Willingness to Pay For Pollution Reduction

by

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I - Introduction

Should the Ontario government replace or keep coal, as a stable source of energy? Keeping the coal would help lower energy prices for households and industry. However, this might not be equitable and efficient if we take into account the cost of polluting the environment and increasing the risk of premature death to elderly and sick people in general (Ontario Medical Association, 2005).

The purpose of this paper is to present a literature review backed by an empirical study to shed light on some aspects of the question mentioned above. Also, two variables that represent the population's beliefs and characteristics are included in the model. These can be used to identify the presence of altruistic answers that, if neglected, can eventually lead to overestimated results due to double counting. This occurs when a respondent, due to altruism or misperception of the (WTP) concepts, includes, in addition to her/his own benefits, the benefits that others receive when determining her/his (WTP).

The empirical study will discuss how the respondent's age, health status, income, region, personal beliefs, and volunteering activities may affect her/his response to the statement: "I would agree to an increase in taxes if the extra money were used to prevent environmental damage"(Inglehart et al., P.25). The model used in this paper is the generalized logistic regression, where respondents have choices scaled on four levels - strongly agree, agree, disagree, and strongly disagree - to pay higher taxes for a cleaner environment. The paper's empirical results find that the determinants of respondents' willingness to pay (WTP) are specific. Our empirical study on Canadian data from taken from the 1990 World Values Survey shows that only a small proportion of respondents are willing to pay significantly higher taxes for cleaning the environment.

Our literature review regarding subjective WTP for reducing the likelihood of premature death is inconclusive in its findings. Current environmental conditions in Canada are higher than the standards set by the Canadian government (McKitrick, Kenneth, Schwartz, 2005). These factors, combined with the results of our empirical study, which show that only a small proportion of respondents are willing to pay higher taxes for a cleaner environment, lead us to recommend that the Government of Canada should be cautious in making environmental policy. For example, it might be more efficient to save the billions of tax dollars that are used to replace the coal-fired power plants in Ontario and instead implement smaller projects that directly address people with low income and/or poor health status. For example, the government could improve access to health services in poor and remote areas or invest in preventive health programs that promote exercise and good nutrition for those with fair health status. Secondly, the government can address the needs of those who take part in environmental activities, whether they are currently active or not, by adopting less costly environmental plans. Such programs could include using cleaner coal for energy production, subsidizing the use of energy efficient products, putting higher taxes on factories that surpass their set emissions ceiling, and pursuing massive tree planting. This plan would, above all, save billions of dollars that otherwise would not, on average, increase total utility for Canadians. In addition, planting trees would improve the scenery and the air quality of the newly planted regions and make them look greener. In addition, planting trees could be used as a tool to stimulate the agricultural sector and the economy of certain communities. By building hospitals and improving access to health services for people with low income and/or fair health status, the government could offer direct and tangible services for the sick. In addition, the money saved from not reforming the whole energy sector might be spent on addressing the priorities and needs of those Canadians for whom the environment is not their top priority.

II - Literature Review

In 1985, Jones-Lee, Hammerton and Philips achieved the first contribution in the literature that coherently estimated the British population's (WTP) to decrease their risk of premature death. Jones-Lee et al. (1985) aim, through the Contingent Valuation Approach (CVA), to quantitatively measure how factors such as age, health, social class and income affect the British population's willingness to trade their wealth for their health, while maintaining their current standard of living. The paper shows that the WTP to decrease the risk of premature death has an inverted U-shape for privately-funded projects (Jones-Lee et al., 1985). WTP increases until age 49 and then decreases thereafter (Jones-Lee et al., 1985). However, when it comes to how much people are willing to pay to finance a public good, such as projects that would increase safety on highways, the article found an inverse relationship between age and willingness to finance such projects (Jones-Lee et al., 1985). This might be due to free riding motivation. Moreover, their empirical study shows that income was not consistent in explaining people's willingness to pay (Jones-Lee et al., 1985). Maybe the reason why income is not a consistent explanatory variable is that its effect is being influenced by either missing explanatory variables such as personal character (e.g. patience and cooperation) or by model misspecifications. In other words, Jones-Lee et al. (1985) consider income as an exogenous variable, but it is probably not strictly exogenous and thus correlated with the error term due to some missing explanatory variables. It is also questionable if social class and income can be perceived as independent explanatory variables. In the U.S. and Canada, income largely determines social class. Nonetheless, the redistribution of income has a significant effect on the value of a statistical life (Jones-Lee et al., 1985).

According to a 2005 report by the Ontario Medical Association (*The Illness Costs of Air Pollution),* air pollution is responsible for significant losses to Ontario society. This is gauged by counting the costs of premature deaths, as well as the losses of productivity and hospitalization costs due to air pollution related diseases (OMA, 2004). From the spirit of "a before and after design", econometrically speaking, the OMA argument would be stronger if it was backed by an empirical study that compares the rate of premature death due to air pollution reasons between two western countries, a country that uses coal as a main source of energy with one where coal is excluded in its energy production (Boardman, Greenberg, Vining, Weimer., 2001, P.339)

In the same year and inspiration, Alberini, Cropper, Krupnick, and Simon (2004) pursued one of the leading Canadian empirical papers, regarding the relationship between the effects of age on people's WTP for decreasing the risk of premature death due to environmental pollution. Alberini et al. (2004) provide evidence that suggests that there is an inverted U-shaped relationship between age and willingness to pay that reaches its peak at age 70. The authors disagree with Jones-Lee et al.'s (1985) contention that aged and ill people are expected to pay less for a project that might decrease their risk of premature death just because their life expectancy is reduced and thus their WTP for decreasing their risk of premature death decreases after the age 40. Moreover, Alberini et al. (2004) enhanced the justification by arguing that this also might not be true for those who draw the most benefit from these projects. As people age or become sick, they become more vulnerable to pollution and respiratory diseases so they are willing to pay more than healthy and young people for projects and plans that decrease their risk of premature death.

Alberini et al.'s (2004) samples came from Hamilton, and the United States. The American sample was representative of America's racial diversity. The Canadian sample was mainly white. Thus, the Canadian sample might not be representative of the Canadian population since the respondents were selected exclusively from the city of Hamilton. Moreover, since respondents were only selected from Hamilton, it can be revealed that the sample did not take into account the diversity of culture, politics, economic stability, and, in particular, pollution levels that differ from one city to another. This may cause the sample to substantially deviate from being a representative sample of the whole country's willingness to pay.

Alberini et al. (2004) attempt through the CVA to gauge how age, health status, social class, education and income affect the targeted group's willingness to contribute financially to projects that might decrease their risk of premature death. In their CVA, Alberini et al (2004) applied a similar approach and included similar explanatory variables, such as income, education and social class, as those used by Jones-Lee et al. (1985). However, Alberini et al. (2004) added factors such as family medical history and patient's current medical condition to the regression analysis. Family medical history is mentioned by previous authors; in particular Viscusi & Hakes (2003) considered its omission as one of the reasons behind the weakness of their model. The age factor in the Alberini et al.'s (2004) study was found to be significant for age 70 at 10 % level of significance.

Even though it could be that WTP increases with income, this finding was not statistically significant in the Canadian case but it was more statistically significant in the American sample at the 10 % level of significance.(Alberini el al., 2004, p. 786). This might be due to the fact that the American sample was more ethnically and geographically diversified; the American sample was not exclusively chosen from only one city but from both urban and rural areas, whereas all the respondents of the Canadian sample were exclusively Caucasian and only chosen from the city of Hamilton. This diversity would also increase the variance of income within the sample, especially variations between Caucasians and African Americans. So, geographical and ethnic diversity, perhaps, can better explain having the income regressors being more significant in the American sample. Another reason for income to be significant in explaining people's willingness to pay in the American sample is the evidence that Americans are more conscious of the fact that part of their income would be sacrificed to buy health insurance products, since health services are not freely supplied to all the citizens. On the other hand, Canadians do not worry about hospital fees as they enjoy a free health care system. In addition, family medical history, such as cancer, does not significantly affect WTP for both the Canadian in Hamilton and the Americans (Alberini et al., 2004). However, the Alberini et al. (2004) study provides evidence that chronic respiratory illness and high blood pressure are not significant in shaping the WTP of the population of Hamilton, whereas it is significant at the five percent level for the American sub-sample. Also, the evidence suggests that the dummy variables for the respondent's social class as well as the respondent's level of education are not significant (Jones-Lee et al., 1985; Alberini et al., 2004). As the level of education increases, potential future income increases. Therefore,_it could be argued that there might be some multicollinearity between the education, income, and social class factors. This problem might cause many of the explanatory variables to become not significant. Eventually, it can be concluded that the divergence in the results shows that no one is perfectly able to understand the Value of a Statistical Life (VSL) -age relationship.

VSL- Consumption Relationship

The aforementioned studies did not include a coefficient to quantitatively measure how the consumption factor can explicitly affect the VSL. However, Kniesner, Viscusi, and Ziliak (2004) believe in explicitly including consumption as an independent variable. Kneiser et al. (2004) argue that as people age, the quality of their health decreases and they have fewer years to live, but this does not necessarily mean that the value of their remaining life is less. With the existence of a consumption factor, the picture is clearer. The greater the value of consumption someone expects to enjoy in the future, the greater the value of life one would expect and vice versa (Kneiser et al., 2004). If people avoid excessive spending at a young age, they will be able to consume more later on in life. Thus, these later years are supposed to yield more satisfaction than the earlier ones. Kneiser et al. (2004) believe that the life-cycle consumption and the age-adjusted value of life shape, which is an inverted U curve, are closely related. Thus, as the consumption follows an inverted U curve so does the value of life curve. In addition, Kneiser et al. (2004) provide evidence that suggests that both curves reach their peak at age 50, and thereafter they decline gradually. Therefore, if consumption is greater later in life than earlier in life, it can be concluded that elderly people have a higher VSL than younger people. This implies that consumption-age variation is mirrored by VSL-age variation.

In order to prevent income from being correlated with consumption, since higher consumption generally requires higher income, Kneiser et al. (2004) used instrumental variables where non-labour income served as a instrument for labour income. Labour income implicitly affects the utility function through the consumption factor; income minus savings (Kneiser, 2004, pp. 9-10). VSL is affected directly through the age-wage relationship and indirectly through the age-consumption relationship. Therefore, including explicitly an explanatory variable for consumption will highlight the age factor, as the consumption-augmented econometric model resulted in an inverted U-shape for age-consumption relationship (Kneiser et al., 2004).

Hedonic Wage vs. CVA

Many economists attempt to reveal the weight people put on proposed government-funded projects either by a hedonic wage approach, which is a market-related approach, or by a CVA that reveals the respondent's preferences. One criticism of the hedonic wage approach is that, in our case, it excludes the willingness to pay of the main beneficiaries of the decreasing pollution projects, because the main beneficiaries of decreased pollution are elderly people that are more likely to be retired. As a result, one of the shortcomings of the hedonic wage approach is that it underestimates the sick and elderly people's willingness to pay for programs that decrease the rate of their premature death. The reason for this is because the job market, especially the market for risky jobs, is mainly occupied by people who are healthy and either young or middle-aged. One of reasons that we have a deviation between the hedonic approach and CVA is, as mentioned by Boardman et al. (2001), that the Hedonic approach suffers from selection bias as people who apply for riskier jobs have less than average risk aversion. Therefore, the results that are derived from the hedonic approach underestimate the true average value of a statistical life. However, selection bias can be mitigated if we take into account the positive benefits that some respondents might enjoy. For example, some people might have average risk-aversion. When they drive, they don't exceed the speed limit. They don't make risky investments. They do not gamble. However, in certain jobs, they might be willing to accept a lower than average wage for some risky projects. This is due to the fact that these people were very frequently exposed to these kinds of jobs at a younger age. For example, they persons might have started learning the career at a younger age because of parents, other relatives or neighbours. Therefore, the hedonic model can be improved to be more accurate in measuring the society's wage-risk trade-off by using some benchmark questions. For example, if a person starts a career at a younger age, which is for example 2 standard deviations below the national average age at which people start learning this career, then automatically this person must be dropped due to this extreme factor.

One of the advantages of the hedonic wage approach is that it observes the real dynamic of supply and demand within the job market. Moreover, it allows us to understand how people are willing to accept higher wage premiums for riskier tasks. Also, the advantage of the hedonic approach is that people already have an idea not only about the amount of money needed to attain a certain level of utility, but also about the job offer and job description. Economists have market data as a tool to help them accurately estimate people's willingness to pay for this observed product.

One of the CVA's disadvantages relative to the Hedonic approach is that the CVA obtains a WTP directly from a respondent's answer regardless of whether the respondent is telling the truth. In other words, one of the problems with CVA according to Boardman et al. (2001) is that in many cases respondents are supposed to evaluate their subjective utility from projects for a cleaner environment which would decrease the risk of premature death, that they did not concretely consume yet. Therefore, it is hard for the respondent to evaluate numerically their true willingness to pay for this new but non consumed product. That is why in the CVA, it is important to give to the respondent some short but crucial information on the projects and their opportunity costs as well (Boardman et al., (2001).

The advantage of the CVA is that it can be designed to reveal specific preferences for proposed projects (Jones-Lee, 1985, p. 51). The hedonic approach reflects the inverse of the former. For example, the hedonic approach measures the minimum wage premium people demand in exchange for accepting additional risk at work. People are free to accept the offer or refuse it. On the other hand, the CVA tries to reveal how much people are willing to pay to decrease a risk that is imposed on them, say through pollution. But in the case of CV, which is used in the articles of both Jones-Lee et al. (1985) and Alberini et al. (2004), people have no choice but to face the risks unless they are willing to pay to mitigate their risk of premature death. In other words, the risk weight might not be a one-to-one mapping in the hedonic approach where both the payments and the risks are endogenous. However, in the CVA, the risks are exogenous and the payments are endogenous. In addition, the static hedonic approach does not take into account the possibility that, as people age, they might adopt healthier habits than when they were young (Evans & Smith, 2006).

Boardman et al. (2001) argue that, in the CVA, the response might be affected by the strategic bias problem whereby respondents try to influence the results so it is in favour of their own point of view. This can be controlled by checking if the data opposes basic fundamental economic concepts. For example, the more benefits people receive, the larger will be their WTP. In addition, people's willingness to pay must not exceed a certain percentage of their net income. Also, by adding some relevant probability tests, we can verify that people understand the question (Jones-Lee et ., 1985; Alberini, 2003).

The Ambiguous Age-VSL Relationship

According to Kneiser et al. (2006), one of the situations in which the age-VSL relationship has a clear form is when the model implies the same marginal utility each year of life, as the perfect annuity case implies, but we have a steady decrease in the VSL (pp. 7-8). However, this is too controversial and something that does not happen in the real business cycle. All real economic situations must take into account factors of inefficiency, externalities, and uncertainties. That is why most of the literature agrees that an age-VSL relationship follows an inverted U-shaped curve; however, they disagree at what age the value of life reaches its optimum.

Evans and Smith (2006), in order to better understand how the WTP changes over a person's lifetime, supposed that the respondents can perceive their own risk in two possible ways but with different perceptions, scaling or translating risks. According to the translating hypothesis, life journey is passing a sequence of risks. In order to go home safely, one must first bypass the risk of dying in an accident in the street (Evans & Smith, 2006, p. 248). In the scaling case, the individual does not discriminate among different sequences of risks. In a few words, the person's survival probability is when she/he survives the aggregate risks she/he faces (Evans & Smith, 2006). Notwithstanding, this was, in some ways, similar to the Eeckhoudt and Hammit (2001), divisions of a person's risk of death. Therefore, the person perceives risks in 2 distinct ways. In other words, the person gives the same weight to death whether it is coming from age or from work. Thus, the person would be willing to pay an extra dollar for the same decrease of any of these risks. If we combine the two risks in one basket, the risk embodied in this basket would be bigger than the background risks. A decrease in occupational risks is perceived as the same as a decrease in absolute risks. However, in the scaling hypothesis, the person has more probabilistic thinking. In other words, the person perceives things in terms of relativity. Offering to the person a small decrease; Δ P, which is a number between 0 and 1, in occupational risk would be perceived by a smaller decrease which is $(1- \pi)\,\Delta$ P, where π is a number between 0 and 1 representing background risk, by the person Eeckhoudt and Hammit (2001). Simply speaking, a decrease in occupational risks would be perceived as a risk decrease in relative terms; weighted vis-à-vis to the person's background risks, and not as a final and independent decrease in risk. Eventually, the probability of a VSL function does not depend only on the given absolute facts but also how these givens are perceived by the respondent.

Evans and Smith (2006) want to show that calculating VSL is more complex and ambiguous than is suggested by Eeckhoudt and Hammit's 2001 article. Eeckhoudt and

Hammit (2001) suggest that considering the background and aggregate risks make people less willing to pay to decrease their risk of premature death from pollution. A mild reduction of such a specific but significant risk becomes less important and valuable (Eeckhoudt et al., 2001). The results of Eeckhoudt and Hammitt might be possible in the specific case of scaling hypothesis, and is not a general and clear-cut conclusion for an age-VSL relationship (Evans & Smith, 2006, P.245). Evans and Smith (2006) achieve this result by opposing Eeckhoudt et al 2001 assumption that the derivative of the background risks with respect to age is 0. As a matter of fact, the goal is to respond to how VSL changes over an individual's lifetime (Evans & Smith, 2006, p. 247). I don't agree with the criticism of Evan and Smith for the assumption is included in a specific context. Eeckhoudt and Hammit (2001) try to gauge respondents' willing to pay for a decrease in a specific risk separately and interdependently of the age-related or background risks

Evans and Smith (2006) criticized Aldy's and Viscusi's (2003) conclusion that VSL is embodied in an inverted U-shaped relationship which peaks at age 40. The criticism was justified on the basis that Aldy's and Viscusi's results were based on a sample of people who were 64 years old or younger, especially since these people are not the main beneficiaries of pollution reduction , as the main beneficiaries are the elderly that are supposed to be retired and thus excluded in this study (Evans & Smith, 2006). Evans and Smith's criticism is not very relevant for the authors' study did not aim to evaluate the VSL due to air pollution projects but to study how the level of occupational injuries can affect the wage –age relationship. Therefore, this definitely requires agents to have an occupation which required the agent's age to be below the retirement one.

Evans and Smith's (2006) suggestions were based on conclusions reached by two studies done by Smith et al. 2004 and Smith and Evans 2004. In these two studies, the respondents were asked to evaluate numerically their subjective risk of surviving each of two consecutive years over a ten -year period. Evans and Smith (2006) justified deriving subjectively and directly the respondents' risk of death in order to have less biased results, and in order to observe the subjective wage risk interaction for two consecutive years over a period of 10 years. The risks were solely based on Bureau of Labour Statistics (BLS) standards and the sample is drawn from a retirement and health study panel dataset where there is no dynamic relationship between age and risks (Evans et al., 2006). It is good to mention that observing people's preferences over a period of 10 years has many advantages, one of which is that the static models, whether CVA or hedonic, do ignore or miss the fact that as people age they become more experienced and increasingly prudent. Therefore, having a dynamic model for VSL is more accurate, for older people supposedly face fewer injuries than less experienced or younger employees. However, older people's death rate is higher due to the fact that older people are less capable of rebounding from an accident than a young person who is in good shape (Aldy and Viscusi, 2003).

Evans and Smith (2006) quoted some results that are taken from the authors Deshazo and Cameron (2004). These results show that baseline risks increase VSL for people who are in good physical shape (Evans & Smith, 2006). These are people who have a good chance to live and to enjoy the outcome of their decision to decrease their risk of premature death (Evans & Smith, 2006). This finding is somehow similar to Alberini et al. (2004), where chronic disease, such as cancer, was not significantly related to VSL, perhaps due to harvesting reasons[1]. One of the common points between Evans and Smith 2006, Jones-Lee et al. 1985 and Alberini et al 2004 is to append probability test for outlying the focal responses.

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[1] For more information about harvesting read Maddison (2006).

Evans and Smith (2006) concluded that the scaling hypothesis can be applied more towards females whereas the translating hypothesis is more precise in describing school drop-outs. Eventually, the final conclusion is that due to the different ways people might perceive their own risks, e.g., scaling or translating, defining a clear age-VSL relationship is an ambiguous and sophisticated process (Evans & Smith, 2006, p. 257).

Alberini (2005*)* shows how the results for an estimated VSL obtained from dichotomous choice questionnaires can be remarkably changed when we adopt different distribution assumptions, such as Weibull or normal distribution, for the WTP. Alberini's findings are applied to many datasets. One of these datasets is derived from the work of Johannesson et al. 1997. One of the problems with this data set is not covering a wide variety of (WTP) distributions, since the majority of the respondents are willing to pay 300 Swedish Krona (SEK), the smallest bid becomes bigger than the median. This is a problem when there is a high probability that the independent variable, such as income or WTP, might be highly skewed especially since the median is less affected than the mean by highly skewed data. Therefore, this would prevent the data from not only missing a wide range of WTP but also from giving unbiased results. This would be less problematic when we deal with a normal distribution that only needs a mean and standard deviation.

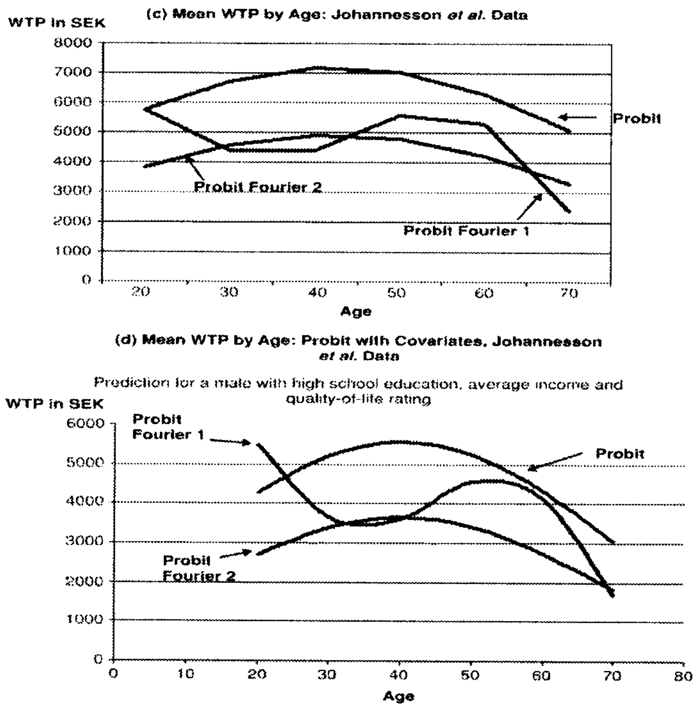
The distribution assumptions would significantly alter the estimation of WTP, which is derived directly from the respondents' answers of whether they accept to pay for decreasing the risks of premature death or not. The effects on absolute and unconditional WTP are such that having normal or logistic distribution would result in a negative mean and median WTP (Alberini, 2005), whereas assuming Weibull or log-normal distribution would yield both a positive mean and median WTP (Alberini, 2005). The latter assumption would yield a higher Akaike value and its mean would be 2,894,292 (SEK), which is more than 10 fold its median 238.39 SEK. (Alberini, 2005, pp. 787-788).

Alberini (2005) tries to see how the dependent variable changes as we use different transformation approaches on the explanatory variables. According to Alberini, (2005) Chen and Randall (1998) and Creel and Loomis (1997) were the first to implement the Fourier Transformation of the independent variables (P. 789). According to Chen and Randall (1997), the WTP model is highly affected by the model assumptions. In other words, choosing the wrong distribution would lead to misspesified results. Thus, the authors find that they can predict the value of WTP with a free -distribution model with the virtue of Fourier Transformation. According to Alberini (2005) this approach resulted in a mean WTP between 4,339 SEK and 3,732 SEK (Alberini, 2005, P. 788). The mean WTP of 3,732 SEK corresponds to an integral whose end point is bid max, and the mean WTP of 4,339 SEK corresponds to an integral whose end point is indefinite (Alberini, 2005, P.789).

Alberini (2005), using the data of Johannesson et al, 1997 finds an inverted U-shaped curve that reaches its optimum at age 40 for the age-VSL relationship. This result was found by implementing the approach Alberini (2005) called " in the spirit of fast Fourier transform approximations " (Alberini, 2005, P. 789). Alberini stated her results as the follows:

> In Panel (c), Probit Fourier 1 includes bid, age, age squared, and sine and cosine functions of these variables; Probit Fourier 2 includes bid, sin (bid), cos (bid), age and age squared. In Panel (d), Probit Fourier 1 includes bid, age, age squared, income, quality-of-life rating, a gender dummy and an education dummy, plus sine and cosine terms of all continuous variables. Probit Fourier 2 includes bid, sin (bid), cos (bid), age, age squared, income, quality-of-life rating, a gender dummy and an education dummy. (P. 790).

In other words the difference between the Probit Fourier 1 and Probit Fourier 2 can be illustrated in the following pictures:



(Alberini, 2005, P. 791).

In the case of the Fourier transformation, the numbers show that the estimates were not sensitive to whether the cumulative distribution function (CDF) adopted the normal standard distribution or the standard logistic distribution. However, the estimates were sensitive to whether the bid max or infinity is considered as an upper limit for the integral function (Alberini, 2006, p. 789).

According to Alberini (2005), Johannesson et al. 1997 end up having a mean value of statistical life of 6, 849SEK value when applying the logit model where a dummy dependent variable includes the negative value of WTP, but they drop out the survival probability of the negative value of WTP (P. 788).

Alberini (2005) mentioned that Cameron and James (1987), who adopted the logit model obtain a mean value equal to -α/β, which has the value of -2,007 SEK (Alberini, 2006, p. 788). Alberini (2005) added that, in their model, Cameron and James, 1987, included the negative distributions of WTP. However, as Alberini (2005), changes the area under the survival probability curve to take the form ''m3 = $\int_0^{B\max} [1 - F(\alpha + \beta y)]\, d$'', the mean WTP takes the value of 6,434 SEK in cases of infinity upper limit and a mean value of 3,528 SEK, a little bit more than the half, in cases of maximum bid as an upper limit (Alberini, 2005, pp. 787- 789). Alberini (2005) was not able to find a clear and decisive tool to detect the outliers. The paper concluded that, in a very special case and in only the use of the median would be unaffected by the presence of outliers (P. 794). Moreover, the author found that, on testing the internal strength validity of the Persson et al. 2001 data, there was a fear that respondents might not be differentiating between the absolute risk reduction and the subjective risk reduction (Alberini, 2005, p. 797). Fortunately, this confusion did not have an impact on the estimated WTP. Also it did not have an effect on the explanatory variables age, age-squared, the respondent's car mileage, both high school and college education, and the number of households (Alberini, 2005). However, in Alberini's CVA model, the estimated WTP was significantly affected by whether Ordinary Least Squares (OLS) or Two-Stage Least Squares was used (2SLS) (Alberini, 2005, p. 797). The model performed better when we used the 2SLS method instead of the OLS method as with 2SLS method, it showed that the WTP of 0.4 is more proportional to the proposed risk reduction (Alberini, 2005, p. 797). But, the estimated WTP is 0.18 when the OLS method is applied (Alberini, 2005, p. 797). But Aldy and Viscusi (2003) mention that their Hedonic model is not sensitive to whether the OLS or 2SLS approach is used. One of the contributions of Alberini's (2005) paper is that the coefficients for income and respondent car mileage were statistically significant, unlike in Jones-Lee et al. (1985), whereas age, age-squared, high school and college education, and the number of households were not significant (Alberini, 2005, p. 797).

Alberini also found a monotonic WTP-age relationship when she applied the Fourier transformation on all regressors, not only on the bid (Alberini, 2005, P. 792). It is good to say that both Alberini (2005) and Johannesson et al. (1997) agree on an empirical basis that the value of life has an inverted U-shaped curve that reaches its optimum at age 40 (Alberini, 2005, p. 791; Johannesson et al., 1997, P. 230). Moreover, Johannesson et al. found a negative and significant relationship between WTP and individual's income and a negative but non-significant relationship between WTP and household income (Johannesson et al., 1997, P. 230).

One of the reasons for this divergence in the literature mentioned above is that either the hedonic-wage or CVA might be omitting significant variables (Boardman et al., 2001; Viscusi and Hakes., 2003). Another reason can come from working with misspecified models. For example, the empirical section in this paper shows that the model becomes more informative when the explanatory variables of the 10 Canadian provinces are aggregated into four regions. Thus, the level of explanatory variable aggregation might be either too high or too low and that the models are unable to detangle the effect of explanatory variables on the willingness to pay.

One of the ideas inspired by Boardman et al. 2001, which can be easily applied and help us to get better results, is to tell the respondents that they might not enjoy the fruits of proposed projects right away; as is the case when renovations are done to make a highway safer. Also, some people might need to wait longer years than others for their body or health to start responding to the lower level of pollution. This is more realistic than telling the respondent, as Alberini (2005), Jones-Lee et al. (1985) did, that they would enjoy the decrease in their premature risk of death in the same year the project is implemented.

To summarize, it seems that the intuitive or intrinsic problem facing the entire literature, including the articles mentioned above, is internal validity and strength. For example, Persson, Norinder, Hjalte, Gralen (2001) found that WTP was higher when there were small risk reductions than when there were much higher risk reductions.

Regarding the efforts to improve the internal strength of the econometric model, Viscusi and Hakes (2003) were concrete and detailed in detecting outliers. They concretize five conditions that must be respected[2]. They mention the importance of each one of these conditions as well as the consequences for the model of having any of these conditions violated. Alberini's (2005) approach for detecting outliers was more general. It is functional only when the model has a small fraction of Yea or Nay answers[3]. Viscusi and Hakes' (2003) first model suffered from a low coefficient of determination (R^2) which they thought might be due to omitted explanatory variables. However, the model still suffered from a low R^2 even after including explanatory variables to measure the effects of income, health status, education, drinking and smoking. Eventfully the authors attributed the poor performance to the low number of observations and the idea of having a scaling probability where people gauge their survival probability on a scale from 1-10 instead of evaluating the probabilities themselves.

One thing in common between Alberini et al., (2004) and Jones-Lee et al., (1985) is attributing different payments to different levels of risk reduction. In other words, people have the opportunity to choose an optimum level of both payment and risk reduction. However, the results might be affected by the initial level of proposed payments. Identifying outliers can be improved by including some questions that can detect whether there are contradictions in the respondent's behaviours. For example, the respondent can be asked, in

[2] To have more knowledge about these 5 conditions read Viscusi and Hakes (2003, p.28).
[3] To learn more about this approach see Alberini (2004, pp.792-794)

case she/he was a smoker, if she/he intends to quit smoking soon. In addition, the model can be improved if the respondent can be informed that there are other sources of air pollution that can accelerate their risks of premature death such as indoor pollution due to cigarette smoke, and humidity. This process would improve the accuracy of the results in two ways. Firstly, the more an individual has additional relevant information, the more the results become realistic and accurate. Secondly, this process can serve as a filter for outliers. For example the irrational "yea" responses can be mitigated by rejecting the payments of those who smoke inside their houses but are willing to pay for cleaner air projects. In other words, people who compromise their personnel health, due to smoking addiction, might compromise the payments regarding their outside environment, which is less critical to their personnel health status.

Boosted Regression Trees

The socioeconomic explanatory variables other than the one for how long since the last visit to the hospital did not contribute in a clear-cut way to understanding the characteristics that might shape and affect people's WTP. This might be due to the fact that the parametric models do not take into account the multicollinearity that is highly possible especially when the socioeconomic characteristics income, education, and health are all included in the regression.

A recent study mentions the Boosting approach that would account for both the inner interactions between all the attributes and for the non-linear relationship without being restricted to the parametric assumption (Wezel, Kagie, & Potharst., 2005, P. 1-2). However, unlike the regression models, this tool does not offer easy explanations. For example, we cannot use the conventional method as the elastic relationship between the explanatory and dependent variables. The Boosted Regression Trees approach shows the relative importance of the relationship between the independent variables' attributes (Wezel et al., 2005). However, applying this approach is beyond the scope of this paper. That is why we will leave it for further research.

III - Personal Characteristics and Altruism

Reciprocal altruism threatens the accuracy of measuring exclusively an individual's willingness to support pro-environmental programs only in exchange for an improvement in their own health. Altruism entails that people are willing to pay for a reduction in risk of a death not only for their own but also for the sake of people they care about. Thus, altruism would cause an overestimation of the sum of all respondents' WTP for environmental programs, as is mentioned above. Therefore, filtering respondents who altruistically evaluate the pro-environmental programs might improve the accuracy of the aggregated procedure. Proxy explanatory variables for altruistic behaviour can serve as a filter if these proxies are found to be statistically significant.

Recently, many articles have been written that correlate the virtue of patience with the level of cooperation and reciprocal altruism. Curry, Price, and Price (2008) wrote that "given that individuals differ in the degree to which they value the future, we should expect such differences to be reflected in individual differences in the degree to which individuals engage in reciprocal altruism; in other words, 'patient' people should be more cooperative" (P. 779). In a "one shot game", Cury et al. (2008) tested the relationship between cooperation and incentives on students from Indiana University (p. 781). They found a slightly statistically significant correlation of 0.27 between the level of patience, embodied by a discount rate, and the level of cooperation. However, the correlation could be stronger if the game was continuous (Curry et al, 2008, P.781)

In addition, Kunioka and Wollerb (1999) found that trust was one of the social norms that allowed residents of ex-soviet republics to prefer a parliamentary authority over a dictatorship (P. 581). In addition, social norms such as trust and patience outperformed household income in shaping an individual's decision between a parliamentary system or a dictatorship (Kunioka & Woller, 1999, PP. 592,593). Regarding trust, the article found that it is built up in people that engage in club activities and volunteering (Kunioka & Woller, 1999, P. 580). Therefore, people who trust each other more, are more likely to be engaged in volunteering and thus altruistic activities. Since it is not within the means of this paper to retest this result, it is going to be taken accordingly and a volunteering indicator will serve as a proxy for trust and cooperation and thus for altruism. Therefore, it can be concluded that people with these traits are more likely to answer in an altruistic manner and thus to engage in strategic behaviour in CV surveys.

IV - Data

As discussed in the literature review, many articles suffered, as did Alberini (2004) and Viscusi and Hakes (2003), from not preventing irrational answers, especially the articles that used CVA which are mostly used in evaluating people 's (WTP) for environmental projects. One of the reasons behind the inaccuracy of the answers comes from the fact that some people, when evaluating their own (WTP) for environmental improvement projects, not only evaluate their own payments based on their own self-interest, but also the interests of their loved ones who might suffer from pollution related illness or just to buy inner peace. This empirical study seeks to investigate the determinants of WTP for environmental improvements and in particular to find a simple, clear and non costly means of filtering the responses that have a high probability of being affected by altruistic concerns. Thus it would be a step forward to improve the accuracy of the CVA.

The data are derived from the World Values Surveys and European Values Surveys (Inglehart et al.,2000) The surveys cover many countries over several years, from 1981–1984, 1990–1993, and 1995–1997. However, this paper's empirical study chooses only the data that are exclusive to Canada for the year 1990. Though 1730 respondents were surveyed, only 1441 observations are available for the analysis due to missing data. Interviewees were selected on the basis of "stratified random samples, with three call backs at random" (Inglehart et al., 2000, P.9). This survey is ideal for our model. It not only allow us to research the effect of the respondent's age, health, and income on her/his (WTP), but also the effect of the respondent's place of residence- province- volunteer activities and personnel beliefs .

According to Boardman et al. (2001), a survey that is conducted by telephone can lead to moderate interviewer influence. The advantage of such surveys is that they allow researchers to obtain a large number of observations at a lower cost. The survey offers a wide range of respondent information, ranging from the respondent's personal beliefs about life, God and his/her nation, to personal demographic and socio-economic information.

The dependent variables that are selected from of the World Values Surveys are multidichotomous variables whose order must be respected. In this contingent ranking method the respondents were presented with the following statement: "I would agree to pay more taxes if the extra money were used to prevent environmental damage". The answering approach is set as follows: "Strongly Agree, Agree, Disagree, Strongly Disagree, Don't know" (Inglehart et al, 2000, P.9). The order in which potential responses are presented can bias quantitative results. But, the bias is less severe than when using an initial numeric bid value for the respondent to start with. Also, the model could be more informative and realistic if the respondent were offered some choices regarding how she/he preferred the goal of a cleaner environment to be achieved; for example, to spend the respondent's money on replacing the coal energy sector with gas, nuclear or renewable sources of energy.

One of the advantages of this kind of survey is that we have less possibility of having strategic bias in the answers. This is due to the sequence of the survey's questions. In other words, not knowing the specific goals of this multipurpose survey makes it hard for the respondent to answer questions strategically in order to bias the results towards his/her personal preference. This kind of survey saves time and effort since it simultaneously studies multiple topics. These topics range from environmental, political, psychological, and even religious issues.

One of the disadvantages of a lengthy survey such as this is making the respondent tired and less interested in thinking deeply and answering the questions wisely. However, it could be that making the respondent more tired makes it more likely that answers will be honest since the respondent will lose interest in manipulating the results. Moreover, one of the advantages of this survey in terms of getting less biased results is the fact that it does not require a clear understanding of probability concepts. For example, it does not let respondents wrongly evaluate their utility for the proposed but unfamiliar products. It simply asks the respondents to qualitatively reveal how much they are convinced, or give the range of their conviction, that the proposed pro-environmental projects should be pursued. Unfortunately, the data do not include a numeric WTP for pro-environmental programs. However, our empirical study is still very useful in showing how much public interest there is for environmental programs, how a few modifications can improve the statistical significance of the whole econometric model, and in identifying variables that can be used as filters for altruistic responses. These findings can also be taken into account for models that contain a numeric WTP for the environment.

The model attempts to reveal how an individuals' willingness to pay higher taxes for a cleaner environment is affected by a wide range of explanatory variables. The explanatory variables that are used in this model are similar to the regressors that are used in most of the literature, with some adjustments. For example, it was expected that there would be some relationship between the income level, education and social class. For example, the more education a person has, the greater the potential that the person's salary would be higher. This potential for multicollinearity might be one of the reasons most of the variables in the literature are not statistically significant. In order to prevent multicollinearity in the model, social class and education are proxied by the income level.

Dependent Variables

The dependent variable is a categorical variable with four categories constructed from the answers to the question "I would agree to an increase in taxes if the extra money were used to prevent environmental damage." The four possible responses regarding willingness to pay higher taxes for a cleaner environment are: Strongly Agree, Agree, Disagree and Strongly Disagree. "Don't Know" responses are dropped from the sample. In the econometric model the dependent variable is called "ENVR".

Explanatory Variables without Manipulation

The coefficient of age was not found to be statically significant in most of the literature mentioned above. However, all of the literature agrees that the WTP-Age relationship is an inverted U curve. Excluding age is considered as a mathematical restriction, although it does increase the degrees of freedom. Thus, "AGESQ", a variable representing the square of the respondent's age, is generated in order to test the inverted U-shaped VSL-age relationship.

The variable that represents the respondent's subjective health status evaluation is spread over five ranges as follows: Very Good, Good, Fair, Poor and Very Poor. Having the respondent evaluate their subjective health status coincides with Evans et al. (2006) where they point out the fact that an individual's self-evaluated health status is more accurate that one derived from the Hedonic approach. In our model, a given respondent's health scales are represented by five descending dummy variables as follows: H1 " Very Good", H2 " Good" , H3 " Fair" , H4 " Poor" and H5 " Very poor". The first dummy variable H1 is dropped as an intercept coefficient for the respondents' subjective health status.

In the data set, the respondent's income is an ordinal multidichotomous variable that is spread over a range of 10 income levels. Dummy variables I1- I10 were created to represent the 10 ascending income classes. The first dummy variable, I1, is dropped as an intercept coefficient for the respondent's income.

Canadian respondents are asked to report their province of residence. Since there are 10 provinces, 10 dummy variables were created to represent the provinces: PEI for Prince Edward Island, NS for Nova Scotia, NB for New Brunswick, QC for Quebec, ON for Ontario, MN for Manitoba, SK for Saskatchewan, AB for Alberta, BC for British Columbia, and NFLD for Newfoundland. The dummy regressor for Ontario is dropped as an intercept coefficient for the respondent's region.

The reason for including provinces is to test if there is a statistically significant effect of these provinces on the respondent's willingness to contribute to a cleaner environment. Some articles, such as Alberini (2005) dismissed regional differences by choosing their entire sample from the city of Hamilton.

Respondents are asked whether they are "active", "inactive" or "not involved" in volunteering for an environmental organization. Including a variable for volunteering activities shows the magnitude of cooperation characteristic on an individual's WTP. The variable EvolActive represents those who are active as volunteers for an environmental organization. The variable EvolInaActive, represents those who are not active volunteers for an environmental organization. These people who are registered as volunteers in environmental organisations probably do have concerns about the environment , but with infrequent participation. The variable Evolnotmemb refers to respondents who are not members of environmental organizations. The first dummy variable, EvolActive, is dropped as an intercept coefficient for these dummy variables.

Respondents are also asked how often they think about the meaning of life. Respondents answer this question out of five possible choices: "Often", "sometimes", "rarely", "never" and "don't know". LifepurposeO refers to respondents who often think about the purpose of life. LifepurposeS refers to those who sometimes think about the meaning of life. LifepurposeR represents those who rarely think about the meaning of life. Finally, LifepurposeN represents those who never think about the meaning of life. Those who don't know are dropped from the sample. The inclusion of these dummy variables for personal beliefs aims to study if these beliefs can affect, in a statistically significant way, our dependent variables. The first dummy variable, LifepurposeO, is dropped as an intercept coefficient for these dummy variables. The variables are listed in Table 1.

The presence of altruism is dealt with using proxies. This is done by adding to the model two explanatory variables, the sixth which has three categories: EvolActive, EvolInaActive and Evolnotmemb, and the seventh which has four categories: LifepurposeO, LifepurposeS, LifepurposeN and LifepurposeR. If these two variables are found to be statistically significant, then they can be used later in another study as a filter for altruism.

For example, by dropping the observations of those who are actively engaged in volunteering activities and those who pay particular attention to spirituality we can improve the accuracy of our estimates.

V - Results

Because the dependent variable is a categorical variable, a linear regression model would not be an appropriate model in this case. Since the categories of the dependent variable are also ordered in terms of the intensity with which the individual agrees with the statement about willingness to pay higher taxes, an ordered model would be an appropriate choice. Therefore, the first model estimated used is an ordered logit model. The results of the first model are summarized in column 1of Table 3.

At first glance, it can be seen that the model does not seem to be very informative. In other words, the coefficients of the variables are not found to be statistically significant and are therefore not helping us to see how they are shaping the dependent variable. This raises many red flags. One possible warning is that the model might suffer from misspecification, multicollinearity or both. One type of specification error that might exist is that the data may be inconsistent with the proportionality assumption that underlies the ordered logit model. In simple words, the proportionality assumption requires the relationship between the coefficient of the lowest independent, say I1, variables and any of the highest ones, say I2 - I10 would have the same relationship as between the coefficient of the second lowest independent variables , say I2, and any of the all the remaining higher coefficient , say I3 - I10. Therefore the Brant test (William, 2007) is used to test this important assumption. The results of this test are presented in Table 2. This Table shows that the proportional odds assumption is violated. Thus, the null hypothesis that the relationship between any pair of coefficients is the same is rejected at 0 % level of significance. In other words, the probability of moving from a lower to a higher level, for each ordered explanatory variable, in each of the four categories of our dependent variables is not consistent.

In the generalized ordered logit model, separate coefficients are estimated for three of the four responses. According to Williams (2007), when the proportional odds assumptions for the ordered logit model are violated, the model can easily replaced by the generalized ordered logit model. This model can be estimated using the gologit2 a do file (Williams, 2007). Model 2 of Table 3 presents the coefficient estimates of this model and will show us if there are big changes, in particular, in the number of significant coefficients with the generalized logistic regression.

As the results did significantly change, this raises some concerns that the model did not suffer just from assumptions violations but also from possible multicollinearity. The precision of the model's structure has to be checked. Due to the virtue of the outreg2 function in Stata, it is possible to see that the model suffers from severe mullticollinearity. The level of condition index is 44.45.

Many trials have been applied without omitting any variables for the sake of respecting the precision of the results. This is applied by re-regressing the model but with some manipulations such as dropping and/or collapsing the categories of the variables that might suffer from multicollinearity. Unfortunately the model still suffers from multicollinearity as the condition index is still far away from being close to 30.

At first glance, the data derived from the World Values Surveys gives the impression that the data are very detailed and highly categorized. For example, we have 10 separate regions for the respondent's province of residence. By aggregating the data we can achieve many goals at once. Firstly, we can decrease the effect of any assessment bias that we may encounter in the survey. For example, let us suppose that a respondent is definitely residing in one of the provinces; however during his/her life time the person migrated somewhere other than her/his birth province. In that case, the respondent can end up being exposed to multiple provincial cultures. Also, it's possible that the respondent is affected by the culture of his/her parents or friends who in turn come from a different province from where the respondent is currently residing. On the other hand, there might not be significant cultural differences between some provinces. This could be due to common borders or cultural interdependence. Besides, some provinces, such as P.E.I, are relatively small in size and cultural influence compared to other provinces. By collapsing some provinces, this error may disappear or become mild. Therefore, the explanatory variables of many provinces are collapsed so that the new aggregated variables have more or less the same size of population or observations as the variables of the big provinces, Quebec and Ontario. The following provinces: New Brunswick, Prince Edward Island, Newfoundland and Nova Scotia are collapsed into one independent variable which is named MaritimesNF. Alberta, British Colombia, Saskatchewan and Manitoba are combined in a variable named Western. The remaining provincial variables are Quebec and Ontario. However, Quebec has not been dropped as an intercept coefficient for the provinces' dummy variables due to its uniqueness as a Francophone province. Thus, Ontario serves as the intercept coefficient. Moreover, this process has completely eliminated multicollinearity; the highest condition index is 21.60, without compromising the model specification by dropping some of other explanatory variables. Perhaps one of the reasons that most of the explanatory variables in Jones-Lee et al. (1985) were not statistically significant is due to including 5 explanatory variables for social class, as well as regressors for income and education. Perhaps, in Jones-Lee et al 's (1985) paper, collapsing these five social class regressors, say to 3, would have improved the significance of the coefficients of the explanatory variables. However, there might be other reasons that these explanatory variables raise a red flag about multicollinearity. For example, Krieger et al. (1997) mentions not only are there interdependence between social class, income and education, but also with health.

At a very fast overview a person can easily recognize that the model has improved. For example, at the end of each table of the Stata gologit2 output, Stata provides a warning about the number of outcomes that have a negative predicted value. After defining the provincial explanatory variables, the number of predicted negative values drops by half from eight to four. This is very important as it is not plausible to have a negative probability. In addition, not many variable coefficients become statistically significant and thus more informative but also the signs of some of the coefficients become more consistent with expectations, as will be discussed in the next section. The mean marginal effect results after remodelling the generalized ordered logit model are demonstrated Table 4.

VI - Quantitative Descriptive Analysis

The first perception when looking at the data of our empirical results this data is that the category, strongly agree and disagree, were people are more persistent or decisive have much more significant explanatory variables, about the double, thus more informative, than the category were people are less decisive; agree and disagree. One of the reasons is that the probabilities of the four possible outcomes must sum to one, if the probability of the *jth*, say "Strongly Agree", rises, then the probability of at least one of the other outcomes must fall. In other words $\sum_j P_{ij} = 1$ implies $\sum_j \Delta P_{ij} = 0$.

The explanatory variable for those whose health status is poor, H4, and Strongly

Agree to pay for cleaner environment has changed from being negative to positive. This makes sense as these people are not suffering in general, say from a desperate illness, at the same level as those whose health is very poor. For, it is more likely that they are willing to contribute for a cleaner environment to preserve their current but critical health status from deteriorating to a very poor level, H5. It is important to mention that the multicollinearity in the eventual restructured model disappeared as the conditional index has dropped by half, from being 44.45 till 21.60.

Explaining the data through the average marginal effect makes such explanation not only easier but also more informative. Because this generalized logistic model includes dummy variables, using the average marginal effect has many advantages over the marginal effect at sample means approach[4]. The average marginal effects are presented Table 4.

Strongly Agree Category

Keeping other things equal, the probability of answering "Strongly Agree" to pay higher taxes for cleaner environment, is 4.4 percentage points lower for those whose health status is good (H2), and 6.7 percentage points lower for those who believe that their health status is Fair (H3) in comparison to those who believe that their health status is "Very Good" (H1). These margins effects are significant at the 1.9% and .5% levels respectively. However there is no significant difference in the probability of answering "Strongly agree" between those whose health status is "Poor"(H4), "Very Poor" (H5), or "Very Good", as the levels of significance are 0.828 and 0.899 respectively. Regarding those whose health is "Good" and "Fair", their results might be justified since healthy people are more likely to enjoy outdoor activities, such as walking in parks, than those who have limited physical capacities. Thus, the respondents whose health is very good might appreciate more the cleaner air and thus be

[4] To learn more about the average marginal effect read Bartus (2005). and Greene (2006, P668).

willing to pay more taxes to keep it. This might be the opposite of what the literature has expected, at least if the person's health benchmark is fair, that sick people are willing to pay more for air pollution reductions than healthier ones. The results for people whose health status is "Poor" or "Very Poor" might be justified as being out of desperation, in other words they are willing to do anything just to keep the hope that they can get better, or most probably, they might be answering out of altruistic concerns that they want to leave a cleaner earth to the next generation so that they don't suffer from pollution- related sickness,. Plus, this might help them to get some inner peace that they do need in the difficult times that they are passing through.

Keeping other things equal, the probability of answering "Strongly Agree" is respectively 11.1, 5.8, 5.9, 5.3, 6.4 and 5.7 percentage points lower for those who fall in the income categories I2, I3, I5, I6, I7, I8 than for those who fall in the lowest income category (I1), these marginal effects are significant at the 10% level. This is perhaps evidence of altruistic, or more probably of careless and irrational answers, since people whose income is low in Canada pay lower taxes, whereas those whose incomes are high already pay a lot of taxes and might not be willing to pay more taxes to subsidize environmental projects. The results also imply that there is no significant difference in the probability, of answering "Strongly Agree" between those who fall in the income categories I4, I9, and I10, vis-a- vis the people who fall in the lowest income class.

Keeping other things equal, the probability of answering "Strongly Agree" for people who live in the Atlantic, Western and Quebec regions not statistically different from that of people who live in Ontario, as the levels of significance of these marginal effects are 0.779, .991 and .637 respectively.

Keeping other things equal, the probability of answering "Strongly Agree" is 14.9

percentage points lower for people who are not members of environmental organizations, (Evolnotmemb), than for those who are active volunteer of environmental organizations. This big difference is perhaps a sign of altruism, for people who are usually engaged in volunteering and charitable activities are more likely than others to answer in an altruistic manner. However, model finds that there is no significant difference in the probability of answering "Strongly Agree" between those who seldom volunteer in environmental organizations (EvolInaActive) and those who are active volunteers members of environmental organizations.

Keeping other things equal, the probability of answering "Strongly Agree" is respectively 3.39, 5.6 and 6.4 percentage points lower for people who sometimes (LifepurposeS), rarely (LifepurposeR), and never (LifepurposeN) think about the meaning and the purpose of life than for those who often think about the meaning of life. All of these marginal effects are significant at the 6.6 % level or less. This shows the importance of personnel beliefs as a determinant of peoples' WTP for a cleaner environment. This might be triggered by altruistic reasons, as caring for others as well as the environment are indispensible virtues in the teachings of many religions and spiritualities.

Agree Category

The real story here is that only one of the explanatory variables has a significant effect on the probability of this response. That variable is having good health, H2. So, keeping other things equal, the probability of answering "Agree" is 6.9 percentage points higher for people who have good health than for those who consider themselves to have very good health, with a level of significance of 0.014. Yet this ambiguity of results for an intermediate category such as "Agree", is to be expected in the ordered response model (see Greene 2006).

Disagree Category

Keeping other things equal, the probability of answering "Disagree" is respectively 19.3, 15.6 and 10.4 percentage points higher for those who fall in the income categories I4, I5 and I7 than for those who fall in the lowest income class I1, these marginal effects are significant at the 0.007 and 0.095 levels respectively.

Keeping other things equal, the probability of answering "Disagree" is 7.2 percentage points lower for Quebec residents (Q) than for Ontario residents, this marginal effect is significant at the 0.078 level. However, there was no statistically significant difference between the residents of Atlantic Canada and the Western region vis-à-vis Ontario.

Keeping other things equal, people who are not members of volunteering environmental organizations (Evolnotmemb) are 11.5 percent more likely to disagree to pay higher taxes for a cleaner environment, at the 7.8 % level of significance, than those who actively volunteer in an environmental organization.

Strongly Disagree Category

Keeping other things equal, the probability of answering "Strongly Disagree" to paying higher taxes for a cleaner environment is 9.8 percentage points higher for those whose health status is poor (H4), than for those who believe that their health status is "Very Good", with a level of significance of 0.082. The results imply that there is no significant difference in the probability of answering "Strongly Disagree" between those whose health status is "Good" (H2), "Fair" (H3), and "Very Poor" (H5), or "Very good".

Keeping other things equal, the probability of answering "Strongly Disagree" is respectively 3.6, 4.3, 4.6, 3.3, 3.2, 5.6, 5.4, and 4.8 percentage points lower for those who fall in the income categories I3, I4, I5, I6, I7, I8, I9 and I10 than for those who fall in the lowest income class (I1), as all of these variables have $p < 5$. So the model shows that increasing income makes people less likely to want to pay higher taxes for the environment.

Keeping other things equal, the probability of answering "Strongly Disagree" is 7.4 percentage points higher for those who live in the western regions (Western), than those who live in Ontario, with a p value of 0.6 percent. There was no statistical significance between the residence of MaritimesNF, Maritimes and Newfound land and Western regions vis-à-vis Ontario region. There was no statistical significance between those who are not residents of MaritimesNF (Maritimes and Newfoundland) and Western regions vis-à-vis Ontario region.

Keeping other things equal, the probability of answering "Strongly Disagree" is 4.2 percentage points lower for those who are inactive volunteers in environmental organizations than for those who are members and actively volunteering in environmental organizations, with a level of significance of 0.045. This result is contrary to expectations; however, it might be a sign of an irrational or altruistic response. For example, these people who are concerned enough about the environment, to become members of environmental organizations, but might have sense of guilt, as they are not active volunteers, and thus might exaggerate their support financially for environment in order to buy inner peace or reduce their sense of guilt. Those who are members and actively volunteering in environmental organisations might not have this sense of guilt, for already they are actively contributing to the environment in kind, and thus might not exaggerate in their responses towards the proposed question. However, consistent with expectations results also show that people who do not volunteer in environmental organizations are also unwilling to pay higher taxes for a cleaner environment.

VII - Conclusion

There is an extensive literature in economics aiming to study whether and how much people are willing to pay to finance environmental programs that can slightly decrease their risk of premature death. However, there is still no consensus about the factors that significantly affect people's WTP for environmental programs. A common problem in most of the literature, besides the ambiguity of people's WTP for environmental programs, is not having an explicit tool for filtering altruistic or focal answers which can lead to double counting or inaccurate results in general. The main finding of this paper is that it founds that people who are, in a statistically significant way, more likely to accept to pay higher taxes for a cleaner environment, are those whose health status is fair, H3, those who are active volunteers in environmental organizations activities, and individuals who often think about the meaning and the purpose of life. Also, these people are more likely to answer out of altruistic concerns. Since the goal of economists is to estimate the person's subjective WTP, this paper suggests that any future contingent evaluation approach includes question about whether the respondents often think about the purpose of life and if they actively engage in volunteering or altruistic activities. In addition, those who belongs to the lowest income classes, but actually are willing to pay higher taxes to cleaner environmental programs raises some concerns. Actually, these people don't pay taxes since at the end of fiscal year, they receive tax credits. It can be concluded that "Lowest" income people might not be serious enough in accepting to pay higher taxes for environmental programs. In order not to discriminate against those who volunteer and those for whom spirituality is an important part of life, two estimates of WTP can be done and the people who earn low incomes. One estimate can include those who answer positively to the questions concerning volunteering and altruistic activities and to the question of how often they think about the meaning of life, and people with "Lowest" income. And another estimate can be done which excludes those respondents. This way, we would have conservative and generous estimates. Eventually, the difference in both estimates can be statically tested to see if there is a significant difference between the two. It is important to conclude by stating once again that the literature has no consensus regarding an accurate estimate or approach for estimating WTP for environmental projects that mildly decrease the likelihood of premature death. Therefore, the government has to cautiously address its environmental policy.

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Table 1. Variable Definitions

Variable name	Definition
ENVR	If the respondent is willing to pay higher taxes for a cleaner environment
Agesq	The square of the respondent's age, 0 otherwise
H1	Equals 1 if health status is very good, 0 otherwise
H2	Equals 1 if health status is good, 0 otherwise
H3	Equals 1 if health status is fair, 0 otherwise
H4	Equals 1 if health status is poor, 0 otherwise
H5	Equals 1 if health status is very poor, 0 otherwise
I1	If the respondent's range of income in Canada under $10,000 per year, 0 otherwise
I2	If the respondent's range of income in Canada, Is between $10,000-$14,999, 0 otherwise
I3	If the respondent's range of income in Canada Is between $15,000-$19,999, 0 otherwise
I4	If the respondent's range of income in Canada Is between $20,000-$24,999, 0 otherwise
I5	If the respondent's range of income in Canada Is between $25,000-$29,999, 0 otherwise
I6	If the respondent's range of income in Canada Is between $30,000-$39,999, 0 otherwise
I7	If the respondent's range of income in Canada Is between $40,000-$49,999, 0 otherwise
I8	If the respondent's range of income in Canada Is between $50,000-$59,999, 0 otherwise
I9	If the respondent's range of income in Canada Is between $60,000-$69,999, 0 otherwise
I10	If the respondent's range of income in Canada Is $70,000 and above per year, 0 otherwise
PEI	If the respondent's province of residence is Prince Edward Island, 0 otherwise
NS	If the respondent's province of residence is Nova Scotia, 0 otherwise
NB	If the respondent's province of residence is New Brunswick, 0 otherwise
QC	If the respondent's province of residence is Quebec, 0 otherwise
ON	If the respondent's province of residence is Ontario, 0 otherwise
MN	If the respondent's province of residence is Manitoba, 0 otherwise
SK	If the respondent's province of residence is Saskatchewan, 0 otherwise
AB	If the respondent's province of residence is Alberta, 0 otherwise
BC	If the respondent's province of residence is British Columbia 0 otherwise
NFLD	If the respondent's province of residence is Newfoundland 0 otherwise

EvolActive	If the respondent is an active volunteer for an environmental organization, 0 otherwise
EvolInActive	If the respondent is not an active volunteer for an environmental organization, 0 otherwise
Evolnotmemb	If the respondent is not a member of an environmental organization 0 otherwise
LifepurposeO	If the respondent often thinks about the purpose of life, 0 otherwise
LifepurposeS	If the respondent sometimes thinks about the purpose of life 0 otherwise
LifepurposeR	If the respondent rarely thinks about the purpose of life, 0 otherwise
LifepurposeN	If the respondent never thinks about the purpose of life, 0 otherwise

Table 2. The Brant test

Variable	chi2	p>chi2	df
ENVR	542.18	0.000	56
Agesq	-10.58	-999.000	2
H2	10.80	0.005	2
H3	5.84	0.054	2
H4	4.68	0.097	2
H5	1.76	0.416	2
I2	5.28	0.071	2
I3	4.06	0.131	2
I4	8.05	0.018	2
I5	7.57	0.023	2
I6	2.91	0.234	2
I7	3.98	0.136	2
I8	8.50	0.014	2
I9	5.06	0.080	2
I10	4.98	0.083	2
NS	166.66	0.000	2
NB	346.05	0.000	2
QC	176.54	0.000	2
ON	234.54	0.000	2
MN	132.29	0.000	2
SK	411.03	0.000	2
AB	193.94	0.000	2
BC	216.52	0.000	2
NFLD	285.24	0.000	2
EvolInActive	1.56	0.459	2
Evolnotmemb	5.81	0.055	2
LifepurposeS	4.64	0.098	2
LifepurposeR	0.04	0.978	2
LifepurposeN	2.33	0.312	2

A significant test statistic provides evidence that the parallel regression assumption has been violated.

Table 3. Ordered Logit Model

Model 1 LRchi2(28)=91.94 Prob>chi2=0.0000 Loglikelihood=-1622.9473 PseudoR2=0.0275		Model 2 LRchi2(84)=180.76 Prob>chi2=0.0000 Loglikelihood=-1578.5397 PseudoR2=0.0542		
Variable	**Model 1 Coefficients**	**Model 2 Strongly agree Coefficients**	**Model 2 Agree Coefficients**	**Model 2 Disagree Coefficients**
ENVR				
Agesq	-1.89e-06 (1.35e-06)	-1.46e-06 (1.46e-06)	-.00005 (.0000382)	-.0000513 (.0000792)
H2	.0458191 (0.113)	.3759021** (.1704284)	-.1147131 (.1289073)	-.0507088 (.2655009)
H3	.1762097 (0.155)	.612939** (.255392)	.1164472 (.1802615)	-.5632634 (.3991307)
H4	.3800336 (0.333)	-.055784 (.4652793)	.2558315 (.3489709)	.9943113** (.4906887)
H5	-.0174402 -0.0174	-.0362548 (.5468317)	-.0743896 (.4604286)	1.027579 (.6743765)
I2	.6022036** (0.300)	1.470273*** (.519394)	.3974777 (.3297485)	-.612201 (.5167676)
I3	.3016297 (0.299)	.5885265 (.4200878)	.3054755 (.3284688)	.9597561* (.5644917)
I4	.5235443* (0.293)	.5391403 (.3975993)	.6685505 (.3180872)	-1.3321** (.5590024)
I5	.4481155 (0.278)	.6411058* (3745705)	.5078596 (.3028593)	-1.265115** (.5453624)
I6	.229409 (0.263)	.5921288* (.3491078)	.1247902 (.2880695)	-.7448243 (.4542914)
I7	.3943781 (0.273)	.6745019* (.3699922)	.3333186 (.2971079)	-.9080701* (.4777384)
I8	.1283877 (0.273)	.6331662* (.3705786)	-.0011381 (.3037761)	-1.820328*** (.6138064)
I9	.0853671 (0.297)	.5404384 (.3995698)	.0345195 (.334669)	1.714298** (.7044137)
I10	.0948523 (0.273)	.4298616 (.3583099)	.0178426 (.3030977)	-1.329244** (.5523715)
NS	-.6398744 (0.654)	-13.70378 (780.1067)	-.5653186 (.7232221)	-.6228742 (1.23941)
NB	-1.109452* (0.669)	-14.65471 (780.1066)	-.6931034 (.7363486)	-1.270977 (1.331029)
QC	-.9133904 (0.593)	-13.93575 (780.1065)	-.8081036 (.6587225)	-1.143124 (1.152349)

ON	-.8007419 (0.591)	-13.84867 (780.1065)	-.6275635 (.6557476)	1.664273 (1.144338)
MN	-.0458311 (0.647)	-12.82767 (780.1068)	-.2149198 (.7116531)	.3487558 (1.178665)
SK	.0447282 (0.630)	-13.14246 (780.1067)	.0547276 (.6943759)	.3323253 (1.164702)
AB	-.3999227 (0.608)	-13.76466 (780.1066)	-.1707068 (.6739132)	.8299766 (1.167795)
BC	-1.163816* (0.604)	-14.30144 (780.1066)	-1.005995 (.6721382)	-1.231282 (1.182421)
NFLD	-.6366617 (0.700)	-13.23248 (780.1069)	-.62521 (.779359)	.8924077 (1.351681)
EvolInActive	-.2907241 (0.368)	-.1168556 (.4090177)	-.32160 (.4541199)	1.330865 (1.165862)
Evolnotmemb	.6695336** (0.293)	.9422011*** (.3297154)	.4859474 (.3355775)	.4765315 (.5639607)
LifepurposeS	.1788564 (0.113)	.2815154* (.167194)	.1887213 (.1280684)	-.3149536 (.2745541)
LifepurposeN	.298791 (0.247)	.5715877 (.4523887)	.1249859 (.2791237)	.6224528 (.4548042)
Cut2	-1.508993** (0.690)			
Cut2	.9667161 (0.690)	Cons: 13.80701 (780.1067)	Cons: -.6971223 (.7647558)	Cons: -.0935721 (1.294091)
Cut3	3.142817*** (0.696)			

*** If the coefficient is significant at 1% level
** If the coefficient is significant at 5% level
* If the coefficient is significant at 10% level

Standard errors in parentheses

Table 4. The mean marginal effect

Variable	Strongly Agree Coefficients	Agree Coefficients	Disagree Coefficients	Strongly Disagre Coefficients
ENVR				
Agesq	2.09e-07 (1.76e-07)	.0000124 (8.30e-06)	-.0000107 (7.96e-06)	-1.93e-06 (4.19e-06)
H2	-.0440775** (.0188398)	0691433** (.0281557)	-.0242945 (.026004)	-.0007713 (.0138973)
H3	-0671714*** (.0240145)	.0365442 (.0414168)	.0503338 (.0389665)	-.0197067 (.0145294)
H4	-.0133223 (.0614563)	-.0774151 (.0813432)	-.0078885 (.0717855)	.0986258* (.0567374)
H5	.0099299 (.078367)	-.0113924 (.101486)	.0808074 (.0921275)	.0822699 (.0757982)
I2	-1112339*** (.0226014)	.0233554 (.0744339)	.1093342 (.069945)	-.0214558 (.0193848)
I3	-.0588565* (.0348581)	-.0080663 (.0727898)	.1034097 (.0706913)	-.0364869** (.0149869)
I4	-.0499792 (.0353589)	-.100203 (.0710535)	.1936522*** (.071543)	-.04347*** (.0124101)
I5	-.0598803* (.0316802)	-.0502332 (.0676485)	.1563046** (.0674254)	-.0461912*** (.0117314)
I6	-.0537295* (.0316974)	.022877 (.0615947)	.0642303 (0583598)	. -.0333779** (.0154385)
I7	-.0641527** (.0306221)	-.0073086 (.0650167)	.1043397* (.0624784)	-.0328784 (.0155437)
I8	-.0577358* (.032064)	0596016 (.0632713)	.0543495 (.0626161)	-.0562153*** (.0089339)
I9	-.0426197 (.0375575)	.0541812 (.0696096)	.0425864 (.0688509)	-.0541479*** (.0089638)
I10	-.0404918 (.0348185)	.0339821 (.0637954)	.0549179 (.062178)	-.0484083*** (.0112541)
MaritimesNF	.0113039 (.0403423)	-.0245663 (.053144)	-.0427125 (.0519688)	.0559748 (.0405447)
Western	-.0002716 (.0236985)	-.040848 (.0336641)	-.0332525 (.0342888)	.0743721*** (.0271814)
QC	.0113248 (.0239772)	.0277194 (.0332248)	-.072034** (.0326519)	0329898 (.0245489)
EvolInaActive	.0137716 (.0532482)	.0541269 (0844971)	-.025421 (.0845149)	-.0424775** (.0211455)
Evolnotmemb	-1491677*** (.0377834)	.0516153 (.067906)	.1150004* (.0653301)	-.017448 (.0288401)
LifepurposeS	-.0339513* (.0180412)	-.0032857 (.0289361)	.0497732* (.0270193)	-.0125361 (.0124879)

LifepurposeR	-.0567026**	-.0569821	.0813197**	.032365
	(.0233893)	(.0416916)	(.0411408)	(.0249137)
LifepurposeN	-.0646217*	.0304282	-.0191266	.0533202
	(.0350972)	(.0645007)	(.0584476)	(.0408772)

*** If the coefficient is significant at 1% level
** If the coefficient is significant at 5% level
* If the coefficient is significant at 10% level

Standard errors in parentheses