The Effects of Culture on Consumers' Response to a Carbon Tax and Container Deposit Scheme: A Sustainable Consumption Study

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Abstract
As the temperature of the planet rises, governments are adopting measures to curb human activities that contribute to global warming. Introducing policies that people would adopt and to achieve the desired outcome is, however, a growing challenge. This situation is not quite unexpected particularly in multicultural societies where people have diverse cultural values and attitudes towards environmental issues and policies. Extant literature has cited the importance of cultural influence on the decisions individuals make. Through vertical socialization, individuals learn the values and behaviours that society expects of them. The current study examines the impact of cultural factors on consumers' response to a carbon tax and cash incentives on consumer preference. Data obtained from an online survey involving 294 respondents in a discrete choice experiment was analysed using an ordered logit approach. The focus of the experiment was on the choice of soft drinks in three pack types namely glass, PET and aluminium cans which have different levels of carbon emission. A comparison of the estimated ordered logit models would show that the effects of a carbon tax and cash incentives on pack type choice do tend to vary according to the consumer's cultural heritage and social identity. The implications of the above findings on policy and possibly industry practice are discussed. Future research directions, particularly in the context of container deposit schemes which are growing in popularity are also explored.

Keywords: Choice Modelling, Cultural Identity, Carbon Tax, Container Deposit

Introduction

The rising temperature of the planet has led to greater interests in governments to introduce policies to mitigate its adverse effects. Producing more goods to meet demand is causing resources to become scarcer and pollution to rise. Policies to change consumer behavior is now more important than ever to lessen the effects of global warming.

Literature Review and Research Objectives

Utility theory states that consumers will behave in such a way that it will bring them the greatest satisfaction. Disincentives such as taxes and fines make certain behaviors such as littering and choosing carbon intensive products to be costly or undesirable. Incentives on the other hand make buying certain products more desirable such as rebates for solar panels and container deposits to encourage recycling. Policies, intentionally or consequentially, can change the satisfaction that certain behaviors will bring to the consumer.

Standard economic theory assumes that preference is exogenous and invariant. This assumption has been criticised in many studies. According to Van Den Bergh, Ferrer-i-Carbonell, and Munda (2000), there are interactions in an economic system which can affect preferences and hence utility. In an environmental tax regime, consumers may compare their purchasing intentions with friends and family to see if it is worthwhile to switch to less polluting products. From a social norms perspective, what other people do and think matters (Farrow, Grolleau, and Ibanez , 2017) which means that significant others can influence a person's environmental behaviour.

Previous studies have shown that attitudes toward the environment have an influence on sustainable environmental behaviour such as demand for green electricity and reduction of energy consumption (Van den Bergh, 2008). There also are studies that examined the effects of culture which sociologists have identified as the underlying factor that dictates the values and beliefs of consumers about the environment and its protection (Kletzan, 2002). These studies show that aside from economic factors, the effects of psychological, cultural and social factors need to be analysed to gain a better understanding about how people will respond to environmental policies.

Understanding the effects of culture on environmental behaviour is made more important in a multicultural society such as Australia's. In a multicultural society, policies may not achieve its expected results. The wants that policy makers assume consumers to have may not apply across cultural groups. One's culture and the people outside it can influence an individual's values. Their upbringing and exposure to other cultures may have taught them that benefits or outcomes from policies do not always bring the satisfaction they want.

This study therefore aims to examine among others, the influence of culture on an individual's response towards environmental policies. A choice experiment employing a carbon tax and container deposit was conducted. The experiment was designed to help understand how a cross-section of consumers choose the pack type of an everyday product, the soft drink. It is widely known that packaging impacts the environment as the material and process used to produce them involve significant

levels of carbon emission. The three commonly used pack types namely, glass, PET, and aluminium cans with varying levels of carbon tax and container deposit comprise the core elements of the choice sets in the current study. A carbon tax represents a punitive instrument placed on goods and services that emits high levels of carbon during its manufacturing or delivery. The resulting price will be higher, making it costlier. A container deposit rewards consumers when they return a container or packaging for recycling. It is an incentive to encourage ecologically friendly behavior.

Methodology

Data collection

The survey was conducted online and an external agency was employed to recruit the respondents. There were 294 respondents who completed the survey. Adults aged 18 to 40 years living in the Greater Sydney Area formed the sample. This age group consumes the most carbonated drinks.

Although budget constraints prevented recruiting a national sample, there also was another advantage in restricting the sample to Greater Sydney. Greater Sydney has the lowest proportion of adults aged 18 to 40 who are born in Australia, making it more culturally diverse than other capital cities for the said age group (ABS[1], 2016).

Experimental design and choice sets

A full factorial 2x2x3x3 choice experiment was designed for the study. Each respondent was presented with six choice sets, each one with three carbonated drinks to choose from. A drink in a glass bottle, plastic bottle and aluminum can featured in each set. Figure 1 shows an example of a choice set. A carbon tax, container deposit or both were assigned randomly to each drink.

Figure 1 - Example of a choice set shown to a respondent

Attributes tested and scale questions

Table 1 shows the attributes, levels tested in the experiment used in the analysis. A drink received a pack size category, small or large, randomly. Depending on the category, a volume level was picked at random to be shown on the choice sets. Table 3 shows the pack size category and the set of volume levels for each. The codes used for the pack type reflects carbon emissions produced during manufacturing. Table 4 shows the carbon emission levels generated by each pack type, ranked from the lowest to the highest.

The covariates included demographic information and the scale items described in Table 5. These scales show how environmentally aware the respondent is, the behaviour he or she has adopted to help the environment and the belief that such actions can make a difference.

Identity points allocation

The respondents allocated 100 points across different items that define who they are today in the survey. This is adapted from the Golden Bear Omnibus conducted by the University of Berkeley (Abdelal, 2009) with two fundamental differences. In the Omnibus study, respondents had to give points on prescribed items while in the current study, the respondents selected the items themselves. If an item was not relevant, alternative words were presented for their selection. The other difference is the presence of *other* as an item. Respondents who are task sensitive will make choices based on items presented to them. In this case, respondents may assign points because they felt they had to. Including "other" allowed them not to use items that had no meaning for them.

Table 1 - Attributes tested and levels

Attribute	Levels
Carbon Tax (added after the GST[2])	0%
	10%
	25%
Deposit (added after the GST)	$0.00
	$0.10
Size	Small
	Large
Pack type	Glass bottle
	PET (Plastic) bottle
	Aluminium can

Table 2 - Attributes tested and levels

Pack size category	Volume levels (ml)
Small	250, 300, 330, 375, 385, 390
Large	440, 450, 600

Table 3 - Carbon emission produced for one tonne packaging type manufactured from raw material. Source: DECCW[3], 2010)

RANK	Pack type	Manufactured Weight	Carbon Emitted
1	Glass	1 Tonne	0.59 Tonnes
2	Polyethylene Terephthalate (PET)	1 Tonne	2.56 Tonnes
3	Aluminium	1 Tonne	16.4 Tonnes

Table 4 - Scales used in the questionnaire

Scale	Description
Ecologically Conscious Consumer Behaviour (Straughan & Roberts, 1999)	Only 11 items were retained to reduce the questionnaire's length. The respondents were asked how regularly they performed certain ecological behaviours, from Never (0) to Always (100).
New Environmental Paradigm (Dunlap, 2008: Dunlap, Van Liere, Mertig, and Jones, 2000)	Only 10 items were retained from this scale. The respondents were asked if they Strongly Disagree (0) or Strongly Agree (100) with each statement describing the current state of the environment.
Perceived Consumer Effectiveness (Straughan & Roberts, 1999)	Only 3 items were retained for relevance. The respondents were asked if they Strongly Agree or Disagree with each statement on the environmental impact that an individual's action can bring.

Transformed variables

Below are the newly created variables used in estimating the models.

1. Deposit (%) **-** The amount of the container deposit was expressed as the share of the price shown to the respondent.

2. Tax ($) - The dollar amount of the carbon tax rate was calculated by multiplying it by the price with the sales tax or GST (shelf price) before the container deposit was added.

3. Newrate - This variable represents the additional amount added to the shelf price relative to the sales tax (GST). It was computed by taking the difference between the sales tax and the combined dollar amount of the carbon tax and container deposit divided by the sales tax. The advantage of this variable is that even if no instrument was applied to a drink, it will still register a value.

4. Eccb10 - This variable is a measure of how often the respondent demonstrated an ecologically friendly behaviour. It was adapted from Straughan and Roberts' (1999) average score for ecologically conscious behaviour.

5. Relative ranking of attributes – The relative importance of an attribute compared to the other attributes identified by the respondent as important in choosing the pack type of a soft drink.

6. Recoded income and age variables -To be consistent with symmetrical coding required for discrete choice experiments, it was decided to ensure that demographic variables were also coded symmetrically. The income categories were retained from the 2011 Census (ABS, 2011) with exception of combining "Negative Income" and "No Income" as one category. The eleven categories were coded symmetrically where -5 was given to the lowest and +5 to the highest income level. The calculated age of the respondents based on their year of birth was also symmetrically coded. Those aged 18 received a code of -11 and those who were 40 received a code of +11.

Data Analysis & Results

The analysis was undertaken using an ordered logistic probability approach using the software, NLOGIT[4]. A general model was first estimated for the entire sample followed by one model for each of the six regions representing the ancestry of the respondents. For those whose ancestries were from more than one region, the respondents were included in more than one model. The model for each region retained only the significant variables from the general model.
The estimated models for respondents with ancestries from Africa, Asia, Europe and the Middle East initially showed that ECCB10 was significant. A regression was performed for each region using items to which they were asked to allocate points. The results presented in these estimates were the forecasted scores (ECCB10R) from these regressions.

Cultural composition of the sample

Table 5 shows the ancestries of the respondents. As it is possible for a respondent to have ancestries from more than one region, the figures in Table 5 do not add up to 100%.

Table 5 - Ancestries of respondents

Sample size, n = 294	
Region	**Proportion of sample**
Africa	3.74%
The Americas	8.50%
Asia	44.22%
Europe	48.98%
The Middle East	4.76%
Oceania	20.41%

Results for entire sample

The results for the entire sample are shown in Table 6. All the variables were significant at 1% or 5% except for Newrate. The combination of a carbon tax and deposit was not significant. The major findings are discussed below:

1. The carbon tax in itself is not a punitive instrument

A respondent is less likely to choose a drink with a carbon tax as shown by the negative coefficient of the carbon tax [Tax(Coded)]. Importance placed on the tax could partially account for this result as shown by the coefficient's size for [Tax(Coded) × RankTax].

Environmentally friendly behavior complements the importance placed on the carbon tax. The coefficient [RankTax × ECCB10] shows that environmentally friendly respondents, to whom the carbon tax is important will not buy a drink that had one. Respondents who have higher incomes are more willing to pay a higher carbon tax for their drink. The coefficient for the interaction term between the dollar amount of tax and income [Tax($) × Income] was positive. Those with higher incomes might continue to buy carbon intensive products because they can afford the carbon tax.

2. The container deposit can work as a reward

The container deposit did make a drink more attractive. The coefficient for the coded deposit was positive. Respondents were more likely to choose a drink with a container deposit if it was important to them. The coefficient for the interaction between importance and the deposit's share of price was larger [Deposit(%) × RankDeposit].

Environmental awareness and the importance placed on the container deposit had opposite effects. The coefficient for the interaction term between importance and the NEP score was negative [Newrate × ECCB10]. An environmentally-aware respondent will choose a drink that has a container deposit even if it was not important to him/her.

The belief that one's actions can help the environment did complement the container deposit. The interaction term between container deposit and the PCE score was positive [Deposit(%) × PCE]. A respondent who believes on their actions and places importance on the deposit will choose a drink that has one.

3. Other variables affect combinations of the carbon tax and container deposit

The combined effects of the carbon tax and container deposit was only significant when other variables were included. The coefficient for the interaction term between Newrate and coded size was negative and statistically significant [Size × Newrate]. Respondents are less likely to choose larger sized drinks with a container deposit and higher carbon tax rates. Consumers are not willing to pay more for volume if a deposit and a higher tax rate are involved.

The combined effects did not complement environmentally friendly behavior. The interaction term between the Newrate and ECCB was negative [Newrate × ECCB10]. A respondent who observes environmentally friendly behavior is less likely to choose a drink with a higher carbon tax and a container deposit. The coefficient also suggests that combining tax and deposit is a useful deterrent for consumers who do not care about the environment. Respondents who have lower ECCB10 scores will not choose

a drink with higher carbon tax and deposit. They will choose a drink with either a lower carbon tax, container deposit or both.

Classes of respondents

Based on the estimated models for individual regions, three respondent groups which showed similar significant variables within each group were identified.

Group 1: Attribute sensitive respondents
This group consists of consumers who chose their drinks based on product attributes only.

Table 6 – Results of the Ordered Logistic Regression for the entire sample

	Entire Sample
Volume (ml)	0.00671*** (0.00046)
Tax(Coded)[5]	-0.53565** (0.25324)
Price with sales tax (GST)	-1.14286*** (0.05528)
Deposit (Coded)[6]	0.19395*** (0.06029)
Newrate[7]	0.14624 (0.20760)
Newrate × ECCB10	-0.07294*** (0.02202)
Size[8] × Newrate	-0.08638*** (0.02730)
Size × Age(Coded)[9]	-0.01497*** (0.00504)
Tax(Coded) × RankTax[10]	-0.34302*** (0.05494)
RankTax × ECCB10	-0.02165*** (0.00871)
Tax($)[11] × Income (Coded)[12]	0.05172*** (0.02237)
Deposit(%)[13] × RankDeposit[10]	10.5970*** (2.77327)
RankDeposit × NEP	-0.03492*** (0.01129)
Deposit(%) × PCE	1.71880*** (0.51216)
Price × RankPrice[10]	-0.02912*** (0.00969)
Threshold – Mu(1)	0.03441*** (0.01771)
Threshold – Mu(2)	1.62938*** (0.04294)

Log-likelihood	-4885.42288
Restricted Log-likelihood	-5369.63782
Chi-Square	968.42989
Degrees of Freedom	14
McFadden Pseudo R^2	0.0901765
No. of Observations (N)	5749
Variables (K)	17
Information Criteria AIC	9804.80000
AIC/N	1.70500
*** P-value <= 0.01; ** P-value > 0.01 & <= 0.05, * P-value > 0.05 & <= 0.10	

Group 2: Ecological responsive respondents
The results for this group show that environmental behavior (ECCB10R) either complemented or worked in opposite directions with the product attributes.
Group 3: Multi-attribute responsive respondents
The estimated ordered logit model for this group showed that almost all of the variables that were significant for the entire sample were also significant for this group. Some of the product attributes and their environmental attitudes played a part in their choices.

Results for Attribute sensitive respondents

Table 7 shows the results for respondents with ancestries from The Americas and Oceania. The results for Oceania are the only ones shown in this paper as it had a bigger sample. The raw data showed that the container deposit was significant for both regions. To improve the model for The Americas, the container deposit's share of the shown price was used. The coefficients of the container deposit are not comparable with Oceania. Below are the significant results.

Table 7 - Results for Attribute Responsive Consumers

	Americas[14]	Oceania
Volume (ml)	0.00314** (0.00141)	0.00619*** (0.00091)
Tax(Coded)		-0.91559*** (0.14361)
Price with GST	-0.62358*** (0.17200)	-1.03627*** (0.11665)
Deposit - (Coded) or Deposit (%)	10.7436* (5.98349)	0.11028* (0.06518)
Newrate	-0.39286*** (0.09596)	
Size × Newrate	-0.20522** (0.09523)	-0.11680** (0.05783)
Tax(Coded) × RankTax		-0.43228*** (0.14456)
Tax($) × Income		0.10535** (0.05106)
Threshold – Mu(1)	0.47514*** (0.06968)	0.35077*** (0.03902)

Threshold – Mu(2)	1.48817*** (0.13667)	1.60502*** (0.09368)
Log-likelihood	-432.72025	-1018.52235
Restricted Log-likelihood	-455.55470	-1097.12523
Chi-Square, Degrees of Freedom	45.66889, 4	157.20576, 6
McFadden Pseudo R^2	0.0501245	0.0716444
No. of Observations (N) & Variables (K)	N = 465, K=7	N = 1174, K = 9
Information Criteria AIC, AIC/N	879.40, 1.891	2055.0, 1.75
*** P-value <= 0.01; ** P-value > 0.01 & <= 0.05, * P-value > 0.05 & <= 0.10		

1. Respondents with ancestries from Americas considered attributes together
The results for The Americas showed that respondents did not consider the combined carbon tax and deposit by itself. The variable Newrate by itself was significant for The Americas while it was not for Oceania. This variable was only significant for respondents with Oceanian ancestries with the drink's size [Size × Newrate].

2. Tax was important for respondents with ancestries from Oceania
Respondents with Oceanian ancestries were less likely to buy a drink if the carbon tax rate was high and it was important to them [Tax(Coded) × RankTax]. They may place more importance to the carbon tax than for The Americas. The coded carbon tax rate by itself was not significant for The Americas while it was significant for Oceania.

3. Those with higher incomes are willing to pay the carbon tax for Oceania
The dollar amount of the carbon tax and income was significant for respondents with Oceanian ancestries [Tax($) × Income]. This was not significant for The Americas. Respondents with Oceanian ancestries may be willing to buy carbon intensive products as they can afford to pay the carbon tax.

Results for Ecologically Responsive Consumers

Table 8 shows the results for these respondents. Respondents with ancestries from Africa, Europe and The Middle East showed ECCB10R scores were significant. Results for Europe were only shown in the conference as it had more respondents and because of time constraints. Below are the significant results.

1. Importance of product attributes was not significant for Africa
Current environmental behavior and the belief they can make a difference motivated respondents with African ancestries. Environmentally friendly consumers will choose drinks that have a high carbon tax and a container deposit [Newrate × ECCB10R]. Respondents who believes they can make a difference to the environment will buy a drink with a deposit even this had a small share of the price [Deposit(%) × PCE].

2. The deposit was more important for those with Middle Eastern ancestries
Environmentally friendly consumers are less likely to buy drinks with high carbon taxes with a container deposit. Scale variables did not influence importance placed on the carbon tax and container deposit. The carbon tax was not significant by itself.

3. The carbon tax was more important for those with European ancestries

Those with European ancestries showed the more environmentally friendly they are, the more likely they will put importance on the carbon tax [RankTax × ECCB10R]. This does not mean that they are willing to pay more tax. They are not willing to pay for drinks with higher carbon taxes. These seemingly conflicting results show that these respondents are attentive to the carbon tax.

4. Respondents with European ancestries considered the pack size of the drink

Respondents who had European ancestries paid attention to the drink's size [Size × Age(Coded)]. Younger respondents are more likely to choose a drink that is larger. Older respondents are more likely to choose smaller sized drinks.

Table 8 - Results for Ecologically Responsive Consumers

	Africa	**Europe**	**Middle East**
Volume (ml)	0.00533** (0.00226)	0.00923*** (0.00065)	
Tax(Coded)		-.87668*** (0.08511)	
Price with GST	-0.91752*** (0.28088)	-1.47286*** (0.08351)	-0.18903*** (0.03902)
Deposit - (Coded)		8.00425*** (2.40691)	0.63202*** (0.18114)
Newrate × ECCB10R[14]	-0.11216** (0.05000)		-0.06217** (0.02640)
Size × Newrate		-0.07376* (0.03845)	
Size × Age(Coded)		-0.02171*** (0.00681)	
Tax(Coded) × RankTax		-0.46932*** (0.08735)	-0.32385* (0.17173)
RankTax × ECCB10R		0.00139** (0.00069)	
Tax($) × Income	0.25068** (0.11879)		
Deposit(%) × RankDeposit			0.57050*** (0.20263)
Deposit(%) × PCE	2.67719* (1.38400)		
Threshold – Mu(1)	0.38366*** (0.09696)	0.25916*** (0.02255)	0.65120*** (0.11024)
Threshold – Mu(2)	1.93445*** (0.25336)	1.69755*** (0.06327)	1.65184*** (0.19670)
Log-likelihood	-180.2606	-2266.68436	-240.62391
Restricted Log-likelihood	-193.43729	-2546.41191	-252.24505
Chi-Square, Degrees of Freedom	26.35337, 4	559.45509, 7	23.242270, 4
McFadden Pseudo R^2	0.0681186	0.1098516	0.0460708
Observations (N), Variables (K)	N=201, K=7	N=2743, K=10	N=252, K=7
Information Criteria AIC, AIC/N	374.50, 1.863	4553.40, 1.66	495.20, 1.965
*** P-value <= 0.01; ** P-value > 0.01 & <= 0.05, * P-value > 0.05 & <= 0.10			

Results for Multi-Attribute Responsive Consumers

Respondents with Asian ancestry considered more attributes and different attitudes and current behavior influenced their choice. The presentation mentioned a few because of time constraints. Table 9 shows the results for these respondents.

1. The belief in making a difference influenced their response to the deposit
Respondents with Asian ancestry show that those who believed that their actions helps the environment will buy drinks with a deposit [Deposit(%) × PCE]. The more important the container deposit, the more likely they will choose a drink that had one even if its share of the price was small [Deposit(%) × RankDeposit]. The deposit by itself was significant.

Table 9 - Results for Multi-Attribute sensitive consumers

	Asia
Volume (ml)	0.00449** (0.00064)
Price with GST	-0.85100*** (0.07877)
Deposit - (Coded)	17.0595** (6.8694)
Newrate	-0.62747*** (0.05268)
Size × Newrate	-0.08440** (0.04030)
Size × Age(Coded)	-0.01486* (0.00779)
Tax(Coded) × RankTax	-0.41144*** (0.07313)
RankTax × ECCB	0.00127** (0.00063)
Tax($) × Income	0.06795** (0.03242)
Deposit(%) × RankDeposit	9.34677*** (3.17750)
Deposit(%) × PCE	2.05285** (1.01141)
Price × RankPrice	-0.03472** (0.01425)
Threshold – Mu(1)	0.43069*** (0.02949)
Threshold – Mu(2)	1.60144*** (0.00063)
Log-likelihood	-2231.01154
Restricted Log-likelihood	-2431.23248
Chi-Square, Degrees of Freedom	400.44187, 11
McFadden Pseudo R^2	0.0823537
No. of Observations (N) & Variables (K)	N = 2605, K = 14

Information Criteria AIC, AIC/N	4490.000, 1.724
*** P-value <= 0.01; ** P-value > 0.01 & <= 0.05, * P-value > 0.05 & <= 0.10	

2. Respondents with Asian ancestry placed importance on more attribute
Compared with others, respondents with Asian ancestries placed importance on price, carbon tax and deposit. The large proportion of respondents with Asian ancestries in the sample and the diverse cultures in this region may have contributed to this result.

3. The carbon tax is not significant by itself
Respondents to whom the carbon tax is important are less likely to buy drinks that had one [Tax(Coded) × RankTax]. Respondents with Asian ancestry are attentive towards the carbon tax. Those who are more environmentally friendly also saw the tax as important [RankTax × ECCB]. Those with higher incomes are willing to pay the carbon tax [Tax($) × Income]. They may continue to buy carbon intensive products if they can afford to pay the carbon tax.

4. The combined effects of the carbon tax and container deposit was significant
Respondents with Asian ancestry were less likely to purchase a drink with a high carbon tax and deposit.

Accuracy of the ordered logistic models

Table 10 shows the accuracy of all the models. This table shows the models correctly classified 67% to 70% of the drinks as chosen or not chosen by the respondents. The models were not good at predicting which drinks the respondents will buy. The models did not classify any drinks in glass bottles correctly. The models predicted less than 6% of drinks in PET (plastic) and less than 11% in cans as chosen or not chosen.

Table 10 - Accuracy of the different Ordered Logistic models

	Overall	**Glass Bottle**	**Plastic Bottle**	**Aluminium Can**
Entire Sample	69.53%	0.00%	0.46%	10.18%
Africa	67.66%	0.00%	0.06%	0.00%
The Americas	67.74%	0.00%	0.00%	0.00%
Asia	70.21%	0.00%	0.00%	10.40%
Europe	68.47%	0.00%	5.93%	9.22%
Middle East	67.06%	0.00%	0.00%	4.17%
Oceania	69.51%	0.00%	0.00%	0.03%

Differences on ecological behavior

Table 11 shows the significant variables for the regression of ECCB10. Respondents with ancestries from Africa, Asia, Europe, and the Middle East. This was a common variable for their models. The predicted values, ECCB10R was used in the ordered logit model.

The table shows environmental awareness (NEP) and beliefs in their own actions (PCE) were significant for all respondents except those with Middle Eastern ancestries. Marital status, sexual orientation and points given to people of the same

heritage show people immediately close to them are influential. These variables were significant for respondents with African and European ancestry. The table shows that people who may not be immediately close to them also influenced respondents with Middle Eastern ancestries.

Conclusion

Culture influences how individuals decide. Their values and people around them can influence their environmental behavior. Priorities differed across cultural groups as shown by the differences in the product attributes used. The models cannot correctly predict the drink a respondent will choose although it was good at predicting what they wouldn't choose.

Table 11 - Results of the regression for ECCB10

Points[16] given to:	**Africa**	**Asia**	**Europe**	**Middle East**
•Marital Status	-1.34895*** (0.04822)			
•Sexual Orientation			0.03505*** (0.00390)	
• People of Same Heritage			-0.11812*** (0.00510)	-4.65764*** (0.03448)
• People of Different Heritage				0.01601*** (0.00466)
Years Lived[17] × Points given to living in Australia				-0.00595** (0.00262)
Residuals of NEP[18]	-0.00100 (0.028787)	1.97386*** (0.01233)	2.20125*** (0.01312)	0.00025 (0.01475)
Residual of PCE[18]	-0.49260 (0.03148)	1.97070*** (0.01162)	2.12347*** (0.01208)	-0.00546 (0.01653)
No. of Observations	3993	47190	52272	5082
F-Statistic	261.65	15064.12	8123.72	4854.24
(df1,df2)	(3, 3990)	(2, 47188)	(4, 52268)	(5, 5077)
R^2	0.1644	0.3897	0.3834	0.8270
Adjusted R2	0.1638	0.3896	0.3833	0.8268
Root MSE	4.7500	4.2761	4.3464	2.1223
*** P-value <= 0.01; ** P-value > 0.01 & <= 0.05, * P-value > 0.05 & <= 0.10				

Future research would benefit from the following:

1. Use responses reflecting the decision-making process as primary variables

Literature in discrete choice experiments states analysts need to use answers about their decision-making if none of the attributes were statistically significant (Hensher, 2005). In this study, ranks or importance placed on the carbon tax, container deposit and price should not be the main variables. The results showed that this should not be the case. Different cultures will have different values. Individuals from different cultures will have different priorities.

2. Increase representation of different cultures

The sample represented respondents with Asian and European ancestries well. This was not the case for those with ancestries from represented in the sample. This was not the case for respondents with African and Middle Eastern countries.

3. Change the orientation of the models

The estimated models were aimed at predicting which drinks the respondents are likely to choose. However, they were better at predicting the drinks that will **not be chosen,** regardless of their pack type. Future researchers should gear their models at predicting the likelihood of rejecting a drink. This will be helpful for policy analyst to determine which attributes need to be changed to discourage consumers from buying carbon intensive products.

Footnotes

1. Australian Bureau of Statsistics (www.abs.gov.au)
2. The sales tax in Australia is called the GST (Goods and Services Tax). It is currently at 10%. To obtain the dollar amount, the shelf price is divided by 11.
3. Department of Environment, Climate Change and Water NSW (http://www.environment.nsw.gov.au)
4. NLOGIT is a statistical software used for but not limited to Discrete Choice Modelling (www.limdep.com/products/nlogit/)
5. The carbon tax rate was coded as follows: -1(0%), 0(10%), +1(25%)
6. The container deposit was coded as follows: -1($0.00), +1($0.10)
7. The Newrate is meant to capture the combined effects of the carbon tax and container deposit. The variable was calculated as below. The symbol $ indicates that the actual dollar amount was used
8. $$Newrate = \frac{(Carbon\ Tax(\$) + Container\ Deposit\ (\$)) - (Sales\ Tax\ or\ GST(\$))}{(Sales\ Tax\ or\ GST\ (\$))}$$
9. The drink's size was coded as follows: -1(Small), +1(Large)
10. The age was recoded as discussed in the Methodology. Those aged 18 were coded as -11 and those aged 40 coded as +11. The codes for the other ages was obtained by adding 1 to the code of the previous age.
11. The relative rank of an attribute can be estimated as below where A is the number of attributes used and S is the rank given where 1 is the most important attribute to the respondent.
$$RelativeRank = 1 - \left\lceil (S-1) \times \frac{1}{A} \right\rceil$$
12. The dollar amount of the carbon tax was calculated as below where the shelf price is the price where only the sales tax (GST) was present.
$$Tax(\$) = Carbon\ Tax\ Rate\ (\%) \times Price\ with\ sales\ tax\ or\ GST\ (\$)$$
13. The income categories used was recoded. The lowest income category received a code of -5 and the highest +5. The code of the other categories were obtained by adding 1 to the code of the income level lower than itself.
14. The deposit was expressed as the share of the price shown to the respondent.
15. Instead of using the coded value of the container deposit for Americas, its share of the price shown was used.
16. The forecasted values of ECCB10 was used to produce ECCB10R. The regression models used is shown on Table 11.
17. The variables listed are the points that the respondent gave to that item when they were asked to allocate points across items that best describe who they are today.
18. This is the number of years the respondent has lived in Australia. If they were born in the country, their age was used.
19. The scale variable NEP was highly correlated with ECCB. It could be used as an independent in a regression. A separate regression for the NEP was estimated retaining statistically significant variables. The residuals were then used instead of the NEP score to forecast the values ECCB10R. The same applied to the PCE scale variable.

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