54th Annual Australian Agricultural and Resource Economics Society Conference, 10-12th February 2010, Adelaide

Comparing responses from web and paper-based collection modes in a choice modelling experiment

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Paper presented at the 54th Annual Australian Agricultural and Resource Economics Society Conference, 10-12th February 2010, Adelaide

Abstract
Different choice modelling experiments have been conducted to test if the collection mode affects sample characteristics and value estimates. The modes tested were paper-based (using drop-off/pick-up) and web-based (using an internet panel). The valuation exercise was to elicit values from Brisbane respondents for future improvement in the environmental condition of the Great Barrier Reef. The total per survey cost of the paper-based survey was approximately $70 per survey and took three months to complete. In contrast, the online survey cost approximately $15 per survey and was completed in two weeks. The results indicate that while there were no differences in gender, education and income levels between the two groups there was an age difference with more young people and less older people in the internet group. A comparison of the WTP of respondents and other model and behavioural indicators do not indicate major differences in models by collection mode.

Keywords: web-based surveys, internet surveys, paper-based surveys, stated preference, collection mode, choice experiments.

1. Introduction

The choice of survey collection modes is important in the generation of primary data in stated preference techniques such as contingent valuation (CV) and choice modelling (CM) (Mitchell and Carson 1989; Bennett and Blamey 2001; Bateman et al. 2002; Champ et al. 2003; Alberini and Khan 2006). CV surveys have traditionally been collected using mail-outs, face-to-face interviews and telephone interviews (Champ 2003; Bateman et al. 2002; Alberini and Khan 2006). The added complexity of CM surveys means that mail-out and face-to face interviews have been the primary collection modes. Limitations of these collection modes are the high costs involved, the difficulties of generating high response rates and representative community samples, and the intensity of effort and time involved.

An alternative mode of survey collection is to use web-based or internet surveys. This collection mode is becoming more popular as there is growing familiarity with internet usage across most sectors of the community. Key advantages of internet surveys are low collection costs, rapid collection times, increased flexibility of tailoring questionnaires to respondent groups, and increased automation of data recording and coding (Berrens 2003; Deutskens et al. 2006; Marta-Pedroso 2007; Fleming and Bowden 2009; Maguire 2009; Olsen 2009). In addition, internet modes are able to incorporate new and innovative design features and information provision[1]. The most commonly cited disadvantages of internet surveys are potential sample frame bias (non-random exclusion of individuals who do not use the internet) and response bias (responses of those who respond may be different from those who do not) (Bateman et al. 2002; Champ 2003; Marta-Pedroso 2007; Fleming and Bowden 2009; Olsen 2009).

Other survey collection modes may also be associated with sample frame bias and response bias as access to and involvement with different groups in society can be expected to vary across collection modes. As access and familiarity with web-based communication increases in society, there may be a convergence between the total sampling frame biases associated with this survey collection mode compared to other modes. However, there is little information about whether the web-based collection mode elicits a different pattern of responses than other collection modes in stated preference surveys.

In this paper, a comparison is made of the results from a choice modelling survey using two collection modes. Identical surveys were collected in a paper-based form using a drop-off/pick-up collection mode and in a web-based form using a pre-recruited internet panel. The CM surveys were focused on eliciting values for improvements in the environmental condition of the Great Barrier Reef (GBR) in Australia. The total cost of the paper-based survey was approximately $70[2] per survey and took three months to complete. In contrast, the internet survey cost approximately $15 per survey and was completed in two weeks. Tests for differences generated by the two collection modes are focused firstly on whether there were different samples of respondents drawn from the target population and secondly on whether the estimated protection values varied across the two sample groups. The results indicate that while there are some demographic differences between the sample groups, they do not impact on choice selection and there is no significant difference between the choice models or the willingness-to-pay (WTP) estimates.

[1] For example, Ready et al. (2006) use an interactive slider to record precise willingness-to-pay (WTP) values in their internet CV survey.
[2] All values are in Australian dollars throughout the paper.

This paper makes an important contribution to the literature on the influence of collection mode in stated preference surveys. to the authors knowledge, it is the first to examine the difference between drop-off/pickup and internet collection modes and the first in the CM literature to examine the use of internet panels. The paper is outlined as follows. In the next section, an overview is given of modal comparisons that have been made for stated preference surveys. In Section 3, details are provided about the choice modelling case study and the results are outlined in Section 4. The implications are discussed and conclusions drawn in the final section.

2. Collection mode and stated preference experiments

Researchers have noted that the mode of collection in stated preference experiments can influence results (Mitchell and Carson 1989; Bennett and Blamey 2001; Bateman et al. 2002; Champ et al. 2003; Alberini and Khan 2006). A major focus of the NOAA inquiry into the CV technique was on the mode of survey collection. Among the key recommendations of that panel was that personal interviews were the preferred mode for data collection, followed by telephone surveys and then mail surveys (Portney 1994). However, there has been continued use of mail surveys and other collection modes because of cost and logistical factors (Carson et al. 2001). As well, the choice of other collection modes may generate more conservative consumer surplus estimates (Marta-Pedroso et al. 2007; Maguire 2009).

There are several studies in the broader social science literature (e.g. Cole et al. 2005) that have involved comparisons between web-based surveys and other collection modes, with some evidence that the collection mode can generate differences in responses. There is a more limited pool of relevant studies evaluating the use of the web-based collection mode in stated preference experiments.

Many internet surveys for stated preference experiments have been administered by researchers themselves and hosted on their organisational websites. This has led to subsequent difficulties in recruiting respondents, with several studies reporting low response rates when using email or internet surveys (e.g., Lefever et al. 2007; Shih and Fan 2009). In the stated preference comparisons, Marta-Pedroso et al. (2007) contacted their internet respondents via email through the internet service provider. The internet response rate was much lower at 5% compared with 84% for the personal interviews. Similarly, Tsuge and Washida (2003) report in their internet CV survey, responses were so low they had to offer a prize to increase the response rate and produce an adequate sample size. Tait et al. (2009) administered their own internet survey but were unable to report a response rate.

One method to help overcome the problem of low responses in internet surveys is to use pre-recruited internet panels. While this is collection method is very common in other discipline areas such as marketing and opinion polls, it has not had common uptake in the application of stated preference surveys. Berrens et al. (2003) and Olsen 2009 are the only authors in the stated preference literature to use pre-recruited internet respondents in an inter-modal comparison. Berrens et al. (2003) explore the relationship between enhanced information access and respondent effort on United States household WTP for ratification of the Kyoto Protocol on climate change. Olsen (2009) examines preferences for different types of landscape from road encroachment when building new motorways in Denmark.

Comparisons of the socio-demographic differences between respondents in stated preference surveys using internet and other collection modes are limited with inconclusive results:

- Berrens et al. (2003) in a comparison of telephone and internet CV surveys in the USA found respondents had a similar age and gender balance but telephone respondents were more educated, had higher incomes and were from different ethnic backgrounds compared with internet respondents.
- Canavari et al. (2005) in a CV comparison of personal interviews and web-based responses in Italy found that respondents in the latter group had higher education levels and were less well represented in the lowest level income group.
- Marta-Pedroso et al. (2007) found internet respondents in Portugal to be younger, better educated and have higher incomes than personal interview respondents.
- Olsen (2009) found a significant difference in the age of internet versus mail survey respondents , but no significant difference in gender, income or education.
- Tait et al. (2009) found differences in the gender, income and ethnicity of internet respondents in New Zealand compared to mail respondents but no difference in labour force status, occupation, education, age and the number of household members.

Apart from Olson (2009), Tait et al. (2009) have made the only (to the authors' knowledge) CM modal comparisons of internet and mail surveys. They examined the effects of agricultural externalities in waterways in Canterbury, New Zealand and found internet respondents had a higher WTP for improvements in ecological condition, but found no difference in the WTP estimates for the other main attributes or consumer surplus estimates between collection modes. Olsen (2009) found no significant differences in the unconditional WTP estimates in their modal comparison.

3. The choice modelling survey

The CM technique requires respondents in a survey format to choose a single preferred option from a set of a number of resource use options (Bennett and Blamey 2001). The economic theory underlying CM assumes that the most preferred option yields the highest utility for the respondent (Louviere et al. 2000; Bennett and Blamey 2001). The options presented to respondents use a common set of underlying attributes that vary across a set number of levels. The variation in the levels of attributes differentiates the options to respondents. By offering the combinations of attributes and levels in a systematic way through the use of an experimental design (Louviere et al. 2000), the key influences on choice can be identified (Rolfe 2006).

In this study a choice modelling survey was conducted in 2009 to estimate the non-market values of state capital (Brisbane) residents for improvements in the condition of the GBR. The choice scenario was framed in terms of a cost attribute and three attributes to describe the GBR:

- COST – an annual payment for a five year period;
- REEF – area of coral reef in good health;
- FISH – number of fish species in good health; and
- SEAGRASS – the area of seagrass in good health.

The choice options were framed in terms of a future base which described the condition of the GBR in 25 years time, and three alternatives with improved outcomes, but with an associated cost. The base level for COST was $0 with four levels in the improvement options

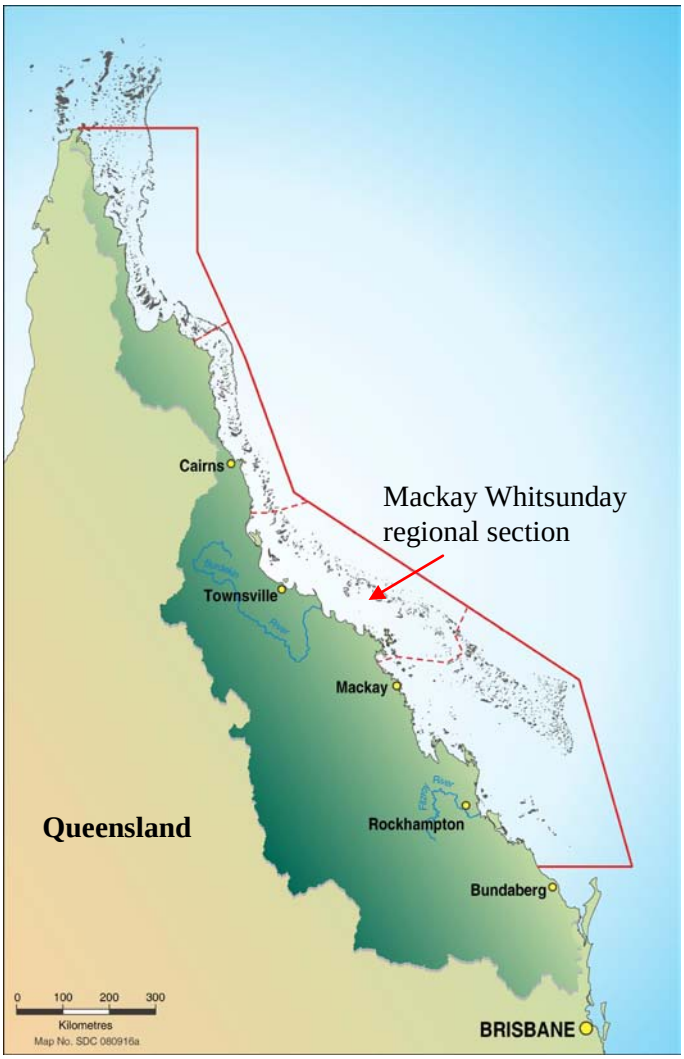
($50, $100, $200, $500). The attribute levels for REEF, FISH and SEAGRASS were described in both absolute terms and as a percentage. The percentage levels were the same for all three attributes with:

- a current level of 90%;
- a future base level of 65%; and
- improvement option levels of 70%; 80% and 85%.

In addition, there were two versions of the survey that related to the scale of the valuation exercise. One referred to the whole GBR and the other referred only to the Mackay-Whitsunday regional section of the GBR (Figure 1). The cost levels and GBR attribute percentage levels remained the same in both the whole and regional surveys, with the absolute values changing accordingly. Example choice sets are outlined in Figure 2.

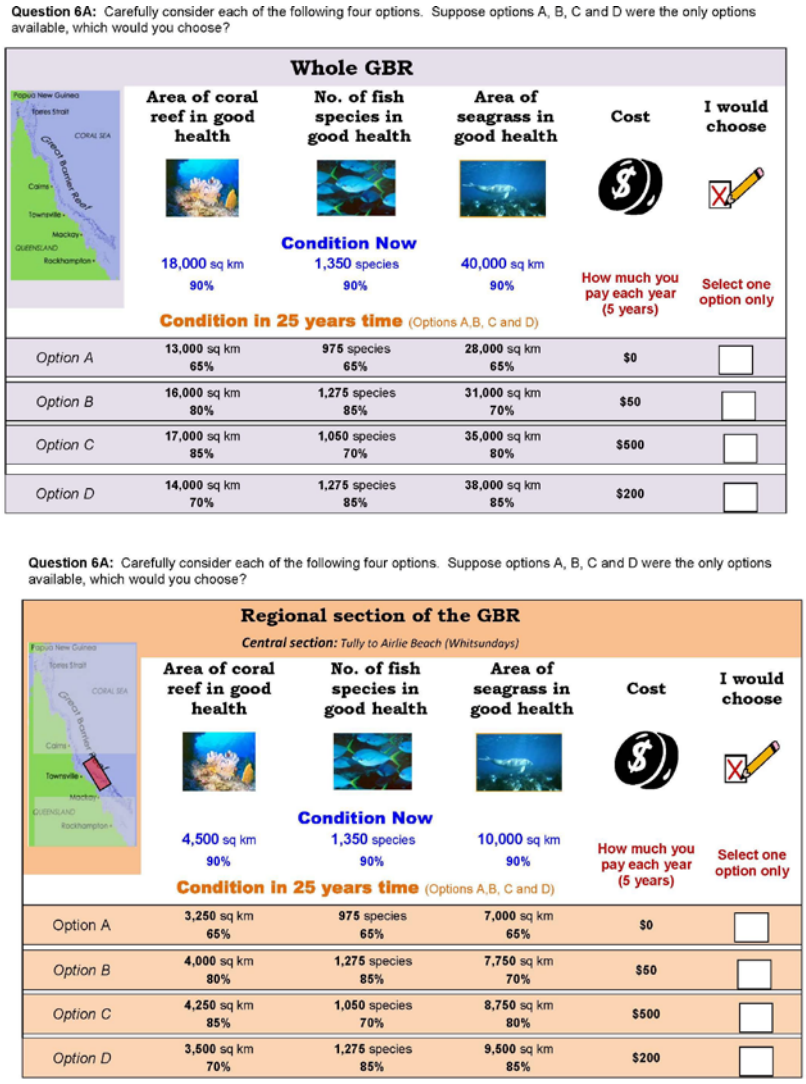
The experimental design for the choice tasks in the survey was developed using ©Ngene software to create an efficient design, with a D efficiency of 0.0026. The same design was used for both the whole and regional surveys. Each of the survey scale versions was divided into two blocks with six choice sets in each block.

Figure 1. Great Barrier Reef



Source: Great Barrier Reef Marine Park Authority

Figure 2 Example choice sets



Question 6A: Carefully consider each of the following four options. Suppose options A, B, C and D were the only options available, which would you choose?

Whole GBR

	Area of coral reef in good health	No. of fish species in good health	Area of seagrass in good health	Cost	I would choose
	Condition Now				
	18,000 sq km 90%	1,350 species 90%	40,000 sq km 90%	How much you pay each year (5 years)	Select one option only
	Condition in 25 years time (Options A,B, C and D)				
Option A	13,000 sq km 65%	975 species 65%	28,000 sq km 65%	$0	☐
Option B	16,000 sq km 80%	1,275 species 85%	31,000 sq km 70%	$50	☐
Option C	17,000 sq km 85%	1,050 species 70%	35,000 sq km 80%	$500	☐
Option D	14,000 sq km 70%	1,275 species 85%	38,000 sq km 85%	$200	☐

Question 6A: Carefully consider each of the following four options. Suppose options A, B, C and D were the only options available, which would you choose?

Regional section of the GBR

Central section: Tully to Airlie Beach (Whitsundays)

	Area of coral reef in good health	No. of fish species in good health	Area of seagrass in good health	Cost	I would choose
	Condition Now				
	4,500 sq km 90%	1,350 species 90%	10,000 sq km 90%	How much you pay each year (5 years)	Select one option only
	Condition in 25 years time (Options A,B, C and D)				
Option A	3,250 sq km 65%	975 species 65%	7,000 sq km 65%	$0	☐
Option B	4,000 sq km 80%	1,275 species 85%	7,750 sq km 70%	$50	☐
Option C	4,250 sq km 85%	1,050 species 70%	8,750 sq km 80%	$500	☐
Option D	3,500 sq km 70%	1,275 species 85%	9,500 sq km 85%	$200	☐

3.1 Survey collection methods and details

Two collection modes were used to collect responses for identical surveys from Brisbane residents. The first was a drop-off/pick-up, paper-based collection technique that is consistent with many applications of choice experiments (Bennett and Blamey 2001). The second involved an internet panel where surveys were completed through the web.

The paper-based collection was conducted in a three month period from June to September 2009, with a high response rate of 91% recorded[3]. A private research organisation were contracted to host the web-based survey and provide access to an internet panel. The web surveys were completed in a two-week period in August 2009. As internet panels are known to be biased towards younger participants and females[4], two segmentation criteria were

[3] This appears high and was repeatedly checked with the collectors. Collection was organised through the Lions Club. The coordinator was an experienced survey collector and had been involved in the collection of the National Census in 2006.

[4] Advice from a number of market research organisations who provide access to internet panels.

implemented to ensure a 50: 50 split between males and females and between respondents aged between 18-45 years and those between 46-88 years. An accurate response rate for the internet panel was not obtained. Emails were sent to 10,754 people, but this included some reminders. Out of the 2097 people who clicked the link to the survey there were 1064 completed surveys. The 1033 screen outs would have included respondents who did not meet the selection criteria (Brisbane residents) or quota requirements (age and gender) as well as genuine non-responses**.**

The whole GBR and regional GBR versions of the paper based survey yielded 90 and 86 responses respectively. As each respondent completed six choice tasks, there were 1056 observations for the combined paper-based survey. In the internet survey, 82 and 80 responses were collected for the whole and regional versions respectively, yielding 972 observations for the combined internet survey.

4. Results

The aim of this paper is to examine how the two different survey collection modes may impact on the results of a choice modelling valuation experiment. The differences are tested in two key ways. The first is to identify if the two collection modes captured equivalent samples of the population. The second is to identify if the samples from the two collection modes generated similar models and value estimates.

4.1 Comparing socio demographic characteristics of sample respondents

The results of this study indicate little difference between collection modes in generating an accurate random sample of the population. There was no significant difference (Pearson's chi squared crosstabs at 5% significance) in terms of gender and income levels between respondents in the two collection modes (Table 1). As expected, there was a difference in the ages of the two groups with the online group having a higher proportion of younger respondents and fewer older people. The online respondents also had higher education levels and were less likely to have any children compared with the paper-based group.

The socio-demographic characteristics of both groups can also be compared with the census data for the same population (Table 1). Results indicate that the gender balance is well aligned in both groups, but the segmentation quota applied in the internet group resulted in a more precise match. While there was also a segmentation quota applied for age in the internet group, people in the oldest age category were still under represented. Overall, the internet group was better matched with the population in the lowest age group and the paper-based group were better matched in the oldest age category. Education levels were much higher than the population in both groups. Income levels were quite similar but there was a lower representation from the highest income level, particularly in the paper -based group.

Table 1 Respondent characteristics for survey modes

		Internet	Paper	ABS 2006 census
Gender	Female	51%	46%	50%
Children**	Have children	61%	74%	n/a
Age**	18-29	28%	17%	24%
	30-45	29%	27%	31%
	46-65	35%	37%	30%
	66-89	8%	18%	16%
Education**	non school qualification	70%	63%	56%
	tertiary degree	43%	41%	24%
Income[1]	less than $499 per week	18%	15%	17%
	$500 – $799 per week	20%	19%	18%
	$800 – $1199 per week	20%	20%	21%
	$1200 – $1999 per week	24%	35%	24%
	$2000 or more per week	17%	12%	21%

** significant difference (chi squared crosstab) between collection modes at 5% level of confidence

[1] 6% of respondents in the paper-based survey did not complete the question

4.2 Comparing the choice models

The choice modelling experiment was designed to elicit stated preferences for improvements in the environmental condition of the GBR in the next 25 years and to generate WTP estimates. For ease of reporting the whole and region scale versions of the survey were combined for both the internet and the paper-based samples and mixed logit models were calculated. A dummy variable (SCALE) was included to distinguish between the whole and regional versions. A pooled model was also created with a dummy variable (INTERNET) to distinguish between the web-based and paper-based collection modes.

Mixed logit (ML) models were calculated using the ©Limdep software. The GBR attributes are modelled in terms of their percentage values and all were randomised with a normal distribution to provide a consistent comparison. The socio-demographic variables were modelled with the status quo or base level option. Details of the model variables are presented in Table 2 and model outputs are presented in Table 3. All models are significant with the cost attribute and the income variable always significant and signed as expected.

Table 2 Model variables

Main attributes	Description
COST	Annual payment for a 5 year period
REEF	Area of coral reef in good health (%,)
FISH	Number of fish species in good health (%)
SEAGRASS	Area of seagrass in good health (%)
AGE	Categories (1-4) – see Table 1 for details
GENDER	Male = 0; Female = 1
CHILDREN	Children = 1; no children = 2
EDUCATION	Coded from 1= primary to 5 = tertiary degree or higher
INCOME	Categories (1-5) – see Table 1 for details
SCALE	Survey scale: Whole = 0; Regional = 1
INTERNET	Survey collection mode: Internet = 1; Paper = 0

Table 3 Mixed logit models for different mode responses[1]

	Internet		Paper		Pooled	
Variable	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Random parameters in utility functions						
REEF	0.0436***	0.0166	0.0468***	0.0148	0.0363***	0.0118
FISH	0.0541***	0.0126	0.0495***	0.0114	0.0453***	0.0084
GRASS	0.0385***	0.0139	0.0164	0.0148	0.0136	0.0099
Non Random parameters in utility functions						
ASC	5.3316	3.4367	-2.2606	3.4850	1.2647	2.3956
COST	-0.0065***	0.0006	-0.0058***	0.0005	-0.0056***	0.0004
AGE	0.0947	0.2720	0.4264	0.2642	0.1692	0.1751
GENDER	-0.5714	0.3972	0.2464	0.4005	-0.5118*	0.2755
CHILDREN	0.0057	0.5156	-0.0186	0.5738	0.2543	0.3179
EDUCATION	-0.0613	0.0600	0.2281	0.1739	-0.0354	0.0307
INCOME	-0.2988**	0.1517	-0.5138***	0.1808	-0.2536**	0.1103
SCALE	-0.5725	0.3894	0.0392	0.4109	-0.2237	0.2719
INTERNET					0.2240	0.2686
Derived standard deviations of parameter distributions						
REEF	0.1694***	0.0183	0.1626***	0.0191	0.1736***	0.0147
FISH	0.0918***	0.0171	0.0902***	0.0161	0.0940***	0.0114
GRASS	0.0976***	0.0154	0.1222***	0.0156	0.1036***	0.0110
model statistics						
No of Observations	972		1038		2010	
Log L	-1017		-1081		-2103	
Halton draws	80		80		80	
Chi Sqrd (D o F)	660 (14)		717 (14)		1365(15)	
McFaddon R--sqrd	0.245		0.246		0.233	

*** significant at 1% level of confidence; ** significant at 5%;

Four main comparisons of model results were used to test if internet and paper- based models generated different outcomes. The tests were focused on comparing the significance of relevant variables, overall model performance, the pattern of respondents' preferences, and willingness to pay measures.

The first group of tests suggest that there is no significant difference between the models:

a) The SCALE dummy variable is not significant for either group. This indicates that responses from both groups are not sensitive to changes in the scale of the valuation exercise.
b) The INTERNET dummy variable is not significant in the pooled model suggesting there is no difference between the two survey collection modes.
c) There is little difference in the significance of the main attributes. The COST, REEF and FISH attributes are highly significant in all models. While SEAGRASS is also highly significant in the internet model it is not significant in the paper-base model.

The standard deviations for the randomised variables are all highly significant indicating there is considerable preference heterogeneity in both groups.

In the second group of tests, the conduct of a log likelihood ratio test ($-2(LogL_{12} - (LogL_1 + LogL_2))$ indicates there is no difference between the models from the two collection modes. The log likelihood ratio statistic was calculated as 12.5 which is well below the chi squared test statistic of 29 at the 1% level of significance. In addition, a Swait-Louviere test was applied where the ratio of scale parameters was allowed to change across data sets (Swait and Louviere 1993). The relationship between the ratio of scale parameters and the variances of the two data sets can be outlined as follows (Swait and Louviere 1993), where σ^2 is equal to the variance of the error term associated with the distribution of choices:

$$\sigma_{paper} / \sigma_{internet} = \pi^2/6\mu^2_{paper} \; / \; \pi^2/6\mu^2_{internet} = \mu^2_{paper} / \mu^2_{interent} = (\mu_{paper} / \mu_{internet})^2 \qquad \ldots (1)$$

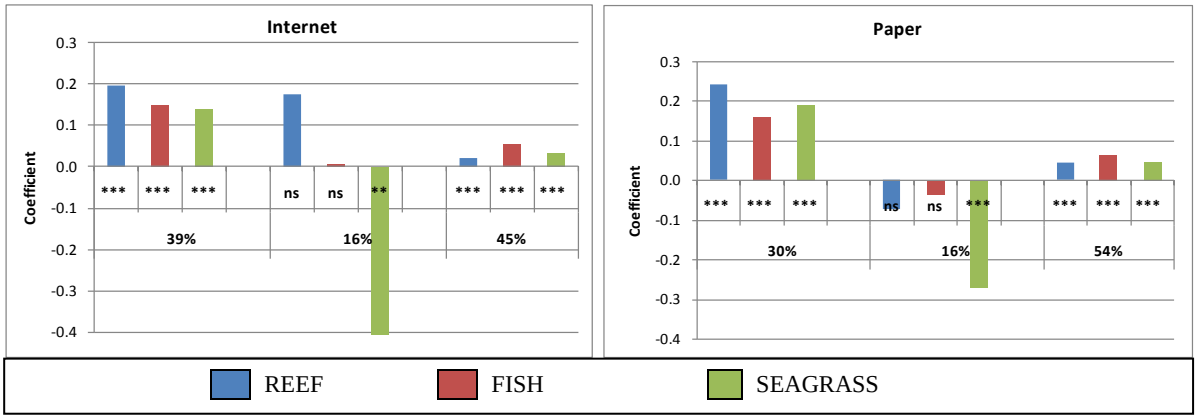
A scalar factor of 0.89 was calculated, indicating the variance associated with the paper-based responses is about 79% of the internet responses. There is slightly more variability associated with the choices of the internet group**.**

The focus of the third group of tests was to identify if there were differences in the pattern of responses between collection modes. An initial examination indicated there was no significant difference (Pearson's chi-squared crosstab) between the two groups in the selection of the status quo (no cost) alternative in the choice sets. This suggests there is no difference in 'protest' votes (Swait and Adamowicz 2001, von Haefen et al. 2005) where respondents select this option because they are reacting against some aspect of the survey.

Two types of latent class models were then developed to test for response structure (Swait and Adamowicz 2001) and non-attribute attendance (Scarpa et al. 2009). The first looked at the overall pattern of attribute selection in a three class model. The results are portrayed in Figure 3[5]. The pattern of responses between the two groups is very similar. Both groups have 84% of respondents with positive values for the three GBR attributes, with one class having stronger preferences than the other class. In both groups 16% of respondents had significant and strong negative preferences for SEAGRASS (i.e., they made preference tradeoffs). These negative preferences were much stronger in the internet group (coefficient value of -1.3).

[5] Full model details and specifications are available from the authors.

Figure 3 Latent class models for attribute selection



*** = significant at 1%; ** = significant at 5%; ** = significant at 10%; ns = not significant

The second comparison examines attribute attendance (Scarpa et al. 2009) in the two groups. Latent class models were developed to determine which attributes were considered and which were ignored by respondents[6]. It was possible to generate 16 possible classes out of the four attributes used in the mixed logit models (corals, fish, seagrass and cost).

- Class 1: all attributes matter;
- Class 2-5: one attribute is ignored;
- Class 6-9: one attribute matters;
- Class 10-15: two of the attributes are ignored; and
- Class 16: no specific attribute matters (suggesting there is perceived collinearity between attributes and attribute interactions are more important than single attribute selection).

The results for the two groups are presented in Table 4. Out of the 16 classes only three classes were significant in each group. For Class 9 in both the internet and paper-based group, COST was the only single attribute that mattered with 25% and 17% of the sample share respectively. The class with 'interactions only' was also significant in both groups. The difference between the groups appeared in the attributes that were ignored by respondents. Over a third of the paper-based respondents (35%) ignored the FISH attribute whereas 28% of the internet group ignored the SEAGRASS attribute.

[6] The technique was presented by Ricardo Scarpa in the 4th Biennial Australasian Choice Modelling Workshop in Christchurch, NZ, Nov 19-20th 2009.

Table 4. Latent class models for attribute attendance

Class	Description	Internet	Paper
		% of sample share	
Class 3	FISH ignored		35%***
Class 4	SEAGRASS ignored	28%***	
Class 9	COST only attended	25%***	17%*
Class 16	Interactions only	18%**	23%***
Other classes		29% ns	25% ns
Model statistics			
Observations		972	1056
No of classes		16	16
Adj Rho sqrd		0.08	0.08
AIC		2.564	2.568
Log L		-1227	-1337

*** = significant at 1%; ** = significant at 5%; ** = significant at 10%; ns = not significant

The fourth group of tests involved comparisons between the WTP estimates. These were calculated within Limdep by calculating ratios of individual parameter estimates. This is a behaviourally more appealing approximation to the true WTP values of each individual in contrast to the draws from population distributions (e.g., used in a Krinsky Robb (1986) procedure) (Hensher et al. 2005). There 162 individual WTP estimates calculated for the internet survey and 173 estimates for the paper-based survey. The mean, maximum and minimum values are presented in Table 5.

Table 5 WTP estimates for a 1% improvement in condition

Survey mode	Reef	Fish	Seagrass
Internet (mean WTP)	$7.72***	$8.90***	$4.86***
(min-max WTP)	(-$34.27 - $69.43)	(-$14.02 - $29.76)	(-$21.41 - $30.57)
Paper (mean WTP)	$8.64***	$8.89***	$3.12
(min-max WTP)	(-$44.67 - $48.59)	(-$19.40 - $34.98)	(-$42.16 - $41.97)
Proportion of differences > 0	0.25	0.25	0.19

*** significant at 1% level of confidence

There is a wide range in the WTP estimates and some strong negative values in both groups. All the confidence intervals (minimum and maximum estimates) are overlapping, indicating the estimates for the two collection modes come from the same population. A Poe et al. (2001) test has been applied to identify any significant difference between WTP estimates. These results (Table 5) indicate that the WTP estimates are not significantly different between survey collection modes.

5. Discussion and conclusions

The results of this study are encouraging for the use of web-based surveys in choice experiments. The web-based collection mode in this study performed to the same standard as the paper-based drop-off and collect approach, both in terms of capturing an accurate random sample of the population and in the generation of equivalent model results.

Some caveats to the results should be noted. First, age and gender quotas were used in the web-based collection process in this study to help generate a representative sample of the population. These quota restrictions may have been important to generate an appropriate sample, and represent a useful tool in web-based surveys. Second, the experiments were conducted in a capital city in a country with high rates of internet access and adoption, where there may have been more familiarity with internet use and web-based surveys. Caution would be needed in any extrapolation of these results to other populations and settings where there may be lower access and acceptance of the internet. Third, the experiment was conducted through an internet marketing firm with an established panel of survey respondents. These results may not be as consistent across other types of web-based surveys.

The outcomes of this study also demonstrate some of the key advantages of the web-based collection mode over a paper based drop-off and collect technique. Survey costs were nearly 80% lower with the web based mode ($15 per survey compared with $70 per survey), while collection time was about 80% quicker (two weeks compared to twelve weeks). The web format allowed a more seamless presentation of tailored questions to respondents, and allowed access to extra information by building in pop-up information and web links. As well, the internet format ensured that respondents fully completed their surveys, and facilitated the compilation of data. These advantages have been gained with no loss in sample representation or efficiency, and suggest that increased use of web-based collection modes is warranted.

Acknowledgement

This research has been supported through the Environmental Economics Research Hub, funded by the Australian Department of Environment and Water Heritage and the Arts under the Commonwealth Environment Research Facility.

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