attributes of digital radio by gender (£)

Gender:	D1: Tuning	D2: Information display	D3: Pause/ rewind	D4: Number of stations	D5: Speciality stations	D6: Sound	Overall WTP
Female	5.40	6.94	7.55	5.05	4.05	9.68	38.67
Male	7.28	7.53	8.11	6.59	5.48	10.10	45.08

Source: London Economics calculations based on online survey data.

3.4.3 WTP by socio-economic group

The differences in WTP across socio-economic groups are not particularly notable (the differences are not as pronounced as between different age groups, for example), and no significant patterns emerge (Table 17).

Table 17: WTP for the attributes of digital radio by socio-economic group (£)

Social class:	D1: Tuning	D2: Information display	D3: Pause/ rewind	D4: Number of stations	D5: Speciality stations	D6: Sound	Overall WTP
Upper middle	6.74	6.41	7.61	4.77	4.08	9.42	39.02
Middle	6.75	7.22	7.84	5.66	4.55	9.74	41.75
Lower middle	6.51	7.21	7.49	6.32	5.23	9.13	41.89
Skilled working	5.55	6.63	6.59	5.52	4.66	8.48	37.42
Working	5.25	7.32	8.33	5.39	4.00	10.91	41.19
Lowest	5.70	7.12	8.52	5.07	4.36	11.36	42.13

Source: London Economics calculations based on online survey data.

3.4.4 WTP by type of region (rural vs. urban)

Rural consumers have a significantly higher WTP for the sound attribute of digital radio (D6) than those from urban or town/fringe areas (Table 18). WTP is also noticeably higher among rural consumers for the option to pause and rewind broadcasts using the radio set (D3).

Table 18: WTP for the attributes of digital radio by type of region (£)

Region type:	D1: Tuning	D2: Information display	D3: Pause/ rewind	D4: Number of stations	D5: Speciality stations	D6: Sound	Overall WTP
Rural	6.94	7.59	9.32	5.38	4.37	12.41	46.01
Town/fringe	6.49	6.48	7.63	5.50	4.71	9.45	40.28
Urban	6.20	7.22	7.62	5.87	4.78	9.61	41.29

Source: London Economics calculations based on online survey data.

3.4.5 WTP by ethnicity

In section 3.3 above we noted that across all consumers WTP is lowest for the attribute of additional speciality stations (D5). However, analysis by ethnic group shows that WTP for this attribute is noticeably higher among consumers who are not of white British origin (Table 19). This should be seen in the context that, for all other attributes, WTP is higher among those of white

British origin. This finding may be because some speciality stations cater specifically to the different languages and cultures.

Table 19: WTP for the attributes of digital radio by ethnicity (£)

	D1: Tuning	D2: Information display	D3: Pause/ rewind	D4: Number of stations	D5: Speciality stations	D6: Sound	Overall WTP
White British	6.48	7.32	8.01	5.90	4.62	10.11	38.68
Other	5.57	6.74	6.79	5.32	5.49	8.76	42.43

Source: London Economics calculations based on online survey data.

3.5 Observed willingness-to-pay

The analysis presented above is based on consumers' *revealed* WTP for the attributes of digital radio.

We can also observe consumers' WTP for digital radio sets by looking at actual prices in the market. A web-sweep of sale prices for digital radio sets suggests that prices range from £25 up to £175, although a reasonable selection is available for £50 or less.¹⁷

However, using observed WTP instead of revealed WTP is problematic, especially in the case of digital radio, for three main reasons:

- Digital radio sets are very diverse and their prices vary considerably, so therefore it is difficult to use observed prices to provide a single figure for how much consumers would be willing to pay for digital radio.
- Observed prices tell us very little about consumers' WTP for the individual attributes of digital radio.
- The actual prices of digital radio sets may be driven by other factors in addition to the attributes of digital radio, such as aesthetics, fashion, 'new technology' appeal, etc, so actual prices may not accurately reflect WTP for digital radio itself.

Therefore, this study focuses only on the consumers' WTP as revealed through the choice experiment.

¹⁷ This figure is based on a web-sweep undertaken by London Economics in February 2011.

4 Disposal habits and costs of disposal

This chapter first examines how consumers dispose of unwanted radios and then presents a model of the costs of disposal for different groups including consumers, retailers and producers of radios, and Local Authorities.

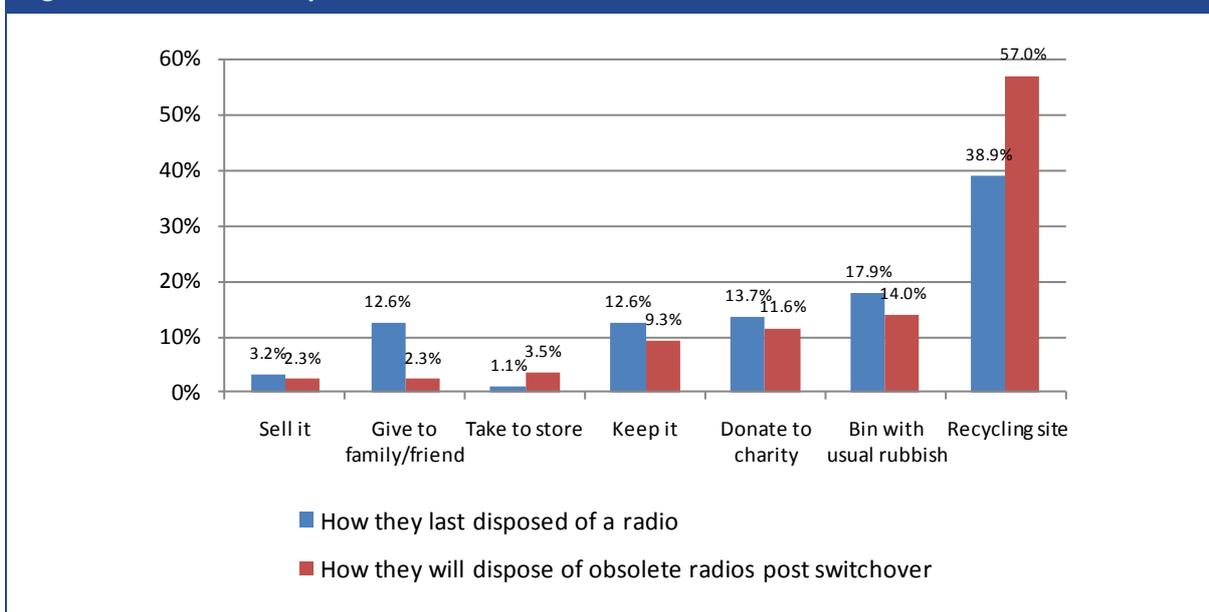
4.1 Disposal habits and attitudes towards disposal

The online survey explored how consumers last disposed of a radio and how they think they will dispose of obsolete radios after the switchover. In both cases, the most common response was that they took (or would take) their radios to a recycling site.

Out of those who provided an answer to the question,¹⁸ more than half reported that they would take obsolete radios to a recycling site after the switchover (Figure 5). This is notably higher than the share who took their radio to a recycling site the last time they disposed of one.

The second most common response was that consumers would dispose of radios in the bin alongside their usual rubbish. Very few consumers reported that they would return their unwanted radios to a store, which has implications for the model of disposal costs presented in the next section.

Figure 5: Consumer disposal habits



Note: The percentages in the chart exclude those who answered 'other', 'not sure' or 'can't remember' to questions 15) and 16) of the survey (see Annex 2).

Source: Online survey.

¹⁸ That is, excluding those who answered 'other', 'not sure' or 'can't remember' to questions 15) and 16) of the survey (see Annex 2).

In addition, the survey also established whether consumers, who would take obsolete radios to a recycling site after the switchover, would make an extra trip in order to do so. Few consumers reported that they would make an additional trip, which again has important implications for the model of disposal costs.

Table 20: Recycling site visits

Most likely scenario	Share
I'd make a separate trip to the recycling site to dispose of my radio	7%
I'd save up enough rubbish for one trip to the recycling site	63%
I'd go to the recycling site on my way to/ past somewhere else.	28%
Other/don't know	2%

Note: Base: Those who reported that they would dispose of obsolete radios after the switchover by taking them to a recycling site.

Source: *Online survey*.

Given this evidence on how consumers dispose of radios, it is also interesting to examine their general attitudes towards disposal. Around nine in ten survey respondents reported that they feel guilty throwing away things that still work and also that they believe people should make more of an effort to reuse electronic equipment that still works, rather than throw it away (Table 21).

However, over one third of respondents reported that they are not sure what they can take to a recycling site, and a quarter reported that they are not prepared to make a special effort to dispose of a radio set in an appropriate way.

Table 21: Consumer attitudes towards disposal

Statement:	Disagree	Agree
I feel guilty if I throw away things that still work	11%	89%
It would be easier just to throw a radio set away in the household bin than recycle it	37%	63%
It's frustrating that it isn't easier to dispose of electronic equipment easily	32%	68%
I'm not sure what I can take to a local recycling site	63%	37%
I should have the main responsibility for disposing of my radio set appropriately	14%	86%
I know that there are facilities to dispose of electronic equipment locally	23%	77%
People should make more of an effort to reuse electronic equipment that still works, rather than throw it away	11%	89%
I'm not prepared to make a special effort to dispose of a radio set in an appropriate way	75%	25%

Source: *Online survey*.

4.2 Disposal cost modelling

This section of the study assesses the costs that would arise from the disposal of analogue radios which would become obsolete after the digital switchover. The analysis uses results from the

online consumer survey, figures provided by Government and industry, and a number of assumptions.

In the following sub-sections, the costs arising for several different stakeholder groups are modelled, including consumers, retailers of radios, producers of radios, and Local Authorities (LAs). It is important to note that the analysis aims to model the additional costs which arise due to the increase in the number of radios that are discarded as a result of the digital switchover, not the costs relating to the disposal of radios in general.

As a first step, it is useful to establish how many radios will be disposed of through each of the various possible channels. The average number of analogue radios per survey respondent was 1.7, so we multiply this by the number of households in the UK (26.2 million according to the ONS) in order to find the total stock of analogue radios.

We assume that, as a result of the switchover, all of these will be disposed of through one of the nine methods listed in Table 22. The shares of each different disposal method are available from the survey, allowing us to calculate the total number of radios disposed of through each channel.

Further, it is also possible to calculate how many radios cause extra costs for the different stakeholder groups (Table 22). For example, all 6.2 million radios which are disposed of with the usual rubbish cause costs for LAs, whereas 129,000 (or 25%) of the radios returned to stores after purchase cause costs for retailers.¹⁹

Table 22: Number of radios disposed of through different channels

Disposal method:	Share of radios disposed	Radios disposed of (000s)	Number of radios causing costs for:			
			Consumers (000s)	LAs (000s)	Retailers (000s)	Producers (000s)
Bin with usual rubbish	14%	6,215	-	6,215	-	-
Store at same time as purchase	2%	1,036	55	-	259	-
Store after purchase	1%	518	518	-	129	-
Recycling site with an extra trip	4%	1,813	1,813	1,813	-	1,813
Recycling site without an extra trip	53%	23,565	-	-	-	23,565
Keep it and store it away	9%	4,143	-	-	-	-
Sell it	2%	1,036	-	-	-	-
Donate it to charity	12%	5,179	363	-	-	-
Give it to family/friends	2%	1,036	-	-	-	-
Total	100%	44,540	2,748	8,028	388	25,377

4.2.1 Costs to consumers

Costs to individual consumers are modelled according to how they would dispose of their analogue radio sets following the switchover. The aggregate cost to all consumers is then calculated by multiplying the costs for individual consumers by the relevant share of the population (based on the proportions from Figure 5 above).

¹⁹ This is because 75% of stores pay to opt-out of offering in-store take back, as explained in section 4.2.3 below.

In the case of consumers, the relevant costs are time costs, such as the time required to go to a recycling site or shop, and monetary costs of travel (e.g. fuel costs, bus fares, etc). However, such costs only arise if consumers take their radios to a recycling site, store or charity shop *and* make an extra trip in order to do so. In other scenarios the costs to consumers are zero (see Box 2).

The approach for calculating the costs to consumers is set out in Box 2. In these calculations, 'travel time' and '£/mile' are derived from the average distance that consumers need to travel to reach a recycling depot (or store) and the mode of transport they would use to get there (information on both of which is available from the survey).

Further, 'travel time' and '£/mile' also depend on a number of input parameters including: average bus and train fares, average speed of travel depending on mode of transport, and the cost per mile of travelling by car and taxi.

The value of time, '£/min', is derived from the average hourly wage (we use one third of the median hourly wage as the value of leisure time). The inputs 'time at site' and 'time at store' are assumed parameters.

Finally, in order to derive the aggregate cost to all consumers, we scale-up the per household cost using appropriate factors, namely: the share of survey respondents who report that they own an analogue radio multiplied by the number of households in the UK multiplied by the share of respondents who would make an extra trip to a recycling site (or store or charity shop) in order to dispose of their radio.

Further details of the modelling approach, including formulae and a full list of the parameters used, are presented in Annex 4.

It should be noted that this approach assumes that other costs, such as the costs of collecting municipal waste, are not passed on to consumers, for example through increased taxation (such assumptions were made following discussions with Defra and BIS).

Box 2: Cost modelling approach - Costs to consumers**Cost to a consumer if they:**

(i) Disposal with usual rubbish	= None
(ii) Return radio to store when purchasing a new one	= None
(iii) Return radio to store after purchasing a new one	= Travel time x £/min + Time at store x £/min + Distance x £/mile
(iv) Take radio to recycling making an extra trip	= Travel time x £/min + Time at site x £/min + Distance to site x £/mile +
(v) Take radio to recycling not making an extra trip	= None
(vi) Take radio to a charity shop with an extra trip	= Travel time x £/min + Time at shop x £/min + Distance to shop x £/mile +
<u>Aggregate cost to all consumers</u>	= (iii) x No. who return to store after purchase + (iv) x No. who recycle with an extra trip + (vi) x No. who take to charity shop with an extra trip

The total costs to consumers are found to be around £5.1m (or £1.84 per radio²⁰), of which £3.7m is due to extra trips to recycling sites, £0.8m is due to extra trips to stores, and £0.5m is due to extra trips to charity shops (Table 23).

It is useful to carry out some sensitivity analysis around the key parameters of the model in order to examine the impact that changes to these inputs have on the final cost estimates. In this case, parameters which are subject to some uncertainty and influence the overall results are the assumptions of average speed by mode of transport and the length of time consumers spend at recycling sites and in stores.

Therefore, in the sensitivity analysis, the average speed for each mode of transport was reduced by 20% and the amount of time that consumers spend at recycling sites and in stores was increased by 50%. The combined effect of these changes is to increase the estimated costs to consumers by 12%, to £5.7m.

²⁰ This is calculated by dividing the total costs to consumers by the total number of radios causing costs for consumers from Table 22 above.

Table 23: Disposal costs for consumers

Mode of travel	Extra trips to stores		Extra trips to recycling sites		Extra trips to charity shops	
	Number (000s)	Cost (£000s)	Number (000s)	Cost (£000s)	Number (000s)	Cost (£000s)
Car/van	143	455	822	3,540	100	318
Foot	36	65	29	90	26	45
Taxi	7	22	2	9	5	16
Bus/coach	39	142	24	99	27	99
Train/tram/ underground	15	94	2	11	11	66
Total	240	777	879	3,748	168	544
Total costs (£000):	£5,069					

4.2.2 Costs to Local Authorities

Disposal costs to Local Authorities (LAs) arising as a result of the switchover are: a) the cost of collecting and disposing of increased municipal waste, and b) the cost of providing additional staff in order to supervise extra traffic at civic amenity (CA) sites.

The costs of collecting and disposing of extra municipal waste depend on: firstly, the additional volume of waste disposed of in this way, which is derived from the share of consumers who would dispose of radios with their usual rubbish; and, secondly, the various resulting costs per tonne which are borne by LAs:

- landfill tax per tonne,
- collection cost per tonne, and
- landfill gate fee per tonne.

It should be noted that the landfill tax is usually treated as neutral to the public purse, since it provides revenue for the Treasury. However, here it is still included in the cost calculations since the modelling specifically relates to the costs for LAs.

The cost of providing additional staff in order to supervise extra traffic at CA sites depends on the average hourly wage, and also the increase in staff time required, which is derived from the share of consumers who would make an extra trip in order to take their radios to a recycling depot.

The approach used to calculate the costs to LAs is set out in Box 3. The input variable '*staff time to supervise extra traffic at CA sites*' is a parameter that needs to be assumed, although discussions with Defra and BIS suggest that it is likely to be small.

Annex 4 provides more details on the approach used to model the costs to LAs.

Box 3: Cost modelling approach - Costs to Local Authorities

$$\begin{aligned}
 \text{Aggregate cost to all LAs} &= \text{Average radio weight} \times \\
 &\quad \text{Increase in radios disposed of with rubbish} \times \\
 &\quad (\text{Landfill tax per tonne} + \\
 &\quad \text{Collection cost per tonne} + \\
 &\quad \text{Landfill gate fee per tonne}) \\
 &+ \\
 &\quad \text{Staff time to supervise extra traffic at CA sites} \times \\
 &\quad \text{Average hourly wage}
 \end{aligned}$$

The analysis found that, at just £647,000 (or 8p per radio²¹), the overall costs to LAs are relatively small (Table 24). However, the modelling approach uses some key input parameters which should be subject to sensitivity analysis, namely: the average weight of a radio which is derived from a small sample of weights from a web-sweep; and the extra staff time required to supervise each additional visit to a CA site by a consumer (which is an assumption).

A given percentage increase in both of these parameters will increase the estimated costs to LAs by the same amount: that is, increasing both parameters by 50% also increases the overall cost estimate by 50%, to £971,000.

Table 24: Disposal costs for Local Authorities

Source of costs	Cost (£000s)
Cost of collecting and disposing of increased municipal waste	574
Cost of supervising additional traffic at CA sites	73
Total	647

4.2.3 Costs to retailers

Under the Waste Electrical and Electronic Equipment (WEEE) Regulations, retailers of radios are required to offer in-store take back on a one-for-one basis. Alternatively, retailers are relieved of this obligation if they pay the membership fee to join the official Distributor Take Back Scheme (DTS). Hence, disposal costs for retailers depend on whether they have joined the DTS.

For a retailer that has not joined the DTS, their disposal costs depend on: firstly, the number of extra radios that are returned to them as a result of the switchover, which depends on the share of consumers who would return their radios to a store when purchasing a new one; and, secondly, on the cost per radio of providing in-store take back (see calculation 'i' in Box 4).

For a retailer that has joined the DTS, their disposal costs due to the switchover are equal to any increase in the amount they pay to be a member of the DTS. However, the DTS fees paid by retailers do not vary according to the amount of WEEE which arises, but instead are determined by the value of each retailer's sales of Electrical and Electronic Equipment (EEE).

²¹ This is calculated by dividing the total costs to LAs by the total number of radios causing costs for LAs from Table 22 above.

There are three fee bands for retailers who want to join the DTS. Those in the bottom two bands pay a lower, fixed fee, whereas those in the top band pay a fee which is proportional to the number of units they sold during the 12 months prior to joining the DTS. Payment of the fee ensures membership of the scheme for the next two years.

Table 25: Phase 2 DTS fees for existing members rejoining the scheme

Fee band	Value of EEE sold by retailer in the 12 months prior to joining the DTS	Fee type
Band A	More than £1.5m	£0.00227 per unit sold ¹
Band B	£100,000 - £1.5m	£187.25 fixed fee
Band C	£0 - £100,000	£70.00 fixed fee

Note: The data specifically refers to the fee for category 4a WEEE (which includes radios). Fees for other categories of WEEE are different.

Therefore, for a retailer in the DTS, their disposal costs depend on whether an increase in their sales as a result of the switchover causes them to move into a higher fee band (see calculation 'ii' in Box 4).

In order to estimate the total cost for all retailers, it is necessary to sum the following costs:

- 1) total additional costs of offering in-store take back for retailers who are not in the DTS; plus
- 2) additional fees that would be paid by retailers in Band A of the DTS (which is equal to the increase in their sales times the per unit fee); plus
- 3) fees paid by retailers that move from Band B to Band A of the DTS as a result of the switchover, minus the fees that these retailers already pay in band B; plus
- 4) fees paid by retailers that move from Band C to Band B of the DTS as a result of the switchover, minus the fees that these retailers already pay in band C.

This is expressed in Box 4 in the calculation 'Aggregate cost to all stores'.

In order to be able to undertake this calculation it is necessary to have information on the number of retailers in each band of the DTS and also the market share (in terms of sales of EEE) of those in Band A. This information was provided by Valpak, the official operator of the DTS. In addition, Valpak also provided an estimate of the share of retailers who are members of the DTS (75%).

It is also necessary to make assumptions about how retailers are distributed within each band in terms of sales. We assume that, within each band, retailers are uniformly distributed between the upper and lower bounds of value of EEE sold (see Table 25 above for the bounds).

Finally, we use the results of the survey to make an assumption about how much the overall sales of radios will increase as a result of the switchover. The assumption we use is that the switchover will prompt all analogue radios to be replaced with digital radios. Hence, the total increase in sales is given by the average number of radios per survey respondent multiplied by the number of households, which is equal to 44.5 million (i.e., the same as the total number of radios being disposed of (see Table 22 above)).

Using this assumption, it is possible to estimate the number of additional radios that are likely to be sold due to the switchover based on the survey results on radio ownership and ONS data on the total number of families in the UK.

Annex 4 presents more detailed information on the modelling approach.

Box 4: Cost modelling approach - Costs to retailers

Cost to a store if they are:

(i) Not in the DTS = Increase in radios returned to stores not in the DTS x
£/radio

(ii) In the DTS = DTS fee with switchover –
DTS fee without switchover

Aggregate cost to all stores = Increase in radios returned to stores not in the DTS x
£/radio
+
Increase in sales of radios (units) x
Market share by volume of retailers in Band A x
Per unit DTS fee for Band A retailers
+
Total sales of retailers that move from Band B to Band A (units) x
Per unit DTS fee for Band A retailers
–
Number of retailers moving from Band B to Band A x
Fixed fee for Band B retailers
+
Number of retailers moving from Band C to Band B x
(Fixed fee for Band B retailers – Fixed fee for Band C retailers)

The analysis found that, at £452,000 (or £1.16 per radio²²), disposal costs to retailers from the switchover are lower than for any other stakeholder group (Table 26). This is largely down to two factors: firstly, a high proportion of retailers are members of the DTS meaning that they do not have to accept in-store returns; and, secondly, only a small share of consumers would try to return their radios at stores.

The total increase in fees paid by retailers who are members of the DTS as a result of higher sales due to the switchover is not particularly large (£219,000 in total). Each retailer that moves up from Band B to Band A will pay just over £1,000 extra.

Again, the modelling approach uses some key input parameters and it is useful to examine how the results change when these parameters are varied. In particular, the cost of providing in store take back for retailers who are not in the DTS is based on assumptions about the costs per unit of

²² This is calculated by dividing the total costs to retailers by the total number of radios causing costs for retailers from Table 22 above.

handling, storage space, and transportation. Raising each of these parameters by 50% increases the estimated total cost to retailers by 26%, to £569,000.

Table 26: Disposal costs for retailers

Source of costs	Cost (£000s)
Extra costs to retailers not in the DTS	233
Extra fees paid by retailers in Band A of the DTS	72
Extra fees paid by retailers moving from Band B to Band A of the DTS	121
Extra fees paid by retailers moving from Band C to Band C of the DTS	26
Total	452

4.2.4 Costs to producers

Through Producer Compliance Schemes (PCSs) producers of EEE pay for the costs of collecting WEEE from recycling sites and for treating and recovering (i.e. extracting reusable components) the WEEE that is collected.

The average cost per tonne of collecting, treating and recovering WEEE in the UK is available from a recent Government impact assessment.²³ Thus, for producers, the disposal cost calculation multiplies this average cost per tonne by the amount of additional WEEE (in terms of weight) that arrives at recycling sites (Box 5).

Box 5: Cost modelling approach - Producers

$$\begin{aligned} \text{Aggregate cost to all producers} &= \text{Average radio weight} \times \\ &\quad \text{Increase in radios taken to recycling sites} \times \\ &\quad \text{Cost per tonne of collection, treatment and recovery} \end{aligned}$$

Total disposal costs for producers are found to be around £2.8m (or 11p per radio²⁴) (Table 27). However, this result depends on the average weight of a radio, which in the model is derived from a small sample of weights from a web-sweep. Raising this parameter by 50% also increases the total estimated costs for producers by 50%, to £4.2m.

Table 27: Disposal costs for producers

Source of costs	Cost (£000s)
Cost of collection, treatment and recovery of radios from recycling sites	2,779

²³ This impact assessment is entitled: "Impact Assessment of Commission's Proposal to Recast Waste Electrical and Electronic Equipment (WEEE) Directive". The average cost per tonne for collection, treatment and recovery of mixed WEEE is £150/tonne.

²⁴ This is calculated by dividing the total costs to producers by the total number of radios causing costs for producers from Table 22 above.

5 Conclusions

Here we present the main findings of the study relating to:

- consumers' WTP for the attributes of digital radio;
- the costs of disposing of radios that become obsolete following the switchover; and
- the profile of a consumer who is less willing to switch to digital radio.

WTP for the attributes of digital radio

On average, consumers are willing to pay for all of the attributes of digital radio, although the amount they are willing to pay varies relatively significantly between attributes. WTP is highest for the sound attribute (i.e. that sound is clear with no background interference) at £9.88, which is more than twice that for the attribute of additional speciality stations, which has the lowest WTP at £4.75.

Other attributes with high WTP are the option to pause and rewind broadcasts using the radio set and the information display.

On average for all consumers, the overall WTP for the all attributes together is £41.82 (calculated by summing the WTP figures for the individual attributes), although it should be noted that this figure assumes that the total WTP for all the attributes combined is not influenced by interactions between the attributes.

The analysis also found interesting differences between various groups of consumers in terms of their WTP for the different attributes of digital radio, specifically:

- Older consumers have higher WTP for the sound attribute than younger consumers, but lower WTP for additional stations and speciality stations. WTP for the option to pause and rewind broadcasts using the radio set generally increases with age.
- Men have a higher WTP for each of the attributes of digital radio, especially the tuning attribute, additional stations, and speciality stations.
- Rural consumers have higher WTP for the sound attribute of digital radio and also for the option to pause and rewind broadcasts using the radio set.

Disposal costs

It is estimated, based on the survey results, there are currently 44.5 million analogue radio sets in UK households.²⁵ According to the results of the part of the survey focusing on the disposal method households are likely to use when disposing of their analogue radio sets following the switchover, a majority (57%) of households plan to take their analogue radios to recycling sites. However, only a few consumers (4%) will make an extra trip in order to do so. Fourteen percent will be disposed of in the bin with the usual rubbish, whereas 12% will be donated to charity and

²⁵ The average number of analogue radios per survey respondent was 1.7, so we multiply this by the number of households in the UK (26.2 million according to the ONS) in order to find the total stock of analogue radios.

9% will be kept and stored away. Only 3% of consumers reported that they will return their old analogue radios to a store when they purchase a new one, and just 1% would make an extra trip to do so.

Based on these shares, the model of disposal costs found that the highest costs are those borne by consumers, at £5.1m. This is largely due to the travel costs associated with going to recycling sites. The second highest costs are those to producers, at around £2.8m, since it is producers who are responsible for collecting and treating WEEE that is delivered to recycling sites. On the other hand, total costs for local authorities and retailers are relatively low in comparison, at £647,000 and £452,000 respectively.

Profile of a consumer who is less willing to switch to digital radio

Finally, the evidence from the different strands of analysis can be drawn together in order to establish a profile for a consumer who is unwilling to switch to digital radio. In particular, we compare whether groups of consumers reported that they are unlikely to get a digital radio in the next 12 months with the overall WTP estimates for these groups.

If, on average, a group reported that they are less likely to buy a digital radio in the next 12 months than the survey sample as a whole, and also have a lower overall WTP than the survey sample as a whole, then we class this group as unwilling to switch to digital radio. There are four groups that meet both of these criteria: those aged 18 to 29, those aged 60 over, those in the working class socio-economic group, and those from urban areas (Table 28).

In addition, we can supplement this with the analysis presented earlier in the report which found that those who listen to fewer channels (see Table 6 in section 2.2) and those who believe that digital radio is too expensive at the current time (see Table 12 in section 0) are less likely to get a digital radio.

Table 28: Groups classed as unwilling to switch to digital radio

		Unlikely to get a digital radio in next year (%)	Overall WTP	Unwilling to switch to digital radio
Age groups	18-29	83.1	38.06	✓
	30-39	79.5	42.91	-
	40-49	80.3	42.80	-
	50-59	74.7	43.15	-
	60-69	81.1	38.86	✓
	70+	80.3	40.38	✓
Gender	Female	78.6	38.67	-
	Male	81.7	45.08	-
Socio-economic group	Upper middle	76.7	39.02	-
	Middle	79.9	41.75	-
	Lower middle	80.6	41.89	-
	Skilled working	77.6	37.42	-
	Working	80.9	41.19	✓
	Lowest	81.9	42.13	-
Location	Rural	79.6	46.01	-
	Town and fringe	74.5	40.28	-
	Urban	81	41.29	✓
Ethnicity	Other	75.7	38.68	-
	White British	80.4	42.43	-
All	80.1	41.82	N.A.	All

6 Further Research

Three areas warrant further research, namely the impact of the switchover on vulnerable consumers, the parameters used in the modelling of the disposal cost, the potential bias arising from the use of an on-line survey and consumers' WTP for digital radio rather than attributes of digital radio.

6.1 Research dedicated to the impact of the switchover on vulnerable consumers

The samples for the fieldwork relating to vulnerable consumers were small so further work in this area could be useful. This could include the experiment or a version of it, plus attitudes, behaviour and switching concerns. Such additional research would likely require a mix of quantitative and qualitative approaches. In order to ensure the success of this additional research, it will be necessary to work in partnership with the relevant charities and other stakeholders.

6.2 Refining the parameters in the disposal cost modelling

The input parameters in the disposal cost modelling could be refined by deepening the analysis undertaken so far. Consultations with various stakeholders such as, for example, the British Retail Consortium are likely to yield additional and more refined cost information. As well, it would be useful to update the parameters in the model closer to the time of the switchover as the disposal cost analysis is undertaken at current prices.

6.3 Complementary face-to-face survey

It would also be useful to complement the on-line survey with a greater number of face-to-face surveys in order to assess whether such a survey results in an upward bias of the population-wide WTP for digital radio attributes.

6.4 Observed willingness-to-pay

Finally, regarding the observed willingness-to-pay, only a very high level analysis was undertaken and it would be worthwhile to undertake a more in-depth analysis of data on sales of digital radio sets in order to obtain more detailed estimates of the observed willingness-to-pay.

References

PricewaterhouseCoopers (2009) "Cost Benefit Analysis of Digital Radio Migration", http://www.culture.gov.uk/images/publications/REDACTED_Ofcom_CBA_of_DRMigration_Final_Report.pdf.

Consumer Expert Group (2010), "Digital Radio Switchover – what is in it for consumers?", <http://www.dcms.gov.uk/publications/7410.aspx>.

Annex 1 Details of survey samples, methodologies

The sampling approach used was to apply stratified random sampling to the YouGov research panel of UK adults. The sample was stratified by age interlocked with gender, social economic group and region (within the UK) based on national statistics.

The weighted sample shares for different groups are presented in Table 29:

Table 29: Unweighted online survey sample breakdown against national population statistics		
Group	Unweighted sample	Population
Gender:		
Male	49%	49%
Female	51%	51%
Age group:		
18 - 29	20%	21%
30 - 39	17%	17%
40 - 49	19%	19%
50 - 59	15%	15%
60 - 69	13%	14%
70 plus	15%	15%
Socio-economic group:		
AB	23%	21%
C1	30%	32%
C2	15%	22%
DE	32%	25%
Region:		
North East	4%	4%
North West	10%	11%
Yorkshire & Humber	9%	9%
East Midlands	7%	7%
West Midlands	8%	9%
East	9%	9%
London	12%	12%
South East	15%	14%
South West	10%	9%
Wales	5%	5%
Scotland	8%	8%
Northern Ireland	3%	3%

Table 30: Online survey sample breakdown (other demographics)	
Group	Unweighted sample
Region:	
Urban / Town & Fringe	77%
Town and Fringe	9%
Rural	12%
Household income:	
Under £14,999 per year	17%
£15,000 to £29,999 per year	20%
£30,000 to £49,999 per year	19%
£50,000 and over	12%

Annex 2 Questionnaires

A2.1 Online survey questionnaire

Part 1 – Willingness-to-pay

To all:

******For the first EIGHT questions you will be presented with a choice between Option A and Option B.

Option A includes a description of THREE aspects of radio listening and ONE associated cost.

Option B also presents THREE aspects of radio listening but ONE of them is different from Option A and there is a different cost.

Simply choose which one you prefer given the aspects of radio listening and the cost to you******

For each choice, three from the following list of six analogue attributes were included at random in one option:

A1: *"The radio skips through all the available stations from one to the next, playing each one briefly, and you can stop it at the one you want. Alternatively you can turn a dial to find reception manually."*

A2: *"The only information provided on the radio set is the identification of the station you are listening to."*

A3: *"You can only listen to live radio as it is broadcast."*

A4: *"You have a choice of 10 national stations and between 5 to 25 local stations depending on your area."*

A5: *"You have a choice of around 5 to 10 specialty radio stations, such as stations in different languages, ethnic stations, stations for different religions, and speciality entertainment, sports and music stations."*

A6: *"You may experience sound interference."*

In the alternative option, one of the analogue attributes was changed to the corresponding digital attribute among the following:

D1: *"You can scroll through the names of all the available stations without hearing them and select the one you want to listen to from this list. If you wish to, you can re-order the list to suit you."*

D2: *"Information is continuously provided identifying the station you are listening to, what programme is on, and what song is playing or who is being interviewed."*

D3: *"You can listen live, and pause / rewind broadcasts using your radio set."*

D4: *"You have a choice of 20 national stations and between 5 to 40 local stations depending on your area."*

D5: *"You have a choice of around 20 to 30 specialty radio stations, such as stations in different languages, ethnic stations, stations for different religions, and speciality entertainment, sports and music stations"*

D6: *"You have clear sound and no background interference."*

Part 2 – Consumer behaviour research

1) During an average week, on how many days do you listen to the radio (including listening at home, in the car, at work, via mobile phone, internet or personal stereo)?

- <1> 7 days a week
- <2> 6 days a week
- <3> 5 days a week
- <4> 3 or 4 days a week
- <5> 1 or 2 days a week
- <6> Less often than weekly
- <7> Never / do not listen to the radio

2) How do you ever listen to radio? Please tick all that apply

- <1> Via an analogue radio set – i.e. AM/FM/LW
- <2> Via a digital radio set – i.e. DAB
- <3> Via digital television
- <4> Through the internet
- <5> Via another device - mobile phone, iPhone, MP3 player, MP4 player
- <6> In-car/ van radio - analogue i.e. AM/FM/LW
- <7> In-car/ van radio - digital i.e. DAB
- <8> Another way
- <9 xor>Not sure

3) How many radio sets do you own in each of the following categories? Please only include radio sets and not other ways you might listen to the radio, such as in-car radios, computers, mobile phones and television sets.

-[q3_num1 if 1 in q2] Analogue radio sets – i.e. AM/FM/LW

-[q3_num2 if 2 in q2] Digital radio sets – i.e. DAB

<1> Numerical answer

4) And how many hours do you typically spend listening to radio in a week?

- <1> up to 2 hours per week
- <2> 3 to 4 hours per week
- <3> 5 to 7 hours per week
- <4> 8 to 14 hours per week
- <5> 15 to 28 hours per week
- <6> more than 28 hours per week

5) Which, if any, of the following radio stations do you listen to for at least 30 minutes at least once a month?

- <1> Absolute 80s
- <2> Absolute 90s
- <3> Absolute Classic Rock
- <4> Absolute Radio
- <5> BBC 1Xtra
- <6> BBC Radio 1
- <7> BBC Radio 2
- <8> BBC Radio 3
- <9> BBC Radio 4
- <10> BBC Radio 5 Live
- <11> BBC Radio 5 Live Sports Extra
- <12> BBC Radio 6 Music
- <13> BBC Radio 7

- <14> BBC Radio Asian Network
- <15> BBC World Service
- <16> Capital Radio
- <17> Chill
- <18> Choice FM
- <19> Classic FM
- <20> Galaxy
- <21> Heart
- <22> Heat
- <23> Jazz FM
- <24> Kiss
- <25> LBC
- <26> Magic
- <27> NME Radio
- <28> Planet Rock
- <29> Punjab radio
- <30> Q
- <31> Smash Hits Radio
- <32> Smooth UK
- <33> Talksport
- <34> The Hits
- <35> XFM
- <97> Other local commercial station
- <98> Any other station
- <99> None of these

To all with a digital radio:

6) Which, if any, of the following features prompted you to get a digital radio set?

- <1> A wider choice of radio stations (e.g. digital only radio stations)
- <2> Clear and high quality sound / interference free
- <3> Extra features (e.g. ability to pause and rewind live radio and programme guides)
- <4> Scrolling text information about the programme (e.g. track and artist name, phone numbers, topics or guests)
- <5> Ease of use (e.g. find your station by name, not frequency)
- <6> Future proof / ready for switchover from analogue
- <7> Got it as a gift
- <8> Like new technology
- <9 fixed> Other [q10_other] {open}
- <10 fixed xor> Don't know

To all without a digital radio:

7) Which of the following, if any, explain why you don't have a digital radio set?

- <1> Happy to use existing analogue service
- <2> Too expensive generally
- <3> Don't know why I should
- <4> Don't listen to the radio / wouldn't use it
- <5> Will get it when I have to / analogue signal switched off
- <6> Poor reception in our area
- <7> Not available in our area
- <8> Can get it through digital TV / internet / mobile phone
- <9 fixed> Other [q12_other] {open}
- <10> Don't know

8) How likely are you to get a digital radio in the next year?

- <1> Certain to get one
- <2> Very likely
- <3> Likely
- <4> Unlikely
- <5> Very unlikely
- <6> Certain not to get one
- <7> Don't know

To all:

9) Do you have a digital radio (i.e. DAB) in your car? If you don't have a car, tick that option below

- <1> Yes
- <2> No
- <3> Don't have a car so not applicable

To those with in-car digital radio:

10) Which of the following best applies when thinking about the digital radio in your car?

- <1> You chose to have digital radio when buying a new car
- <2> It was already installed in the car when you bought it
- <3> You replaced the original analogue radio with a digital radio
- <4> None of the above

To those who chose it as an option when buying a new car or replaced an original analogue:

11) You said that you chose to have a digital radio in your car, which of the following reasons explain why?

- <1> Number of stations available
- <2> Access to special interest radio stations (e.g. languages, music or chat)
- <3> Ease of tuning / easy to find stations
- <4> Clear sound (less background interference)
- <5> Consistent sound (no loss of signal when on the move)
- <6> Good coverage across the country
- <7> Extra functions on the set such as scrolling text (station name / DJ / songs)
- <8> Like new technology in general
- <9 fixed> Other [q16a] {open}
- <10 fixed xor> Don't know

To those who do not have in-car digital radio:

12) Why don't you have a digital radio (i.e. DAB) in your car?

- <1> Too expensive
- <2> Radio came with the car and happy with it
- <3> Digital reception is poor in the car
- <4> Prefer listening when I can concentrate
- <6> Never thought about switching it to digital
- <7 fixed> Other [q17_other]{open}
- <8 fixed xor> Don't know

To all:

13) To what extent do you agree or disagree with the following statements? Please answer on a scale of 1 to 5, where 1 means 'strongly disagree' and 5 means 'strongly agree'. If you are not sure, please give your best guess.

- 13.1) Digital radio..has more stations that are of interest to me than analogue radio
- 13.2) Digital radio...has less reliable reception than analogue radio (loss of signal/ wavering sound)
- 13.3) Digital radio...has a clearer sound than analogue radio (no background interference)
- 13.4) Digital radio...is easier to tune/ find stations than on analogue radio

13.5) Digital radio...is too expensive at the current time compared to an analogue radio

13.6) Digital radio...sets have more useful functions than an analogue radio

13.7) With digital radio...it is easy to catch-up if you miss a programme

13.8) Digital radio...sets use less energy than analogue radios

To all:

****Please now think about what you did, or might do when getting rid of an old radio set.****

14) Approximately, when was the last time you got rid of a radio set that you no longer used or had replaced?

<1> In the last six months

<2> Between six months and year ago

<3> Between 1 and 2 years ago

<4> Between 2 and 5 years ago

<5> Between 5 and 8 years ago

<6> Over 8 years ago

<7> Never had a radio set I no longer wanted

<8> Can't remember

15) Thinking about the last time you had an old radio set that you no longer used, what did you do with it?

<1> Put it in bin alongside the usual rubbish

<2> Returned it to the store where I purchased a new radio at the same time as making the purchase

<3> Returned it to the store where I purchased a new radio shortly after making the purchase

<4> Took it to a local recycling site which accepts electric goods

<5> Kept it and stored it away (e.g. in your attic or garage)

<6> Sold it (e.g. through ebay)

<7> Donated to a charity shop/ fund

<8> Gave it to family or a friend

<9 fixed> Other

<10 fixed> Can't remember

****Now imagine the analogue radio signal is switched off and so your analogue radio set would no longer work****

To all those with an analogue radio set:

16) How do you think you would dispose of your analogue radio set if the analogue radio signal is switched off? If you are unsure please tick the answer that you think most likely.

<1> Put it in bin alongside the usual rubbish

<2> Hand it in at the store where I purchase a new radio at the same time as making that purchase

<3> Take it to the store where I purchased a new radio shortly after making that purchase

<4> Take it to a local recycling site which accepts electric goods

<5> Keep it and store it away (e.g. in your attic or garage)

<6> Sell it (e.g. through ebay)

<7> Donate it to a charity shop/ fund

<8> Give it to family or a friend

<9 fixed> Other [q23_other] {open}

<10 fixed> Not sure

To all who will return it to the store at the same time as they made the purchase at 16):

****You said that you might hand in your old radio at the store where you bought a new one****

17) If the store did not offer to dispose of your old radio on your behalf, would you still buy from a shop or would you then buy a new radio a different way?

<1> Still buy from a shop

<2> Buy online instead

- <3> Buy from a mail order catalogue instead
- <4> Buy in another way [q24_other] {open}

To all who will dispose through a recycling site at 16):

18) You mentioned you are likely to dispose of your analogue radio at a local recycling site. Which of these scenarios is most likely?

- <1> I'd make a separate trip to the recycling site to dispose of my radio
- <2> I'd save up enough rubbish for one trip to the recycling site
- <3> I'd go to the recycling site on my way to/ past somewhere else.
- <4> Other
- <5> Don't know

To all:

19) Please can you estimate how far it is to your nearest recycling site that would accept electrical goods? If you are unsure please provide your best estimate.

- <1> Less than 1 mile
- <2> 1-2 miles
- <3> 3-4 miles
- <4> 5-6 miles
- <5> 7-10 miles
- <6> 11 to 15 miles
- <7> More than 15 miles
- <8> Don't know

To all:

20) If you did choose to take a radio set to your local recycling site, how would you travel there?

- <1> By car/ van
- <2> By foot
- <3> Taxi
- <4> Bus / coach
- <5> Train, Underground or Tram
- <6> Other
- <7> Not sure

To all:

21) If you did buy a new radio from a shop, could you estimate how far that journey might be? You might be travelling to the shop from home or work for example. If you are unsure please provide your best estimate.

- <1> Less than 1 mile
- <2> 1-2 miles
- <3> 3-4 miles
- <4> 5-6 miles
- <5> 7-10 miles
- <6> 11 to 15 miles
- <7> More than 15 miles
- <8> Don't know

22) And how would you travel to nearest shop you could buy a radio from?

- <1> By car/ van
- <2> By foot
- <3> Taxi
- <4> Bus / coach
- <5> Train, Underground or Tram
- <6> Other

<7> Not sure

23) To what extent do you agree or disagree with the following statements? Please answer on a scale of 1 to 5, where 1 means ‘strongly disagree’ and 5 means ‘strongly agree’.

23.1) I feel guilty if I throw away things that still work

23.2) It would be easier just to throw a radio set away in the household bin than recycle it

23.3) It’s frustrating that it isn’t easier to dispose of electronic equipment easily

23.4) I’m not sure what I can take to a local recycling site

23.5) I should have the main responsibility for disposing of my radio set appropriately

23.6) I know that there are facilities to dispose of electronic equipment locally

23.7) People should make more of an effort to reuse electronic equipment that still works, rather than throw it away

23.8) I'm not prepared to make a special effort to dispose of a radio set in an appropriate way

A2.2 Face-to-face survey questionnaire

Good morning/afternoon/evening. I am conducting a survey on radio listening. It will take 15 minutes of your time. Will you help us please?

D1.	RECORD GENDER		
	Male	01	CONTINUE
	Female	02	CONTINUE

D2.	SHOWCARD A Please can you tell me which of the following age bands you fall into? CIRCLE ONE CODE ONLY		
	Under 50	01	END SURVEY
	50-54	02	
	55-59	03	
	60-64	04	
	65-69	05	CHECK QUOTAS CONTINUE
	70-74	06	
	75 and over	07	

D3.	And do you live alone or with a spouse / partner / family? CIRCLE ONE CODE ONLY		
	Live alone	01	CHECK QUOTAS CONTINUE
	Live with a spouse / partner or other people	02	

D4.	SHOWCARD B Which, if any, of the following do you currently own? CIRCLE AS MANY AS APPLY		
-----	--	--	--

Desktop / laptop computer	01	CONTINUE
Digital camera / camcorder	02	
Mobile phone (for calling and texting)	03	
Smartphone (e.g. iPhone, Blackberry)	04	
e-book reader (e.g. Kindle, Sony)	05	
HD television	06	
Portable media player (e.g. iPod or Mp3 / Mp4 player)	07	
In-car Satellite Navigation	08	
Flat panel Television (LCD / Plasma)	09	
None of these	10	

D5.	SHOWCARD C		CONTINUE
	Which of these best describes how often you use the internet?		
	CIRCLE ONE CODE ONLY		
	Everyday	01	
	Every two or three days	02	
	About once a week	03	
	About once a fortnight	04	
	About once a month	05	
	Less often	06	
Not at all	07		

PART 1 INTRODUCTION

For the first set of questions I will show you a card with a choice to make between Option A and Option B.

Option A is made up of a description of THREE features of radio listening and ONE cost.

Option B will have TWO of the THREE features shown in Option A, but the other one will be different. It will also have a different cost.

Simply judge the features of radio and the costs and state which option you prefer.

T.	Which option do you prefer?					
	T1	T2	T3	T4	T5	T6
	Option A	01	01	01	01	01
	Option B	02	02	02	02	02

PART 2

Q1.	During an average week, on how many days do you listen to the radio (including listening at home, in the car, at work, via mobile phone, internet or personal stereo)? CIRCLE ONE CODE ONLY		
	7 days a week	01	CONTINUE
	6 days a week	02	
	5 days a week	03	
	3 or 4 days a week	04	
	1 or 2 days a week	05	
	Less often than weekly	06	
	Never / do not listen to the radio	07	GO TO Q5

Q2.	How many hours do you typically spend listening to radio in one week? CIRCLE ONE CODE ONLY		
	Up to 2 hours per week	01	ALL CONTINUE
	3 to 4 hours per week	02	
	5 to 7 hours per week	03	
	8 to 14 hours per week	04	
	15 to 28 hours per week	05	
	More than 28 hours per week	06	

Q3.	SHOWCARD D How do you ever listen to the radio? CIRCLE AS MANY AS APPLY		
	Via an analogue radio set – i.e. AM/FM/LW	01	GO TO Q4 IF CODED GO TO Q5 IF NOT CODED
	Via a digital radio set – i.e. DAB	02	
	Digital television	03	
	Through the internet	04	
	Via another device – mobile phone, iPhone, MP3 player, MP4 player	05	
	In-car / van analogue radio	06	
	In-car / van digital radio	07	
	Another way	08	
	Not sure	09	

ALL THOSE WHO HAVE A DIGITAL RADIO SET (CODED 2 AT Q3)

Q4.	SHOWCARD E Which, if any, of these reasons prompted you to get a digital radio set? CIRCLE AS MANY AS APPLY	
	A wider choice of radio stations (e.g. digital only radio stations)	01
	Clear and high quality sound / interference free	02
	Extra features (e.g. ability to pause and rewind live radio and programme guides)	03
	Scrolling text information about the programme (e.g. track and artist name, phone numbers, topics or guests)	04
	Ease of use (e.g. find your station by name, not frequency)	05
	Future proof / ready for switchover from analogue	06
	Got it as a gift	07
	Like new technology	08
	Other	09
	Don't know	10
	GO TO Q7	

ALL THOSE WHO DON'T HAVE A DIGITAL RADIO SET (DID NOT CODE 2 AT Q3) OR DON'T LISTEN TO THE RADIO (CODED 7 AT Q1)

Q5.	SHOWCARD F Which of the following, if any, explain why you don't have a digital radio set? CIRCLE AS MANY AS APPLY	
	Happy to use existing analogue service	01
	Too expensive generally	02
	Don't know why I should	03
	Don't listen to the radio / wouldn't use it	04
	Will get it when I have to / analogue signal switched off	05
	Poor reception in our area	06
	Not available in our area	07
	Can get it through digital TV / internet / mobile phone	08
	Other	09
	Don't know	10
	GO TO Q6	

ALL THOSE WHO DON'T HAVE A DIGITAL RADIO SET (DID NOT CODE 2 AT Q3)

Q6.	<i>SHOWCARD G</i>		<i>CONTINUE</i>
	<i>How likely are you to get a digital radio set in the next year?</i>		
	<i>CIRCLE ONE CODE ONLY</i>		
	<i>Certain to get one</i>	<i>01</i>	
	<i>Very likely</i>	<i>02</i>	
	<i>Likely</i>	<i>03</i>	
	<i>Unlikely</i>	<i>04</i>	
	<i>Very unlikely</i>	<i>05</i>	
	<i>Certain not to get one</i>	<i>06</i>	
	<i>Don't know</i>	<i>07</i>	

ALL

Q7.	<i>SHOWCARD H</i>		<i>CONTINUE</i>
	<i>Approximately, when was the last time you got rid of a radio set that you no longer used or had replaced?</i>		
	<i>CIRCLE ONE CODE ONLY</i>		
	<i>In the last six months</i>	<i>01</i>	
	<i>Between six months and a year ago</i>	<i>02</i>	
	<i>Between 1 and 2 years ago</i>	<i>03</i>	
	<i>Between 3 and 4 years ago</i>	<i>04</i>	
	<i>Between 5 and 8 years ago</i>	<i>05</i>	
	<i>Over 8 years ago</i>	<i>06</i>	<i>GO TO Q9</i>
	<i>Never had radio set I no longer wanted</i>	<i>07</i>	
	<i>Can't remember</i>	<i>08</i>	

Q8.	SHOWCARD I Thinking about the last time you had an old radio set that you no longer used, what did you do with it? CIRCLE ONE CODE ONLY		
	Put it in the bin alongside the usual rubbish	01	CONTINUE
	Returned it to the store where I purchased a new radio at the same time as making the purchase	02	
	Returned it to the store where I purchased a new radio shortly after making the purchase	03	
	Took it to a local recycling site which accepts electric goods	04	
	Kept it and stored it away (e.g. in your attic or garage)	05	
	Sold it (e.g. through e-bay)	06	
	Donated to a charity shop/ fund	07	
	Gave it to family or a friend	08	
	Other	09	
	Don't know	10	

IF THEY HAVE AT LEAST ONE ANALOGUE RADIO SET (CODED 1 AT Q3)

Q9.	SHOWCARD J Now imagine the analogue radio signal is switched off and so your analogue radio set would no longer work How do you think you would dispose of your analogue radio set if the analogue radio signal is switched off? If you are unsure please tick the answer that you think most likely. CIRCLE ONE CODE ONLY		
	Put it in bin alongside the usual rubbish	01	GO TO Q12
	Hand it in at the store where I purchase a new radio at the same time as making that purchase	02	GO TO Q10
	Take it to the store where I purchased a new radio shortly after making that purchase	03	GO TO Q12
	Take it to a local recycling site which accepts electric goods	04	GO TO Q11
	Keep it and stored it away (e.g. in your attic or garage)	05	GO TO Q12
	Sell it (e.g. through e-bay)	06	
	Donate to a charity shop/ fund	07	
	Give it to family or a friend	08	
	Other	09	
	Don't know	10	

THOSE CODED 2 AT Q9

Q10.	<p>SHOWCARD K You said that you might hand in your old radio at the store where you bought a new one. If the store did not offer to dispose of your old radio on your behalf, would you instead buy from a shop or would you then buy a new radio a different way? CIRCLE ONE CODE ONLY</p>		
	Still buy it from a shop	01	GO TO Q12
	Buy online instead	02	
	Buy from mail order catalogue instead	03	
	Buy another way	04	

THOSE CODED 4 AT Q9

Q11.	<p>SHOWCARD L You mentioned you are likely to dispose of your analogue radio at a local recycling site. Which of these scenarios is most likely? CIRCLE ONE CODE ONLY</p>		
	I'd make a separate trip to the recycling site to dispose of my radio	01	CONTINUE
	I'd save up enough rubbish for one trip to the recycling site	02	
	I'd go to the recycling site on my way to/ past somewhere else	03	
	Other	04	
	Don't know	05	

ALL

Q12.	<p>Please can you estimate how many miles it is to your nearest recycling site that would accept electrical goods? If you are unsure please give you best estimate CIRCLE ONE CODE ONLY</p>		
	Less than 1 mile	01	CONTINUE
	1 or 2 miles	02	
	3 or 4 miles	03	
	5 to 6 miles	04	
	7 to 10 miles	05	
	11 to 15 miles	06	
	More than 15 miles	07	
	Don't know	08	

ALL

Q13.	<i>SHOWCARD M</i>		
	<i>If you or someone you know took a radio set to your nearest recycling site, how would you / they travel there?</i>		
	<i>CIRCLE ONE CODE ONLY</i>		
	By car / van	01	CONTINUE
	On foot	02	
	Taxi	03	
	Bus / coach	04	
	Train, Underground or tram	05	
Other	06		
Not sure	07		

ALL

Q14.	<i>If you did decide to buy a new radio set from a shop could you estimate in miles how far the journey might be? You might be travelling to the shop from home or work for example. If you are unsure please provide your best estimate</i>		
	<i>CIRCLE ONE CODE ONLY</i>		
	Less than 1 mile	01	CONTINUE
	1 or 2 miles	02	
	3 or 4 miles	03	
	5 to 6 miles	04	
	7 to 10 miles	05	
	11 to 15 miles	06	
More than 15 miles	07		
Don't know	08		

ALL

Q15.	<i>SHOWCARD M</i>		
	<i>And how would you be most likely to travel to the nearest shop you could buy a new radio set from?</i>		
	<i>CIRCLE ONE CODE ONLY</i>		
	By car / van	01	CONTINUE
	On foot	02	
	Taxi	03	
	Bus / coach	04	
	Train, Underground or tram	05	
Other	06		
Not sure	07		

THAT BRINGS US TO THE END OF THE SURVEY. THANK YOU FOR YOUR TIME.

Annex 3 Willingness-to-pay technical annex

The units of observation in the dataset are bundles of attributes presented to participants during the choice experiment. Each observation records which attributes were included in the bundle, whether or not the bundle was chosen, and the price premium attached to the bundle.

Each bundle presented during the experiment included either three attributes from among the analogue attributes in Table 31, or otherwise two from among the analogue attributes and one from among the digital attributes. The former are referred to as 'analogue bundles', whereas the latter are referred to as 'digital bundles'.

Table 31: Attributes included in the choice experiment

Digital attributes	Analogue attributes
D1: "You can scroll through the names of all the available stations without hearing them and select the one you want to listen to from this list. If you wish to, you can re-order the list to suit you."	A1: "The radio skips through all the available stations from one to the next, playing each one briefly, and you can stop it at the one you want. Alternatively you can turn a dial to find reception manually."
D2: "Information is continuously provided identifying the station you are listening to, what programme is on, and what song is playing or who is being interviewed."	A2: "The only information provided on the radio set is the identification of the station you are listening to."
D3: "You can listen live, and pause / rewind broadcasts using your radio set."	A3: "You can only listen to live radio as it is broadcast."
D4: "You have a choice of 20 national stations and between 5 to 40 local stations depending on your area."	A4: "You have a choice of 10 national stations and between 5 to 25 local stations depending on your area."
D5: "You have a choice of around 20 to 30 specialty radio stations, such as stations in different languages, ethnic stations, stations for different religions, and speciality entertainment, sports and music stations"	A5: "You have a choice of around 5 to 10 specialty radio stations, such as stations in different languages, ethnic stations, stations for different religions, and speciality entertainment, sports and music stations."
D6: "You have clear sound and no background interference."	A6: "You may experience sound interference."

The equation estimated in the WTP regression analysis was:

$$(i) \text{ Chosen} = \beta_1.A2 + \beta_2.A3 + \beta_3.A4 + \beta_5.A5 + \beta_6.A6 + \beta_7.D1 + \beta_8.D2 + \beta_8.D3 + \beta_9.D4 + \beta_{10}.D5 + \beta_{11}.D6 + \beta_{12}.Premium$$

Where: 'Chosen' is a dummy variable taking the value 1 if the bundle was chosen, 0 otherwise.

'A1' to 'A6' are dummy variables taking the value 1 if the corresponding analogue attribute was included in the bundle, 0 otherwise.

'D1' to 'D6' are dummy variables taking the value 1 if the corresponding digital attribute was included in the bundle, 0 otherwise.

'Premium' is the price premium for the bundle: equal to the difference between the prices of the two bundles for digital bundles, or zero for analogue bundles.

Equation (i) was estimated using a Logit model. Since the dummy variables A1 to D6 are mutually exhaustive and exclusive, one of these variables must be dropped in the regression. The attribute which is dropped is referred to as the *base attribute*.

The regression results tell us whether including a particular attribute instead of the base attribute increases or decreases the likelihood that a bundle will be chosen. Thus, in order to study the impact that the first digital attribute (D1) has on the likelihood that a bundle is chosen the first analogue attribute (A1) is made the base. Likewise, in order to study the second digital attribute (D2) the second analogue attribute (A2) is made the base.

Since our regression technique (the Logit model) involves a non-linear logistic transformation it is necessary to compute the marginal effects of the independent variables on the probability that the bundle is chosen at the sample means. This is because the transformation means that the variable coefficients themselves are not very informative about the size of the effects of the independent variables.

Once the marginal effect is computed for each independent variable, then WTP can be calculated as follows:

$$WTP = mfx_D1 / mfx_Premium$$

where: '*mfx_D1*' is the marginal effect of D1 evaluated at the sample means /

mfx_Premium' is the marginal effect of the price premium evaluated at the sample mean.

Annex 4 Details of disposal cost calculations

A4.1 Costs to consumers

Parameters used to model disposal costs for consumers are presented in Table 32. The modelling approach uses these parameters to calculate the costs through the following formulae:

1. *Number of extra trips to stores by mode of transport =*
Number of households with an analogue radio x
Share who return to store after making a purchase x
Share of mode of transport in trips to stores

2. *Cost of extra trips to stores by mode of transport =*
((Average time at store +
Average travel time to store by mode) x
Cost of time per minute
+
Average distance to store by mode x
Cost per mile by mode) x
Number of extra trips to stores by mode

3. *Number of extra trips to recycling sites by mode of transport =*
Number of households with an analogue radio x
(Share who take to recycling site with extra trip +
Share who would take to a store x
Share of shops in the DTS) x
Share of mode of transport in trips to recycling sites

4. *Cost of extra trips to recycling sites by mode of transport =*
((Average time at recycling site +
Average travel time to recycling site by mode) x
Cost of time per minute
+
Average distance to recycling site by mode x
Cost per mile by mode) x
Number of extra trips to recycling sites by mode

5. *Number of extra trips to charity shops by mode of transport =*
Number of households with an analogue radio x
Share who donate to charity x
Share who make extra trip to donate to charity shop x
Share of mode of transport in trips to stores

6. Cost of extra trips to charity shops by mode of transport =

$$\begin{aligned} & ((\text{Average time at store} + \\ & \text{Average travel time to store by mode}) \times \\ & \text{Cost of time per minute} \\ & + \\ & \text{Average distance to store by mode} \times \\ & \text{Cost per mile by mode}) \times \\ & \text{Number of extra trips to charity shops by mode} \end{aligned}$$

7. Total costs =

$$\begin{aligned} & \sum_m (\text{Cost of extra trips to recycling sites}_m) + \\ & \sum_m (\text{Cost of extra trips to stores}_m) + \\ & \sum_m (\text{Cost of extra trips to stores}_m) \\ & \text{where } m \text{ is mode of transport: car/van, foot, taxi, bus/coach or train/tram/underground} \end{aligned}$$

Table 32: Parameters used in the model of disposal costs for consumers

Parameter	Figure	Units	Source/notes
Disposal methods (shares of consumers):			
With usual rubbish	14%	%	Survey
Return to store at same time as making a purchase	2%	%	Survey
Return to store after making a purchase	1%	%	Survey
Take to recycling site with extra trip	4%	%	Survey
Take to recycling site without extra trip	53%	%	Survey
Keep it	9%	%	Survey
Sell it	2%	%	Survey
Donate it to charity	12%	%	Survey ¹
Give it to family/friends	2%	%	Survey
Households with an analogue radio:			
Share of respondents with an analogue radio	79%	%	Survey
Number of households	26.2	Million	ONS projection for 2011 ²
Number of households with an analogue radio	20.62	Million	Calculated
Share of retailers in the DTS:			
Market share of retailers in the DTS	0.75	%	Valpak ³
Average distance of round trip to store:			
If mode = car/van	4.79	Miles	Survey
If mode = foot	1.06	Miles	Survey
If mode = taxi	4.17	Miles	Survey
If mode = bus/coach	3.54	Miles	Survey
If mode = train/tram/underground	3.49	Miles	Survey
Mode of transport to store (shares):			
Share: car/van	60%	%	Survey
Share: foot	15%	%	Survey
Share: taxi	3%	%	Survey
Share: bus/coach	16%	%	Survey
Share: train/tram/underground	6%	%	Survey
Average distance of round trip to recycling site:			
If mode = car/van	7.02	Miles	Survey
If mode = foot	2.26	Miles	Survey
If mode = taxi	7.08	Miles	Survey
If mode = bus/coach	6.6	Miles	Survey
If mode = train/tram/underground	4	Miles	Survey
Mode of transport to recycling site (shares):			
Share: car/van	94%	%	Survey
Share: foot	3%	%	Survey

Table 32: Parameters used in the model of disposal costs for consumers

Parameter	Figure	Units	Source/notes
Share: taxi	0%	%	Survey
Share: bus/coach	3%	%	Survey
Share: train/tram/underground	0%	%	Survey
Average speed by mode:			
Car/van	25	mph	Assumption
Foot	3.38	mph	Road Engineering Journal ⁴
Taxi	25	mph	Assumption
Bus/coach	20	mph	Assumption
Train/tram/underground	20	mph	Assumption
Time at store/recycling site:			
Average time at store	7	Mins	Assumption
Average time at recycling site	5	Mins	Assumption
Cost of time:			
Cost of time per minute	0.07	£/min	1/3 of median hourly wage
Monetary costs of travel:			
Cost of travelling by car/van	0.40	£/mile	HMRC approved mileage rates
Cost of travelling by foot	0.00	£/mile	Assumption
Cost of travelling by taxi	0.52	£/mile	
Average single bus fare outside London	1.20	£/trip ⁵	Guardian website ⁶
Average single bus fare in London	1.30	£/trip ⁵	Transport for London
Weighted average single bus fare to visit store	1.22	£/trip ⁵	Calculated using regional split
Weighted average single bus fare to visit recycling sites	1.23	£/trip ⁵	Calculated using regional split
Cost of travelling by train/tram/underground	5.00	£/trip	Oyster peak time pay as you go zones 1-3

Notes:

1. Assume 7% of these make an extra trip to donate to a charity shop.
2. <http://www.statistics.gov.uk/STATBASE/ssdataset.asp?vlnk=7678>
3. <http://www.valpak.co.uk/dts/page1534.aspx>
4. <http://www.usroads.com/journals/p/rej/9710/re971001.htm>
5. Cost for one way only.
6. <http://www.guardian.co.uk/business/2010/sep/06/bus-transport-operators-subsidy>

A4.2 Costs to Local Authorities

Parameters used to model the disposal costs for Local Authorities are presented in Table 33. The modelling approach uses the parameters in the table to calculate the costs through the following formulae:

1.
$$\text{Volume of disposed of with usual rubbish} = \text{Number of analogue radios} \times \text{Share who dispose of radios with usual rubbish} \times \text{Average weight of radio}$$
2.
$$\text{Number of extra trips to CA sites} = \text{Number of households with an analogue radio} \times \text{Share who take radios to recycling site with extra trip}$$
3.
$$\text{Total time to supervise extra traffic} = \text{Minutes per extra trip made by consumers} \times \text{Number of extra trips to CA sites}$$

4. *Cost of collecting and disposing of increased municipal waste =*
Volume of disposed of with usual rubbish x
(Landfill tax per tonne +
Collection cost per tonne +
Landfill gate fee per tonne)
5. *Cost of supervising additional traffic at CA sites =*
Total time to supervise extra traffic x
Average hourly wage of CA site staff
6. *Total costs =*
Cost of collecting and disposing of increased municipal waste +
Cost of supervising additional traffic at CA sites

Table 33: Parameters used in the model of disposal costs for Local Authorities

Parameter	Figure	Units	Source/notes
Disposal methods (shares of consumers):			
With usual rubbish	14%	%	Survey
Retune to store at same time as making a purchase	2%	%	Survey
Retune to store after making a purchase	1%	%	Survey
Take to recycling site with extra trip	4%	%	Survey
Take to recycling site without extra trip	53%	%	Survey
Keep it	9%	%	Survey
Sell it	2%	%	Survey
Donate it to charity	12%	%	Survey
Give it to family/friends	2%	%	Survey
Number of analogue radios:			
Analogue radios per respondent	1.7	Units	Survey
Share of respondents with an analogue radio	79%	%	Survey
Number of households	26.20	Million	ONS projection for 2011 ¹
Number of households with an analogue radio	20.62	Million	Calculated
Number of analogue radios	44.54	Million	Calculated
Weight of radios:			
Average weight of a radio	0.73	kg	Web-sweep
Costs per tonne of municipal waste:			
Landfill tax per tonne	72.00	£/tonne	Defra
Collection cost per tonne	32.50	£/tonne	Defra
Landfill gate fee per tonne	22.00	£/tonne	WRAP ²
Hourly wages:			
Median full time hourly wage	12.33	£/hour	Survey of hours and earnings
Extra traffic at CA sites:			
Number of extra trips	839	Thousand	Calculated
Extra staff time at CA sites:			
Minutes per extra trip made by consumers	0.5	Mins	Assumption
CA site staff hourly wage as percentage of median wage	85%	%	Assumption

Notes:

1. <http://www.statistics.gov.uk/STATBASE/ssdataset.asp?vlnk=7678>

2. WRAP regularly surveys the gate fees charged for a range of waste management options (e.g. http://www.wrap.org.uk/recycling_industry/publications/gate_fees_2010.html)

A4.3 Costs to retailers

Parameters used to model the disposal costs for retailers are presented in Table 34. In addition, the modelling approach makes the following assumptions:

- Assumption 1: Within each band of the DTS, retailers are uniformly distributed between the upper and lower bounds of value of EEE sold.
- Assumption 2: The switchover will prompt all households to replace all analogue radios they currently own.

The modelling approach calculates the costs to retailers using the following formulae:

1. *Share of Band C retailers out of all sales by retailers in the DTS =*

$$(1 - \text{Share of Band A retailers out of all retailers in the DTS}) \times (\text{Sales by Band C retailers} / (\text{Sales by Band B retailers} + \text{Sales by Band C retailers}))$$

where 'Sales by Band B retailers' and 'Sales by Band C retailers' are derived from data on the number of retailers in each band and using Assumption 1.
2. *Share of Band B retailers out of all sales by retailers in the DTS =*

$$(1 - \text{Share of Band A retailers out of all retailers in the DTS}) \times (\text{Sales by Band B retailers} / (\text{Sales by Band B retailers} + \text{Sales by Band C retailers}))$$

where 'Sales by Band B retailers' and 'Sales by Band C retailers' are derived from data on the number of retailers in each band and using Assumption 1.
3. *Increase in radios returned in-store =*

$$\text{Number of analogue radios} \times (\text{Share who return to store after making a purchase} + \text{Share who return to store when making a purchase})$$
4. *Increase in sales of radios (units) =*

$$\text{Share of households owning analogue but not DAB} \times \text{Number of households}$$
5. *Increase in sales of radios (value) =*

$$\text{Increase in sales of radios (units)} \times \text{Average price of a digital radio}$$
6. *Increase in sales of radios for retailers in the DTS (value) =*

$$\text{Increase in sales of radios (value)} \times$$

Market share of retailers in the DTS

7. *Costs to retailers not in the DTS =*
Increase in radios returned in-store x
(Cost of handling extra radios +
Cost of floor space to store extra radios +
Cost of transporting extra radios to treatment facilities)
8. *Costs to retailers in Band A of the DTS =*
Increase in sales of radios by retailers in Band A (units) x
DTS fees for Band A members (for all other EEE)
9. *Costs to retailers in Band B of the DTS =*
Sales of EEE by retailers that move up to Band A x
DTS fees for Band A members (weighted average)
 –
Number of retailers that move up to Band A x
DTS fees for Band B members
10. *Costs to retailers in Band C of the DTS =*
Number that move up to band B x
(DTS fees for Band B members – DTS fees for Band C members)
11. *Total costs =*
Costs to retailers not in the DTS +
Costs to retailers in Band A of the DTS +
Costs to retailers in Band B of the DTS +
Costs to retailers in Band C of the DTS

Table 34: Parameters used in the model of disposal costs for retailers

Parameter	Figure	Units	Source/notes
Disposal methods (shares of consumers):			
With usual rubbish	14%	%	Survey
Retune to store at same time as making a purchase	2%	%	Survey
Retune to store after making a purchase	1%	%	Survey
Take to recycling site with extra trip	4%	%	Survey
Take to recycling site without extra trip	53%	%	Survey
Keep it	9%	%	Survey
Sell it	2%	%	Survey
Donate it to charity	12%	%	Survey
Give it to family/friends	2%	%	Survey
Number of analogue radios:			
Analogue radios per respondent	1.7	Units	Survey
Number of households	26.20	Million	ONS projection for 2011 ¹
Number of analogue radios	44.54	Million	Calculated
Per unit costs of in-store take back:			
Cost of handling extra radios	0.1	£/radio	Assumption
Cost of floor space to store extra radios	0.1	£/radio	Assumption
Cost of transporting extra radios to treatment facilities	0.4	£/radio	Assumption
Market shares of sales of EEE:			
Market share of retailers in the DTS	75%	%	Valpak ²
Share of Band A retailers out of all retailers in the DTS	95%	%	Valpak

Table 34: Parameters used in the model of disposal costs for retailers

Parameter	Figure	Units	Source/notes
Share of Band B retailers out of all retailers in the DTS	4%	%	Calculated
Share of Band C retailers out of all retailers in the DTS	1%	%	Calculated
Radios returned in-store:			
Increase in radios returned in-store	388	Thousand	Calculated
Number of retailers:			
Number of retailers in Band B of the DTS	498	Units	Valpak
Number of retailers in Band C of the DTS	1086	Units	Valpak
Average prices for EEE:			
Average price of a digital radio	72	£s	Web-sweep
Average price of an item of EEE	50	£s	Assumption
Increase in sales of radios:			
Increase in sales of radios (units)	44.54	Million	Calculated
Increase in sales of radios (value)	3,207	£m	Calculated
Increase in sales of radios for retailers in the DTS (value)	2,405	£m	Calculated
DTS fees:			
DTS fees for Band A members - fridges and freezer	0.17	£/unit sold	Valpak ³
DTS fees for Band A members - other white goods	0.0696	£/unit sold	Valpak ³
DTS fees for Band A members - televisions and monitors	0.0616	£/unit sold	Valpak ³
DTS fees for Band A members - lighting	0.0010	£/unit sold	Valpak ³
DTS fees for Band A members - all other EEE	0.0023	£/unit sold	Valpak ³
Fridges and freezer - weighting	0.1	Weight	Assumption
Other white goods - weighting	0.1	Weight	Assumption
Televisions and monitors - weighting	0.2	Weight	Assumption
Lighting - weighting	0.2	Weight	Assumption
All other EEE - weighting	0.4	Weight	Assumption
DTS fees for Band A members - weighted average	0.0374	£/unit sold	Calculated
DTS fees for Band B members	187.25	£s	Valpak ³
DTS fees for Band C members	75.00	£s	Valpak ³
DTS fee band definitions:			
Band C lower bound value of sales of EEE	0	£s	Valpak ³
Band C upper bound value of sales of EEE	100,000	£s	Valpak ³
Band B lower bound value of sales of EEE	100,000	£s	Valpak ³
Band B lower bound value of sales of EEE	1,500,000	£s	Valpak ³

Notes:

- <http://www.statistics.gov.uk/STATBASE/ssdataset.asp?vlnk=7678>
- <http://www.valpak.co.uk/dts/page1534.aspx>
- http://www.valpak.co.uk/docs/weee/dts_phase2_factsheet_rejoining_members.pdf

A4.4 Costs to producers

Parameters used to model the disposal costs for retailers are presented in Table 35. The modelling approach calculates the costs to retailers using the following formula:

$$1. \quad \text{Total costs} =$$

$$\begin{aligned} & \text{Number of analogue radios } \times \\ & (\text{Share who take to recycling site with extra trip} - \\ & \text{Share who take to recycling site without extra trip}) \\ & \text{Average weight of a radio } \times \\ & \text{Cost per tonne for separately collected mixed WEEE} \end{aligned}$$

Table 35: Parameters used in the model of disposal costs for producers

Parameter	Figure	Units	Source/notes
Disposal methods:			

Table 35: Parameters used in the model of disposal costs for producers

Parameter	Figure	Units	Source/notes
With usual rubbish	14%	%	Survey
Store at same time as purchase	2%	%	Survey
Store after purchase	1%	%	Survey
Recycling site with extra trip	4%	%	Survey
Recycling site without extra trip	53%	%	Survey
Keep it	9%	%	Survey
Sell it	2%	%	Survey
Donate it to charity	12%	%	Survey
Give it to family/friends	2%	%	Survey
Number of analogue radios:			
Analogue radios per respondent	1.7	Units	Survey
Number of households	26.20	Million	ONS projection for 2011 ¹
Number of analogue radios	44.54	Million	Calculated
Volume of radios:			
Average weight of a radio	0.73	kg	Web-sweep
Cost of collection, treatment and recovery			
Cost per tonne for separately collected mixed WEEE	150	£/tonne	BERR (2009) ²

Note:

- <http://www.statistics.gov.uk/STATBASE/ssdataset.asp?vlnk=7678>
- Impact assessment of Commission's Proposal to Recast Waste Electrical and Electronic Equipment (WEEE) Directive.

