Carbon Pricing: Factors that Influence Behavioural Intention for a Greener Future

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1. Introduction

By 2019 the Canadian Federal Government is implementing a new initiative, called Economy-wide Carbon Pricing (Government of Canada, 2016). A carbon-pricing scheme, which is often referred to as a carbon tax, is a fee charged to consumers for creating carbon emissions (Schneider and Goulder 1997). This public policy intends to reduce carbon usage and in hand greenhouse gases (Schneider and Goulder 1997). Experts refer to taxing carbon as the most effective and least invasive means of emissions reduction (Schneider and Goulder 1997). The price level is set to reflect the social cost of climate damage caused by carbon usage (Schneider and Goulder 1997). The higher the price is set, the greater incentive it is for consumers to choose more environmentally friendly options (Schneider and Goulder 1997). An increase in demand for sustainable options is also expected to increase research and innovation (Schneider and Goulder 1997).

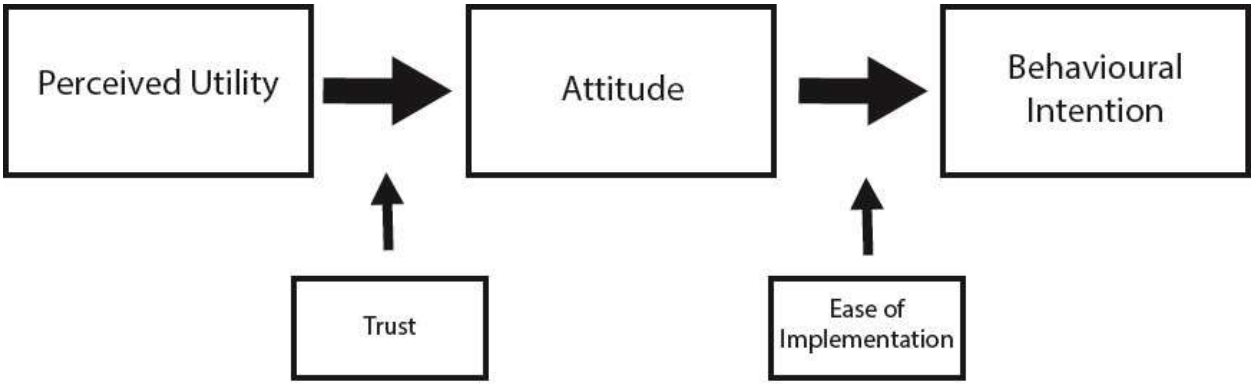
The Government of Canada website stated "Economy-wide carbon pricing is the most efficient way to reduce emissions, and by pricing pollution, will drive innovative solutions to provide low-carbon choices for consumers and businesses." (Government of Canada 2016). This being said, a nation-wide carbon tax is set to be implemented by the end of 2018 under Liberal leader Justin Trudeau. This is a result of the 2015 Paris Agreement (Dimitrov 2018). This was the first global accord on climate change that required all countries to make commitments on their reduction efforts (Dimitrov 2018). Canada now is under legal obligation to reduce emissions by 30% below 2005 levels by 2030 (Dimitrov 2018). Canada plans on accomplishing this by setting an initial price on carbon at $10/tonne rising to $50/tonne by 2022 (Dimitrov 2018).

This tends to be a controversial topic among Canadian citizens. A study had identified five general reasons for the rejection of this public policy; personal costs perceived as too high, policy can be regressive (not fairly distributed among low- and high-income earners), may cause damage to the economy, perceived as ineffective at discouraging carbon intensive behavior, and distrust in government intentions (Carattini, Carvalho and Fankhauser 2018). Although some of these variables have been proven to be incorrect, the perception still acts as a barrier for attitude and adoption (Carattini, Carvalho and Fankhauser 2018). Some of these variables tends to make consumers feel threatened and therefore create passionate views towards the policy. It appears as though these challenges are greater than expected (Borenstein and Charlton 2018). When president, Emmanuel Macron, increased fuel taxes in December 2018, in an attempt to reduce carbon usage, the country was faced with one of the worst protests in decades (Borenstein and Charlton 2018).

Individual stance is very important in regard to the carbon tax. There are multiple reasons for this; in order for a new public policy to be implemented, there needs to be a general pubic acceptance, and for a tax on externalities to be effective, consumers must undergo the intended behavioural change (the transition to more sustainable actions). Regardless of personal opinions, there is a scientifically proven need for climate action of some sort.
There are many variables which must be addressed in order to implement a carbon pricing scheme that effectively decreases carbon emissions and therefore plays a role in halting global

warming. The purpose of this research is to understand a variable that has yet to be thoroughly investigated, behaviour. Due to the restrictions of this study, we will be researching behavioural intention in place of behaviour itself. Previous studies have effectively connected behavioural intention with actual behaviour (Davis 1986). More specifically, we will look at factors which will increase the general publics' intention to adopt behaviours that will reduce greenhouse emissions, the true underlying goal of the carbon tax. Without eliciting behavioural change (to more sustainable options) carbon pricing is rendered ineffective.

Based on the technology acceptance model (TAM), we have proposed an attitudinal model toward the carbon tax in order to understand the pathway to behavioural decisions regarding a carbon tax. Four hypotheses will be proposed below in order to test each pathway. Each pathway is expected to be equally impactful. If any relationship is disproven, or if any variable is not correctly manipulated, it is expected that there will be a disruption in the behaviour change. In other terms, if any of the following (high perceived utility, high trust, positive attitude, high ease of implementation) are not maintained, it is unlikely that the individual will intend to change their behavioural to a more sustainable option, making the tax ineffective (unable to achieve its stated and intended purpose). The model will be explained further in later sections, and empirically tested through a public opinion survey.



2. Literature Review

2.1 Factors that Influence Consumers Attitudes

Attitude formation can be a complex process. There are many variables that influence whether someone attributes positive or negative feelings with someone or something. Establishing a positive attitude plays an important role in many aspects of human behaviour (Davis 1986). When someone establishes their attitude towards someone/something they are likely to act (or intend to act) in a way that is consistent with said attitude (Davis 1986). This is vital in regards to carbon pricing. It is expected that if someone has a positive attitude toward C02 pricing, they will be more likely to act in a more environmentally friendly way, making the tax effective. This reinforces the importance of attitude formation. Although many different variables play a role in attitude formation, in this context it is expected that perceived utility will play a vital role. Perceived usefulness is referring to whether an individual believes that a carbon pricing scheme is useful in society. Typically, being useful in society indicates that they believe that the scheme will actually decrease C02 emissions. This being said, if consumers believe a carbon pricing scheme is useful, they are more likely to have a positive attitude towards it.

Perceived utility is dissected from the Technology Acceptance Model (TAM), which has a large impact on this research. Fred Davis used both the Theory of Reasoned Action (TRA) by Fishbein and Ajzen, and the Theory of Planned Behaviour (TPB) by Ajzen as a basis for the TAM (Davis 1986). From these models, he was able to create a system to explain and predict the acceptance of new technology (TAM) (Davis 1986). This system stated that perceived usefulness and perceived ease of use, influence individuals' attitudes towards use, which leads to behavioural intention to use, and in turn, the actual use of new technology (Davis 1986).

The variables dissected from this model which were used towards the formation of H1 include: perceived utility and attitude formation. Within the TAM, it is stated that perceived utility has a direct effect on individuals' attitudes towards an information system (Szajna 1996). In the context of technology, perceived utility is referring to an individuals' belief that adopting the system would improve their work performance (Davis 1986). This variable is what influences attitude formation towards the information technology system (Davis 1986).

Translating this into the context of the carbon tax, it predicted that if individuals perceived that a carbon pricing scheme would benefit society, they will have a positive attitude towards it. In contrast, if an individual does not believe that carbon pricing will have a positive impact on society, they will form a negative attitude towards the Pigouvian tax.

Multiple academic sources confirm this relationship between perceived usefulness and attitude. In the context of technology usage for salespersons, it was concluded that if a salesperson believes that new technology will enhance their ability to increase sales, they are more likely to have a positive attitude towards it (Robinson, Marshall and Stamps 2005).

Research was also completed in order to understand user response to social media advertising (Lin and Kim 2016). This research once again confirmed a positive relationship. In this instance it was stated that if individuals perceive Facebook advertising as useful, it is likely that they will have a positive attitude towards Facebook advertising as a whole (Lin and Kim 2016). This confirms the relevance of the TAM model in diverse contexts.

In addition, this relationship has already been proven in regard to carbon pricing. Barzanzini and Carattini stated "perceived environmental ineffectiveness is one of the main barriers to the acceptability of carbon taxes." (Baranzini and Carattini 2017) This was concluded after a survey was done to understand how various variables affect attitude formation towards a carbon tax (Baranzini and Carattini 2017). Philippe Thalmann had also concluded that individuals' perceived environmental effectiveness is positively correlated with support for carbon pricing, and in turn, is consistent with their voting behaviour (Thalmann 2004). Not only is there an obvious connection between these variables, we can also see the importance of the connection by the following research by Baranzini and Carattini. Their research had stated that "The European experience of environmental taxation and in particular of the (planned) environmental tax reform indicates that a considerable level of popularity is a requirement for implementation in virtually all contexts." (Baranzini and Carattini 2017).

Based on the findings from previous literature, we hypothesize that if consumers believe that carbon pricing will decrease emissions in Canada, they will be more likely to have a positive attitude towards it.

From this we have formulated the following hypothesis:

Hypothesis 1: Perceived utility will have a positive influence on attitude.

2.2 The Role of Trust in Attitudes

Previous literature not only highlights the importance of attitude in regard to carbon pricing, but it also indicates a key issue; trust. Greenberg has coined the following definition of trust "believing that a person(s) or organization(s) can be relied upon to accomplish objectives because they are competent and possesses values and intentions" (Greenberg 2014). Consumers often are skeptical of the government's role and intention of C02 pricing. This skepticism is often related to the revenue that is raised, how it will be used and if this is the best alternative for reducing environmental impact. Although this variable has been isolated on various occasions, the exact role it will play is unclear. It is intended for our study to determine this.

Previous research, unrelated to the carbon tax, has indicated that there is a relationship between trust and attitude formation, as well as trust and perceived usefulness. This has been proven in many forms, including: general trust, societal trust, trust in government etc. This relationship has helped to predict the impact that trust would have in the context of carbon pricing. It is expected that trust will strengthen the relationship formulated in hypothesis one (perceived usefulness and attitude). Trust strengthening attitude is quite important, as it would have an impact on the end goal; behavioural intention.

Trust is expected to play a moderating role in perceived usefulness and attitude. A moderator is a third variable that effects the relationship between two variables (Baron and Kenny 1986). This can be through strengthening or weakening the correlation (Baron and Kenny 1986). The third variable, trust, is expected to play an important role in strengthening the relationship. This is due to the fact that if one believes a carbon tax is useful, but does not trust that the government will implement it in an appropriate manner, they still will not have a positive attitude.

Very diverse research has been carried out regarding trust. Three different studies, investigating different contexts (organic food market, online retail and food safety) and different forms of trust (trust in labeling, cultural trust, supplier and industry level trust and general trust) all found similar results; high trust created a positive attitude, and in turn increased buying intention (Nuttavuthistit and Thogersen 2017) (Bianchi and Andrews 2011) (Weiping 2013).

A link was also established between trust and perceived usefulness. In a study to understand what influences students to adopt information from Wikipedia, it was found that if students trust Wikipedia, and the information it provides, they are more likely to perceive the information as useful (Shen, Cheung and Lee 2013). This proves a connection between the three variables within our model, perceived utility, attitude and trust.

The wide variety of applications of trust seem to create the same valuable result, that trust is a strong and significant motivator in consumer behaviour. This proves the relevance of the variable and its flexibility.

More specifically to this research, trust has been investigated regarding environmental taxation. Harring and Jagers reviewed trust's relationship with carbon pricing from different facets

(Harring and Jagers 2013). There were three significant findings from this: the more political trust one has, the more likely they are to be supportive of an increase in C02 tax; the more general trust one has in other people, the more likely they are to support a tax increase; and finally; the more trust one has that others will act in an environmentally friendly way, the less supportive they are of a tax increase (Harring and Jagers 2013). This paper also outlined two different contexts of political trust; trust that politicians are competent in combating climate change and trust that political institutions will earmark revenues in an appropriate manner (Harring and Jagers 2013).

The domain of political trust is typically the focus when investigating environmental taxes. A study comparing multiple taxes in order to understand attitudes towards tax levels found corrective taxes to be especially reliant on political trust (Hammer, Jaggers and Nordblom 2008). Further research had reconfirmed this, finding that general trust was not statistically significant in regard to carbon tax, and that only political trust was (Hammar and Jagers 2011). It was stated that "This is consistent with the following logic: if I am inclined to trust politicians, I probably also trust the policies that the politicians decide upon and implement."(Hammar and Jagers 2011) Another source also made the following statement "The variable – trust in government – appears to be one of the most important predictors of support, with support increasing monotonically with increases in trust." (Kallbekken and Saelen 2011).

Although the positive impact of high trust was discussed, it is equally important to understand the negative consequences of low trust in regard to emission taxation. Kallbekken and Saelen stated "One important reason for public opposition to environmental taxes is that the public does not seem to understand – or trust – the main rationale for Pigouvian taxes." (Kallbekken and Saelen 2011). Another study added to this, as they found that individuals who distrust politicians are more likely to advocate for reduced C02 taxes (Hammer, Jagers and Nordblom 2008). This is explained by a lack of confidence (distrust) in politicians ability to set effective Pigouvian tax levels (Hammar, Jagers, and Nordblom 2008) This being said, if individuals do not trust politicians, they are more likely to have a negative attitude towards a C02 tax, decreasing the likelihood of it being implemented, or the likelihood of people changing their behaviour to a more environmentally friendly alternative.

This relationship between perceived utility, attitude and trust shown above, inspired the creation of the second hypothesis. This being said, it is believed that if people trust that a carbon tax is being implemented in good interest, they will believe a carbon tax is more useful and are more likely to have a positive attitude towards it.

Hypothesis 2: Trust will strengthen the relationship between perceived utility and attitude.

2.3 Attitudes Impact on Behavioural Intention

Consumer behaviour is a very complexed field. In order to impact a consumers' end behaviour, behavioural intention must be considered. Behavioural intention is referring to the probability that a consumer will perform a specified behaviour (Ajzen 1991). The variable, behavioural intention, is often manipulated, instead of actual behaviour. This is due to the difficulty of studying and recording information on actual behaviour. The variable, behavioural intention, tends to be considered useful as a direct relationship with actual behaviour, has been proven (Ajzen 1991). Although there are many variables that could influence behavioural intention, attitude is considered to be one of the most influential variables (Ajzen 1991). Simply put, this is due to the fact that if a consumer holds negative feelings toward an activity, it is unlikely they will voluntarily intend to partake in it. In terms of carbon pricing, if a consumer does not like carbon pricing and does not support the implementation of it, it is unlikely that they will intend to change their behaviour in a way that will promote it. Carbon pricings' goal is to decrease the level of carbon emissions throughout Canada by taxing negative actions. To achieve this, the population must change to more environmentally friendly behaviours. For example, gasoline is taxed which therefore makes driving car more expensive and unattractive, in order to avoid this expense, people would need to choose an alternative like biking, busing, car pooling etc. If people have a negative attitude towards carbon tax, they are more likely to choose not to change their behaviour and instead incur the extra expense. In order to effectively influence people to act upon the desired behavioural change, they must have a positive attitude towards the tax. The relationship between attitude and behavioural intention is key to the success of carbon pricing.

The Theory of Reasoned Action by Fishbein & Ajzen, evaluates what influences behaviour. This theory concludes that attitude and subjective norms independently influence behavioural intentions, which in turn influence the actual behaviour of an individual. Attitude is defined by an individual's evaluation of the behaviour, that is, if they are in favor or opposed to the behaviour (Ajzen 1991). Subjective norm is referring to the social influence from people whom they perceive as important (Ajzen 1991). An individual or combination of these variables may have a significant and positive relationship with behavioural intention. In order to understand what influences behaviour, one must understand what determines attitude, which is hypothesized above (Ajzen 1991) (Trafimow 2009).

Additional research has been done in order to reconfirm the relationship that TRA originally introduced. A study was completed in order to understand green informational technology acceptance (Mishra, Akman and Mishra 2014). TRA was applied and it concluded that attitude towards behaviour determined behavioural intention and in turn the actual adoption of the green information technology (Mishra, Akman and Mishra 2014). Another study had found that adolescent's attitude towards smoking significantly predicted their behavioural intention towards smoking, which they had concluded is consistent with TRA (Guo, et al. 2007). Attitude continues to prevail as the most important predictor of behavioural intention regarding the Theory of Reasoned Action. Studies by (Mishra, Akman and Mishra 2014), (Vallerand, et al. 1992) confirmed this.

It appears that there is very little, to no research investigating this relationship in the context of carbon taxation, inferring a gap in literature. As actual behaviour is vital to the success of Pigouvian taxes, this remains an important relationship to understand. Carbon emissions are caused by human activity, once again inferring that the key variable in a sustainable future is behavioural change (McKenzie-Mohr 2000). Typically, environmental projects are designed focusing on one of two variables, in order to entice behavioural change: education and cost (McKenzie-Mohr 2000). These two perspectives have been discredited in multiple instances (McKenzie-Mohr 2000). This being said, other variables must be investigated in order to influence behavioural change. For the scope of this study, behavioural intention will be studied, instead of actual behaviour. Although actual behaviour is vital, it is costly and time consuming to measure.

It is expected that if people attribute positive feelings to the carbon pricing scheme, they will also intend to act in a more environmentally conscious way.

This has led to the creation of hypothesis 3: *Attitude will have a strong influence on behaviour intention.*

2.4 Ease of Implementations Impact on Attitude and Behavioural Intention

The attitude-behaviour relationship mentioned above can be complicated at times. Some studies have proven that attitudes and intentions are not the sole influence on behaviour (Arbuthnott 2008). In order to reinforce this, Arbuthnott stated "we do not always do what we wish or say we will do." (Arbuthnott 2008). Although it is complicated to influence behaviour, it is believed that making environmentally sustainable behaviour easier, or more rewarding, could be effective (Arbuthnott 2008). This can be accomplished through improved infrastructure, regulations and incentives (Arbuthnott 2008). This is referring to ease of implementation. Ease of implementation can be described as how easy it is for a consumer to choose (implement) a more environmentally friendly option, in place of their current behaviour. In even simpler terms, how easily someone can change their own behaviour.

Ease of implementation was directly dissected from the technology acceptance model (Davis 1986). TAM was originally created with inspiration from the theory of reasoned action (Davis 1986). Theory of reasoned action states that a mixture of three variables (perceived behavioural control, subjective norm, attitude), influence intention and in turn, behaviour (Ajzen 1991). Perceived behavioural control is the variable that was translated into ease of implementation. Perceived behavioural control is referring to whether consumers believe they have the resources, capabilities, and convenience to carryout an action (Ajzen 1991). The reasoning behind perceived behavioural control, over true behavioural control, is that one may not fully understand how easy/hard an activity is to complete (Ajzen 1991). If someone perceives an action as very difficult or inconvenient to carryout, they are less likely to attempt it, regardless of its true difficulty (Ajzen 1991). This reasoning was translated to the TAM, in the form of ease of implementation, which was the inspiration for this projects' model. In the original TAM paper, perceived ease of use (perceived ease of implementation) was defined as the degree of effort that an individual believes they will have to undergo when partaking in an activity (Davis 1986). It was found that perceived ease of use, both directly and indirectly, effects behavioural intention and in turn, actual behaviour.

The relationship between attitude and ease of implementation has also been established. In a study on the usage of electric cars, it was found that if individuals perceived that the car is easy to use and easy to drive, that they will have positive feelings towards electric cars (Moons and Pelsmacker 2015). It was also found that if individuals believe that it would difficult to find a place to charge their car, that they will have a strong negative attitude towards electric cars (Moons and Pelsmacker 2015). This is directly related to this carbon tax research, as electric cars are one of the alternatives often discussed as a way to decrease carbon usage. This reconfirms that if individuals believe that it will be easy to implement more sustainable options, that their attitude towards a carbon tax will increase.

Multiple studies within the environmental field have investigated the relationship between ease of implementation and behavioural intention. A study on the use of urban green space concluded that consumers who perceived that they are able to use urban green spaces with ease, will be more likely to intend to do so; showing a significant relationship between ease of implementation

and behavioural intention (Wan and Shen 2015). This relationship was once again confirmed regarding construction waste reduction behaviour (Li, et al. 2018).

This relationship has not been tested in the context of carbon pricing, inferring the gap in literature, but from the evidence provided, it is believed that it will transfer. In this context it is expected that if individuals believe that a carbon pricing scheme will be easy to implement, they will have an increased positive attitude towards it. For example, if an individual believes that it would be easy to take the bus to work instead of driving, they are more likely to like the idea of carbon pricing. Additionally, the individual would also be more likely to intend to take the bus.

From this evidence we have created *hypothesis 4: Ease of implementation will strengthen the relationship between attitude and behaviour change.*

3. Methodology

In order to carry out this research, a questionnaire-based survey was conducted online. This was done in cooperation with the Social Sciences Research Laboratories (SSRL).

3.1 Survey Method

After several considerations, an online questionnaire-based survey was decided upon. The survey is qualitative in order to gain a general understanding of the average Saskatchewan resident. In regard to this specific study, it is more important to gain a general understanding than to research specific individuals, this is due to the fact that public policies effect all citizens, not just a segregated group. This being said, an online-based survey was the best alternative to gather information from a large number of respondents in an efficient manner, in terms of cost and time. An online survey also allowed for confidentiality and limited geographical biases. There are also potential limitations to using an online-based survey. For example, respondents may be limited to those who have a compatible device and internet access. There is also a risk of those who have personal stakes in a carbon tax to be more willing to participate in the survey. This creates a risk that respondents may not accurately represent Saskatchewan residents. Considering all constraints and risks, the limitations stated were deemed acceptable.

3.1.1 Power and Sample Size

Statistical power is referring to the likelihood of a study determining an effect when one is present. A perfect level of statistical power has not been established. It is suggested that 0.8 is acceptable in most instances (Heston and King 2017). This value balances accuracy while avoiding wasting resources.

In order to estimate a reasonable sample size, we used an A-priori Sample Size Calculator (Soper, 2019), which can be accessed at https://www.danielsoper.com/statcalc/calculator.aspx?id=1 . This calculator takes into consideration multiple variables including: number of predictors, anticipated effect size, statistical power and probability level. The number of predictors was set at 9 (including control variables), effect size 0.15 (medium), statistical power 0.8 (as discussed above) and a probability level of 0.05. The minimum required sample size was 113 according to this algorithm. A sample size of 120 was chosen in order to allow for variations (discontinuation of participation etc.). Said sample will not have demographic quotas. The only characteristics that must be met is being a Saskatchewan resident above the age of 18.

3.1.2 Procedure

We will send out an invitation to their participant pool with the goal of 120 completed surveys. A link to the survey will be included in the email. From this link they will be presented with general information associated with the study. This will include the nature and purpose of the study, the researchers, vendors, contact information for the principal investigator (Dr. Zhang), as well as information about anonymity, confidentiality and data storage procedures. Instructions for the completion of the questionnaire will also be communicated at this time. Following this,

the terms of consent, and what that means, will be identified. Participants will then be asked to click the “I agree” button if they wish to continue and give their informed consent for the completion of the questionnaire.

3.2 Measures

The theoretical models used to formulate the hypotheses in this study were developed from the following well-practiced models: Theory of Reasoned Action, Theory of Planned Behaviour, Technology Acceptance Model. The vast majority of variables used in the model have been thoroughly investigated in previous studies. Survey questions were adopted from said studies and modified in order to reflect our hypotheses. The questions fall within eight categories including usefulness, trust, attitude, behaviour intention, ease of implementation, earmarking, current environmental efforts and demographics. Within these eight categories there are 48 questions in total.

In order to understand consumers stance on perceived utility, they were indirectly asked to rate related statements. Questions were modified from the study by Baranzini and Stefano (2017), as well as the study by Bolsen, Leeper and Shapiro (2014).Two examples of these nine statements include “This initiative would lead to a reduction of energy consumed by the Canadian population.” and “This initiative would lead to better air quality.” In order to ensure individuals are mentally engaged, both positive and negative frames are used.

Trust in government is indirectly tested in order to gain insight into whether consumers trust that the government will implement a carbon tax responsibly. In order to test this, previous survey questions were adapted from a study by Scholz, Jutz, and Heller (2011). Six statements were created, for example “Most of the time we can trust people in government to do what is right.” and “I believe Canadian government will use the revenue from this initiative responsibility.”

Attitude is investigated in order to understand how consumers feel about a carbon tax being implemented. Consumers are asked to indicate on a 5-point scale how they feel about the initiative using 3 measures (like to dislike, good to bad, and support to not support).

Consumer’s likelihood to change their behaviour is measured by indicating their willingness to partake in a list of actions. There are 7 actions listed including “Use a small or fuel-efficient car.” and “Change my eating habits to include food options with less environmental impacts.”. Participants who indicate they are ‘extremely willing’ with statements 1 – 7 show a strong likelihood to change their behaviour in the instance of a carbon tax. The actions were dissected from past literature by Wallace, Irvine, Wright, and Fleming (2010). Ease of implementation is measured by manipulating the same actions mentioned above (in the behavioural change section). In this question, they are asked to indicate how easy they believe it would be to implement the actions. The scale ranges from ‘extremely difficult’ to ‘extremely easy’.

A survey question on earmarking is also investigated in order to understand where consumers would like the revenues from a carbon tax to be allocated. A scale from 1-5 stating 'not important at all' to 'extremely important' was used to gather opinions on 6 different revenue areas. Examples of these areas include 'Funding environmental projects." and "Improve public transportation and other infrastructure." These action items were gathered from two sources, Wallace, Irvine, Wright, and Fleming (2010), as well as Baranzini, and Carattini (2017).

In order to gain a sense of consumers' past environmental efforts, 5 statements were created in which they can state on a scale from 1-5 if they 'strongly disagree' to 'strongly agree' with them. These statements range from "I have switched products for ecological reasons." to "I have tried very hard to reduce the amount of electricity I use." (Antil 1984).

To conclude the survey, extra demographic questions were included in order to understand if there were variations in answers among them. The demographics included were: gender, age, education level, and income level.

3.3 Data Analysis

Primarily, regression analysis was used for data analysis. The relationship between independent and dependent variables were tested. A procedure introduced by Baron and Kenny (1986) was used for the analysis when multiple variables were presented at once (ex. perceived usefulness, attitude and trust). In order to test the validity of the model a factor analysis was performed. This was used to check the dimensionality, reliability and discriminant validity of the measurement scales.

Both hypothesis 2 and 4 include moderation. This was a method coined by Baron and Kenny (1986). Moderation can be detected by adding interaction terms, which tests if the moderators also have a direct influence on the dependent variables. Significant regression coefficients of the interaction terms indicate that moderating relationships are considered to be significant. In order to test the effect of trust on the relationship between perceived utility and attitude, the interaction term "Perceived Utility X Attitude" was created and added to the model. This was also applied to the relationship between perceived ease of implementation, attitude and behavioural intention. In order to test this the term "Attitude X Behavioural Intention" was created to test the mentioned relationship.

3.4 Results

3.4.1 Descriptive Information

Participation included 92 females (52.6%), 82 males (46.9%) and one individual who chose not to disclose their gender (0.6%). The age of these participants were dispersed across many different categories, with 62, 55-65 year olds (35.4%) accounting for the largest percentage, and 66-75 year olds following with 36 individuals (20.6%). This was expected, as it was consistent with SSRL's participant pool. The vast majority also completed post secondary schooling, accounting for 109 people (62.3%). Income had a higher variation with more than $125,000

accounting for the largest percentage of people at 21.1%, $75,001-$100,000 followed accounting for 17.7% and the third largest income group was simply specified as 'retired', accounting for 16% of participants (See Table 1).

3.4.2. Construct Reliability (alpha)

For the construct of perceived utility, we recoded 'Choose Not to Answer' to missing and reversed coded negatively worded items. After this was completed, the reliability was tested. This resulted in an alpha of 0.949, which indicates good reliability. We then calculated the mean average of the 4 items to create composite index for the construct. This same process was repeated for the remaining 4 constructs, as shown in *Table 1* below. Every construct had a Cronbach's alpha of greater than 0.7 indicating good reliability apart from ease of implementation. This construct had an alpha of 0.681 (See Table 2).

3.4.3. Testing of hypothesized relationships

H1 predicted that perceived usefulness would strengthen attitude. In order to test this hypothesis, the following regression model (Model 1) was used:

Attitude = $\beta 1$ * Perceived Utility + error ……. Model 1

The result indicated that, as hypothesized, Perceived Utilities is a significant and strong predictor for Attitude (β=0.889, p=0.000). H1 was supported.

H2 predicted that, in addition to perceived utility, trust also plays a role. More specifically, we predicted that when trust is high, the relationship between perceived utility and attitude will be stronger. In order to test this hypothesis, we developed the following moderation model (Model 2) based on the protocol suggested by Baron and Kenny (1986). For the interaction term, we created the cross product of perceived usefulness and attitude.

Attitude = $\beta 1$ * Perceived Utility + $\beta 2$ * Trust + $\beta 3$ * (Perceived Utility Trust Interaction) + error … Model 2

The result indicated that, in this moderation model, perceived utility remains a strong and significant predictor for attitude ($\beta 1$=0.534, p=0.000), trust by itself is not a significant predictor ($\beta 2$=-0.038, p=0.723), and the interaction term between perceived utility and trust has an influence that is marginally significant ($\beta 3$=0.411, p=0.062). For the interaction term, although the p-value is 0.06, the standardized coefficient beta is positive, suggesting the same direction of influence as hypothesized, but the significance is marginal. Hence, we consider H2 as being marginally supported.

Table 1: Demographic information of the participants

Demographic Information		Number of People	Percentage
Gender			
	Female	92	52.6%
	Male	82	46.9%
	Prefer not to say	1	0.6%
Age			
	26-35	8	4.6%
	36-45	32	18.3%
	46-55	26	14.9%
	56-65	62	35.4%
	66-75	36	20.6%
	76 or above	10	5.7%
	Prefer not to say	1	0.6%
Highest level of education			
	Completed high school	24	13.7%
	Some post-secondary	40	22.9%
	Completed post-secondary	109	62.3%
	Prefer not to say	2	1.1%
Annual household income before tax			
	Under $25,000	7	4%
	$25,001-$50,000	19	10.9%
	50,001 - $75,000	22	12.6%
	75,001 - $100,000	31	17.7%
	101,000 - $125,000	18	10.3%
	More than $125,000	37	21.1%
	Retired	28	16%
	Prefer not to say	13	7.4%

Table 2: Reliability of major variables

Constructs	Cronbach Alpha
Perceived Usefulness	$\alpha = 0.949$
Trust	$\alpha = 0.854$
Attitude	$\alpha = 0.978$
Ease of Implementation	$\alpha = 0.681$
Behavioural Intention	$\alpha = 0.804$

H3 predicted that a positive attitude would lead to the intended behavioral change. We developed the following model (Model 3) to test this hypothesis.

Behavioural Intention = β1 * Attitude + error …….…… Model 3

This model had provided evidence that attitude is a strong and significant predictor for behavioural intention (β1=0.526, p=0.000). This being said, H3 is supported.

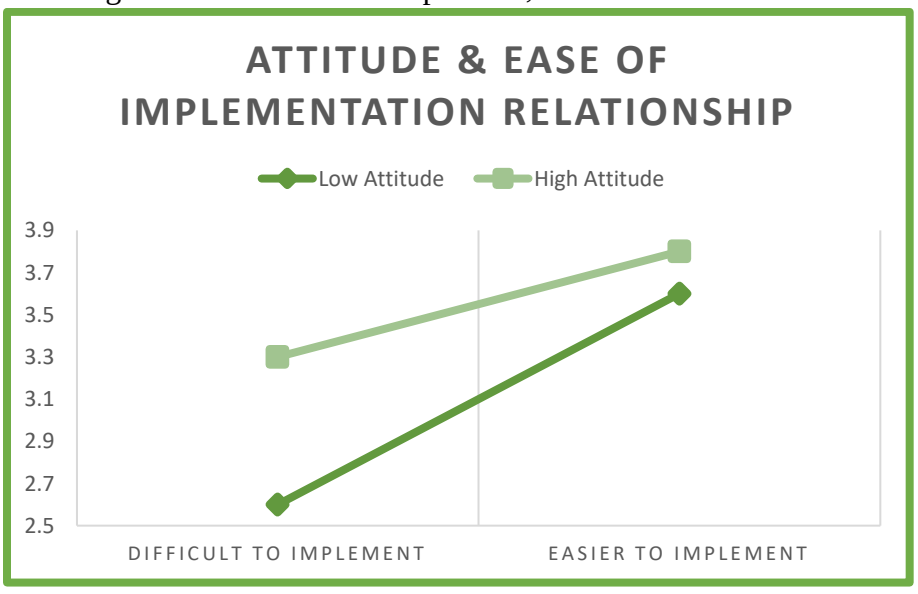
In addition to the attitude and behavioural intention relationship stated in H3, we created H4 in order to understand ease of implementations role as well. We predicted that when ease of implementation is high the relationship between attitude and behavioural intention will strengthen. In order to test this hypothesis, we created the moderation model below (model 4). This was created with inspiration from Baron and Kenny (1986). For the interaction term, we created a cross product of attitude and ease of implementation.

Behavioural Intention = β1 * Attitude + β2 * Ease of Implementation + B3 (Attitude Ease of Implementation Interaction) + error …… Model 4

The results indicate that within this moderation model, attitude is a strong and significant predictor of behavioural intention (β1=0.757, p=0.003). Ease of implementation also stands as a strong and significant predictor of behavioural intention (β2=0.693, p=0.000). The attitude/ease of implementation interaction shows a significant but negative correlation (β3=-0.587, p=0.034).

In order to better illustrate the negative effect of the interaction between attitude and ease of implementation, we conducted an ANOVA. The results, as depicted below, indicate that

a) Better attitude would lead to higher intention to adopt greener behaviors;
b) People are more likely to adopt green behaviors that are easy to do; and
c) For things that are difficult to implement, attitude matter more.



3.4.4 Additional analysis

Some additional analysis was done, as extra variables were included in the survey to further understand different influences on carbon pricing.

Demographics

A linear regression model was created in order to understand demographics influence on attitude. Information was collected on the participants gender, age, education, and income. The following model was used.

Attitude = β1 * gender + β2 * age + β3 education + β4* Income + error …….. Model 5

The model showed varying results: gender was insignificant (β1=0.005, p=0.950), age was considered significant (β2=0.195, p=0.009), education was proven moderate and significant (β3=0.247, p=0.001), and income was not significant (β4=-0.083, p=0.262). This shows both age and education play a role in attitude formation in regard to carbon pricing. More specifically, it seems that older people and people that are more educated tend to have more positive attitude toward the Carbon Tax.

Previous Environmental Efforts

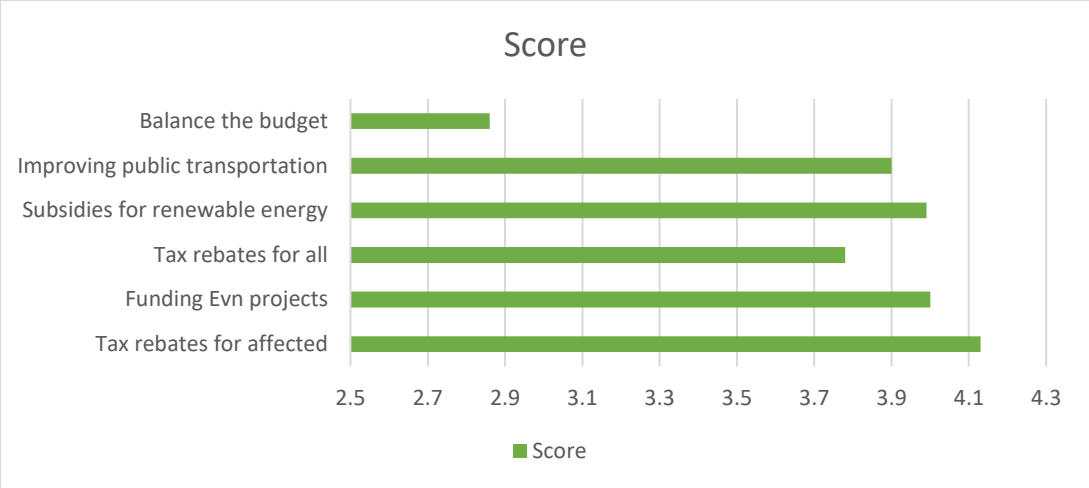
The survey collected information on participants previous environmental efforts. As apart of the additional analysis, we analyzed if attitude, ease of implementation, attitude/ease interaction and prior behaviour played a role in behavioural intention. The moderation formula was computed based on Baron and Kenny's (1986) work.

Behavioural Intention = β1*Attitude + β2*Ease of Implementation + β3*(Attitude Ease of Implementation Interaction) + β4*Previous Behaviour + error …… Model 6

This model provided the following information: attitude is a strong and significant predictor (β1=0.824, p=0.000), ease of implementation is a strong and significant predictor (β2=0.617, p=0.000), attitude/ease of implementation interaction was not significant (β=-0.713, p=0.005), and that prior behaviour was a solid and significant predictor of behavioural intention (β=0.319, p=0.000).

Earmarking

The findings from consumer preferences on earmarking of revenues is shown below. The most popular option was tax rebates for those who are most effected, followed by subsidies for renewable energy. Balancing the budget was the least popular option.



4. Discussion and Conclusion

This study has echoed several arguments that have been put forward by previous studies. We also discovered several interesting new insights about consumers' perceptions and behavioural intentions with carbon pricing. Previous studies have often looked at attitude, but few have gone beyond this by also looking at behaviour, which was the focus of our study. This information will pose beneficial to policy makers, and environmental groups in order to more effectively create a positive environmental impact.

First, our study has revealed that a large percentage of the public has strong negative attitudes toward the Carbon Tax. It was also found that perceived usefulness is a significant predictor of attitude. Usefulness is referring to individuals believing that a carbon pricing scheme would effectively reduce industrial and personal emissions, road congestion etc. If one does believe that the scheme is useful in society, they are more likely to have a positive attitude towards it. This being said, in order to improve consumers' attitude towards carbon pricing, it would be beneficial to educate them on the environmental and societal impacts.

To our surprise, trust did not prevail as a significant predictor of attitude. Additionally, the trust and perceived utility interaction was a moderately significant predictor of attitude. As attitude remains a very important determinant of the success for carbon pricing, going forward, other influencing variables, or a more specific type of trust should be researched. It is believed that specifically, political trust could be a more effective focus as some previous research has proven a relationship.

Filling the gap in literature we found, attitude plays an important role in behavioural intention. If an individual holds a positive attitude towards carbon pricing, they are more likely to intend to participate in environmentally friendly behaviours. What makes carbon pricing schemes successful and impactful is when individuals change their current behaviour to more environmentally conscious choices. This reinforces the importance of influencing consumers to

create a positive attitude, so that they will voluntarily make the decision to be more environmentally conscious.

Individually, attitude and ease of implementation both held an important relationship with behavioural intention. However, The two variables interacting created different results than we hypothesized. We originally hypothesized that, essentially, ease of implementation would enhance the translation of positive attitudes into positive behaviours. Upon reflection, the negative interaction also makes sense. It means that when activities are easy to implement the individual's attitude is important, but when an environmentally friendly activity is difficult to implement the role of attitude has an even greater influence. This finding reinforces the importance of having a strong attitude, especially when behavioural change is not easy. In order to continue to influence behaviour, attitude must be the focus.

For optimal results, both attitude and ease of implement should be focused upon. Due to restrictions some may only be able to concentrate on influencing consumers through one or the other. This being said, the government could focus all efforts into influencing attitude. If everyone held a strong and positive attitude towards carbon pricing, they would do everything in their power to reduce their carbon footprint regardless of the difficulty. Of course, we know this is unlikely as some individuals are set in their ways and are resistant to new information. If this is the case, ease of implementation can be the primary focus instead. With ease of implementation being the priority, the government would need to improve infrastructure and ensure that it is easy for consumers to be environmentally friendly. Individuals may participate in eco-friendly activities without even realizing they are decreasing their emissions, for example, individuals will choose to take the train if it is quicker and easier than driving during rush hour, regardless of their attitude towards carbon pricing.

In terms of demographic influences, we found that both age and education were significant predictors for attitude. It is no surprise that those who were more educated typically had a better attitude. This is consistent with findings in previous studies that education plays a vital role in the success for carbon pricings. It was somewhat surprising to find that older consumers have more positive attitudes toward the Carbon Tax than younger consumers. This result shows that it is crucial to conduct targeted education in order to engage opposed groups in an attempt to make the scheme more effective.

It was also found that people who have previously dedicated themselves, or identify with, previous environmental efforts are more likely to intend to partake in the carbon pricing scheme. This is inferring that people who are generally more environmentally conscious are more likely to change their behaviour in a way that carbon pricing intends. It would be beneficial to continue to educate individuals about the issues of climate change and the benefits of being more sustainable. According to our results, this could translate into increased effectiveness of carbon pricing.

Findings from consumers' earmarking preferences can be applied to public policy in an attempt to tailor to consumer desires. This may be a strategy to increase the publics' attitudes towards it. It is very clear that the revenues should not be used to balance the budget, or marketed as such, as vast majority of individuals were opposed to it.

These results can be applied to improve current and future carbon pricing schemes, as well as to facilitate future studies. There is an opportunity to use the significant variables (perceived usefulness, attitude, ease of implementation) in order to more effectively influence behavioural intention with hopes of also influencing actual behaviour.

Due to the constraints of our study only behavioural intention was included, but the future of carbon pricing schemes would benefit from studies on actual behaviour. Studying actual behaviour remains vital as studies in other contexts have found gaps between behavioural intention and actual behaviour.

References

Ajzen, Icek. 1991. "The Theory of Planned Behaviour." *Organizational Behavior and Humaneicison Processes* 179-211.

Antil, John H. 1984. "Socially Responsible Consumers: Profile and Implications for Public Policy." *Journal of Macromarketing* 18-34.

Arbuthnott, Katherine . 2008. "Education for sustainable development beyond attitude change ." *International Journal of Sustainability in Higher Education* 152-163.

Baranzini, Andrea, and Stefano Carattini. 2017. "Effectiveness, earmarking and labeling: testing the acceptability of carbon taxes with survey data." *Environmental Economics and Policy Studies* 197-227.

Baron, Reuban, and David Kenny. 1986. "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations." *Journal of Personality and Social Psychology* 1173-1182.

Bianchi, Constanza, and Lynda Andrews. 2011. "Risk, trust and consumer online purchasing behaviour: A Chilean perspective." *International Marketing Review* 253-275.

Bolsen, Toby, Thomas J Leeper, and Matthew A Shapiro. 2014. "Doing What Others Do: Norms, Science, and Collective Action on Global Warming." *American Politics Research* 65-89.

Borenstein, Seth, and Angela Charlton. 2018. *Paris Riots Over Fuel Taxes Dim Hopes for Climate Fight.* December 6. https://www.ctvnews.ca/business/paris-riots-over-fuel-taxes-dim-hopes-for-climate-fight-1.4206935.

Carattini, Stefano, Maria Carvalho, and Sam Fankhauser. 2018. "Overcoming public resistance to carbon taxes." *WIREs Climate Change.*

2015. *Causes of Climate Change.* November 27. Accessed October 30, 2018. https://www.canada.ca/en/environment-climate-change/services/climate-change/causes.html.

Chen, Hsinchun, Daniel Zeng, Homa Atabakhsh, Wojciech Wyzga, and Jenny Schroeder. 2003. "Managing Law Enforcement Data and Knowledge." *Communications of the ACM* 28-34.

Davis, Fred. 1986. "A Technology Acceptance Model for Empirically Testing New End-User Information Systems : Theory and Results." *Doctoral Dissertion, Sloan School of Management, Massachusetts Institute of Technology.*

Dimitrov, Radoslav. 2018. *The Paris Agreement on Climate Change: An Overview and Impication for Canada.* Policy Brief, Western University.

Farley, John, Donald Lehmann, and Michael Ryan. 1981. "Generalizing from "Imperfect" Replication." *Journal of Business* 597-610.

Government of Canada. 2016. *Pan-Canadian Approach to Pricing Carbon Pollution.* 10 03. https://www.canada.ca/en/environment-climate-change/news/2016/10/canadian-approach-pricing-carbon-pollution.html.

Greenberg, Michael. 2014. "Energy Policy and Research: The Underappreciation of Trust." *Energy Research & Social Science* 152-160.

Guo, Qian, Anderson Johnson, Jennifer Unger, Liming Lee, Bin Xie, Chih-Ping Chou, Paula Palmer, Ping Sun, Peggy Gallaher, and MaryAnn Pentz. 2007. "Utility of the theory of reasoned action and theory of planned behaviour for predicting Chinese adolescent smoking." *Addictive Behaviours* 1066-1081.

Hammar, Henrik, and Sverker Jagers. 2011. "Can trust in politicans explain individuals' support for climate policy? The case of the C02 tax." *Climate Policy* 613-625.

Hammar, Henrik, Sverker Jagers, and Katarina Nordblom. 2008. "Attitudes Towards Tax Levels: A Multi-Tax Comparsion." *Fiscal Studies* 523-543.

Harring, Niklas, and Sverker Jagers. 2013. "Should We Trust in Values? Explaining Public Support for Pro-Environmental Taxes." *Sustainability* 210-227.

Heston, Thomas, and Jackson King. 2017. "Predictive power of statistical significance." *World Journal of Methodology* 112-116.

Hosseinpour, Masoumeh, Hossein Nezakati, Samsinar Md Sidin, and Wong Foong Yee. 2016. "Consumer's Intention of Purchase Sustainable Products: The Moderating Role of Attitude and Trust." *Journal of Marketing and Management* 40-49.

Howell, Allison, Bret Shaw, and German Alvarez. 2015. "Bait Shop Owners as Opinion Leaders: A Test of the Theory of Planned Behavior to Predict Pro-Environmental Outreach Behaviors and Intentions." *Environment and Behavior* 1107-1126.

Kallbekken, Steffen, and Hakon Saelen. 2011. "Public acceptance for environemtnal taxes: Self-interest, environemtnal and distributional concerns." *Energy Policy* 2966-2973.

Li, Jingru, Jian Zuo, Hong Cai, and George Zillante. 2018. "Construction waste reduction behavior of contractor employees: An extended theory of planned behavior model approach." *Journal of Cleaner Production* 1399-1408.

Lin, Carolyn, and Tonghoon Kim. 2016. "Predicting user response to sponsored advertising on social media via the technology acceptance model." *Computers in Human Behaviour* 710-718.

McKenzie-Mohr, Doug. 2000. "Fostering Sustainable Behavior Through Community-Based Social Marketing." *American Psychologist* 531-537.

Mishra, Deepti, Ibrahim Akman, and Alok Mishra. 2014. "Theory of Reasoned Action application for Green Information Technology acceptance." *Computers in Human Behavior* 29-40.

Moons, Ingrid, and Patrick De Pelsmacker. 2015. "An Extended Decomposed Theory of Planned Behaviour to Predict the Usage Intention of the Electric Car: a Multi-Group Comparsion." *Sustainability* 6212-6245.

Nuttavuthistit, Krittinee, and John Thogersen. 2017. "The Importance of Consumer Trust for the Emergence of a Market for Green Products: The Case of Organic Food." *Journal of Business Ethics* 323-337.

Robinson, Leroy, Greg Marshall, and Miriam Stamps. 2005. "An empirical investigation of technology acceptance in a field sales force setting." *Journal of Business Research.*

Schneider, Stephen, and Lawrence Goulder. 1997. "Achieving Low-Cost Emissions Targets." *Nature* 13-14.

Scholz, Evi, Regina Jutz, and Marleen Heller. 2011. "ISSP 2010 Germany: Envrionment III." Technical Report, Cologne .

Shen, Xiao-Liang , Christy Cheung, and Matthew Lee. 2013. "What leads students to adopt information from Wikipedia? An empirical investigation into the role of trust and information usefulness." *British Journal of Educational Technology* 502-517.

Szajna, Bernadette. 1996. "Empircal Evaluation of the Revised Technology Acceptance Model ." *Management Science* 85-92.

Thalmann, Philippe. 2004. "The public acceptance of green taxes: 2 million voters express their opinion." *Public Choice* 179-217.

Trafimow, David. 2009. "Theory of Reasoned Action - A Case Study of Falsification in Psychology." *Theory & Psychology* 501-518.

Vallerand, Robert, Paul Deshaies, Jean-Pierre Cuerrier, Luc Pelletier, and Claude Mongeau. 1992. "Ajzen and Fishbein's Theory of Reasoned Action as Applied to Moral Behavior: A Confirmatory Analysis." *Journal of Personality and Social Psychology* 98-109.

Wallace, Andrew A, Katherine N Irvine, Andrew J Wright, and Paul D Fleming. 2010. "Public attitudes to personal carbon allowances: findings from a mixed-method study." *Climate Policy* 385-409.

Wan, Calvin, and Geoffery Shen. 2015. "Encouraging the use of urban green space: The mediating role of attitude, perceived usefulness, and perceived behavioural control." *Habitat International* 130-139.

Weiping, Chen. 2013. "The effects of different types of trust on consumer perceptions of food safety." *China Agricultural Economic Review* 43-65.

n.d. *What is Global Warming?* Accessed October 30, 2018. https://www.nationalgeographic.com/environment/global-warming/global-warming-overview/.