Key Factors Correlated with Smoking Cessation in Canada

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Abstract

This paper presents an empirical analysis of the key factors underlying cessation of smoking using data from the 2008 Canadian Tobacco Use Monitoring Survey (CTUMS). The study investigates these key factors by analyzing two aspects of a smoker's quitting behaviour. One is a smoker's actual attempts to quit smoking; the other is a smoker's intention to quit smoking. Logit, probit and Poisson models are used in this paper. The study suggests that a dentist's or a doctor's advice has a positive effect on quitting. Furthermore, the probability of quitting is higher if a smoker agrees with policies to ban smoking in public areas, and if the smoker is male. The study also shows that the more cigarettes smoked per day, the less likely it is that a smoker would quit smoking. Furthermore, the results show that the probability that a smoker intends to quit is lower if the smoker resides in Quebec. In addition, a smoker who has at least one child, who uses a cessation product such as nicotine patch or gum, who is employed, who is more than 19 years old, and who thinks smoking should be banned in the workplace makes more attempts to quit smoking.

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I. Introduction

Smoking is harmful to both smokers and non-smokers who are exposed to second-hand smoke in the environment. In recognition of this fact, World No Tobacco Day is held on May 31 every year; the World Health Organization (WHO) puts forward a new theme each year to fight smoking worldwide. In Canada, 17.9% of Canadians 15 years or older were current smokers in 2008, which is slightly lower than the 18.6% who smoked in 2007.[1] Smoking can induce various diseases, accompanied by large health-care costs. Harrison, Feehan, Edwards and Segovia (2003) estimate that the costs attributed to smoking for hospitals and physicians range from $110 to $140 per capita (based on the 1995 Newfoundland Adult Health Survey). Therefore, policymakers have an incentive to devise various policies to control smoking.

According to Goel (2007), the factors that affect smokers' cessation behaviours are price- or tax-based and nonprice-based. Studies show that cigarettes are a normal good; the short- and long-run price elasticities reported by Gospodinov and Irvine (2005) using Canadian data are in the range (-0.1,-0.3). Although this range is lower than a widely accepted estimate in the range (-0.3,-0.5) which was obtained by Goel and Nelson (2006) and Chaloupka and Warner (2000) in the US case, it still shows that tax policy is a key government policy to combat smoking.

Many nonprice factors affect smokers' cessation behaviours, such as restrictive smoking policies, level of education, opinions on smoking, income, health professionals, household smoking and other factors which researchers believe induce people to quit smoking. Since there are few papers that focus on smokers' quitting behaviours from a Canadian perspective, I chose

[1] The data are from the Canadian Tobacco Use Monitoring Survey, 2008: Cycle 1, Person File, Variable SS_Q10; and the Canadian Tobacco Use Monitoring Survey, 2007: Cycle 1, Person File, Variable SS_Q10.

to study in this paper the factors that induce Canadian smokers to quit smoking. The data in this paper are from the Canadian Tobacco Use Monitoring Survey, 2008: Cycle 1, Person File.

Using a logit or probit model, my study suggests that the probability of quitting is higher if a smoker received a dentist's or a doctor's advice to quit. Furthermore, the probability of quitting is higher if a smoker agrees with policies to ban smoking in public areas, and if the smoker is male. The study also shows that the more cigarettes smoked per day, the less likely it is that a smoker would quit smoking. The findings of this paper should provide some information that can be used by policymakers to control smoking.

This paper proceeds as follows. Section II reviews the relevant literature on the factors that affect quitting smoking. Section III presents the data, the variables and econometric methods applied in this paper. In section IV, I will present and interpret the estimation results.[2] Finally, the conclusions are summarized in the last section.

II. Literature Review

Many researchers have made great efforts to determine the key factors inducing smokers to quit smoking. Many key factors have been identified, but the conclusions have sometimes differed among these studies. In this section, I will examine the models used in previous empirical studies and discuss their main findings.

1. Models, data, and empirical methods

Previous researchers have used various methods to study the key factors that affect smokers' quitting behaviours. We can classify these methods into two categories. The first

[2] The econometric software package SHAZAM 10 is used in this paper.

category includes studies that focus on a specific factor affecting quitting smoking, such as O'Shea and Corah's (1984) study focusing on the role of dentists, Evans at al.'s (1999) investigation of workplace smoking bans', and Kozlowski et al.'s (2007) study of the role of cessation products from the medical field. The findings of this type of study will be discussed in the next subsection.

The second category includes studies that ask which factors affect smokers' quitting behaviours; examples include Keeler, Marciniak and Hu (1999); Feng (2005); Hammar and Fredrik (2005); Costa and Mossialos (2006); Goel (2007); and Kan (2007); whose objectives are similar to those of this paper. Therefore, in this section, I will emphasize the second category of studies and provide an overview of the models, data, and empirical methods of these studies. Table 1 lists the studies in chronological order and summarizes their principal features.

Firstly, table 1 reveals that both microdata and aggregate data are used in empirical studies. Because current smokers do not form a large group of respondents, small sample sizes of between 378 and 1000 appear in Hammar and Fredrik (2005), Costa and Mossialos (2006), and Kan (2007). These data are from Sweden, Europe and Taiwan respectively. Sample sizes are usually larger in U.S. studies, except when aggregate data are used. In Goel's (2007) study, there are only 51 observations corresponding to the 50 states of the U.S. and the District of Columbia.

Secondly, the dependent variable is defined in different ways by different studies. Some studies base their definition of the dependent variable on actual quitting behaviours over a specified period of time, although the period of time may differ. Keeler, Marciniak and Hu (1999) define the dependent variable as being equal to 1 if the individual has quit smoking for one year, and 0 otherwise. In Feng's (2005) study, the dependent variable is equal to 1 for smokers who have quit smoking for less than 12 months and more than 1 month prior to the survey. In Goel

(2007), the dependent variable captures current smokers who smoked every day and tried to quit for 1 day or longer. Although these three definitions are not identical, they all capture the fact that smokers attempt to quit smoking. Other studies look at whether or not the smoker intends to or expects to quit smoking, as in Hammar and Fredrik (2005), Costa and Mossialos (2006), and Kan (2007).

Thirdly, different studies use different econometric models. When the dependent variable is a dummy variable, a probit or logit model is used; when the dependent variable is a categorical variable, a multinomial logit model is employed; and when the dependent variable is a continuous variable, a linear regression model is used. Independent variables can be found in studies that use continuous aggregate data rather than microdata such as in Goel (2007).

Finally, studies vary in their choice of explanatory variables. The most common and critical explanatory variables include whether or not the smoker was advised to quit by a doctor or by his/her children, age, cigarette taxes, level of education, employment status, gender, consider of health risks, income, marital status, number of children, number of cigarettes consumed per day, whether or not the smoker uses patches, cigarette prices, smoking prohibitions at restaurants or at home, purchasing restrictions, and smoking restrictions in the workplace. The justifications given for including these variables are discussed in the next subsection.

2. Principal findings of the previous studies

A number of studies have focused on the responsiveness of cigarette demand to price changes. Feng (2005), Hammar and Fredrik (2005) and Goel (2007) report that a high cigarette price increases the expected probability of smoking cessation. As mentioned in the introduction,

Gospodinov and Irvine (2005) report that the price elasticities in Canada are higher than in the U.S. The reason is probably that cigarette prices are much higher in Canada than in the U.S. In looking at the effectiveness of pricing policies on different demographic groups, Gospodinov and Irvine (2005) also found that youth smoking rates have declined by more than adult rates; this conclusion is the same as that of the study of Gilleskie and Strumpf (2002) for the U.S. As mentioned in Gospodinov and Irvine (2005, 386): some evidence shows that in the United States teen and youth smoking is more price sensitive than adult smoking. Because teens and youth have lower budgets, they are strongly influenced by their peer, and they are also in the period of their life cycle where they may not yet have become addicted.

Ross et al. (2005) apply a unique approach to analyzing the impact of cigarette prices on high school students' smoking cessation. Their approach consists of estimating an equation for the probability that the individual will quit in the future in which quitting is assumed to be a function of future cigarette prices and the socioeconomic characteristics of the individual. They also include in their model a series of dummy variables reflecting future price increases (Ross et al. 2005, 201). Their results show that the estimated price elasticity of demand is between -0.895 and –0.930, which gives stronger support to the view that raising cigarette prices or taxes will induce more youth smokers to quit than adult smokers. DeCicca, Kenkel and Mathios's (2008) study also shows that youth smoking is more tax- or price-responsive than adult smoking.

Public awareness of the potentially harmful effects of second-hand cigarette smoke has increased in recent years, and many firms have begun to adopt workplace smoking restrictions in favour of non-smoking workers. Some researchers have found an interesting relationship between workplace smoking bans and smoking. Evans, Farrelly and Montgomery's (1999) empirical study shows that there is a causal relationship between workplace smoking bans and

reduced smoking; their results indicate that workplace smoking restrictions induce 5 percent of existing employees who smoke to quit smoking, and reduce current smoker consumption by two and a half cigarettes per day, which accounts for more than 10 percent of daily consumption of cigarettes. However, using a different data set, Hammar and Fredrik's (2005) econometric study leads to the contradictory conclusion that regulations in workplaces do not seem to have any effect on smoking cessation, and their conclusion is supported by Goel (2007). Meanwhile Goel (2007) reports that restrictive policies at home are the one of the primary factors leading individuals to quit smoking.

Smoking cessation products such as nicotine patches and gum are recommended by experts in public health to help smokers quit smoking; these products have been used as a smoking cessation aid by many smokers. Kozlowski et al. (2007) provide detailed advice to consumers about how to properly use these cessation products to assist them to quit smoking. Avery et al.'s (2007) study also provides evidence that smoking cessation products encourage smokers' cessation behaviours.

A doctor's advice on quitting smoking can contribute to smokers' cessation behaviours; this conclusion can be found in some medical research. Schofield et al. (1995) emphasize the role of a doctor's advice on quitting, even though other smoking cessation programs are reaching their patients. Dentists may also play an appreciable role in promoting smoking cessation. As O'Shea and Corah (1984, 510) mention in their study, "dentists in general practice can serve as non-smoking role models for their patients, provide information about the health hazards of smoking, give advice, refer patients to cessation programs, recommend cessation measures, and monitor patients' efforts to quit smoking." Another interesting finding is that advice from

smokers' children tends to increase an individual's incentive to quit smoking (Hammar and Fredrik, 2005).

Restrictive smoking policies also contribute to control of smoking. Hammar and Fredrik's (2005) empirical study uses data from the World Health Organization's (WHO) MONICA Project. The study shows that regulations in restaurants, bars and cafés increase smokers' cessation probability. Hersch (2005) and Kan (2007) both find support for restrictive smoking policies among smokers who plan to quit smoking in the near future; these findings imply that restrictive policies may reduce the costs of quitting and provide support for self-control mechanisms.

High income may induce smokers to quit smoking. The explanation may be that smokers are aware that smoking could shorten life; thus by quitting smoking, current smokers with a high income would get more benefit than they could get from smoking. In his paper, Goel (2007) poses the hypothesis that wealthier individuals have more disposalable income and thus greater access to various quitting resources, so that high income prompts smoking cessation behaviours. However, his econometric results do not support his hypothesis. Keeler, Marciniak and Hu (1999), however, show that income is positively correlated with smokers' cessation behaviours.

Education is also a factor that affects smokers' quitting decisions. Feng (2005) argues that more educated individuals better comprehend smoking's harmful effects on long-term health, and thus have more incentive to quit smoking. Furthermore, individuals who have more education would probably acquire high salaries and high retirement income; after quitting smoking, the quitters would gain extra years of consumption. Goel (2007) also mentions that more educated individuals may be less likely to begin smoking.

Age appears as an independent variable in Feng (2005), Hammar and Fredrik (2005), Costa and Mossialos (2006) and Kan (2007). Feng (2005) mentions that middle-aged smokers are more likely to fail to quit,[3] because they face more "barriers" such as life pressure, than very young and very old people when they try to quit smoking. Marital status is a factor that induces smokers to quit smoking; Feng (2005) explains that smoking could bring negative externalities to the smokers' family members, so that quitting smoking is beneficial to the whole family.

From the previous empirical studies, we can see that using different data and different models, researchers arrive at different key factors that affect smokers' quitting behaviours. Since these factors have been identified as key factors by other researchers in both theoretical and empirical studies, they are all important to my study.

In this paper, I will include two types of independent variables in my models of quitting behaviour. First, I will try to include the key factors that have been identified in the previous studies. Second, I will include, where possible, the control variables most commonly used in the previous empirical studies. The independent variables in my paper thus include: whether or not a smoker has a child, whether or not a home has a smoking restriction, cigarette prices, whether or not a smoker uses cessation products, whether or not a smoker received advice from doctors and dentists, income, whether or not a smoker is in favour of banning smoking in public areas or in the workplace, level of education, region of residence, age, marital status, gender and number of cigarettes smoked per day.

[3] In Feng (2005), middle-aged smokers are smokers whose age is in the range (35, 54).

III. Data and Model Specification

1. Data

The data used are from the Person File of Cycle 1 of the Canadian Tobacco Use Monitoring Survey (CTUMS), 2008, which was conducted by Statistics Canada from February to June 2008.[4] The CTUMS is designed to provide data on tobacco use and related issues for Health Canada. Since 1999, Statistics Canada has released CTUMS files twice every year. One file covers February to June, while the other covers July to December. The primary objective of the survey is to provide data that can be used to examine changes in smoking prevalence over time. The CTUMS is conducted in census metropolitan areas in the ten provinces of Canada. Respondents are 15 years or over. The sampling procedure is stratified random sampling, and the survey methods include computer-assisted, random-dialed and telephone interviews.[5]

Cycle 1 of the 2008 CTUMS includes 155 variables, and 9,719 persons took part in the survey. Among the 9,719 respondents, there are 1,891 current smokers, representing 18.1% of the population.[6] Seventy- three point six percent of current smokers smoke every day, while 26.4% of current smokers are occasional smokers. This paper focuses on current smokers' quitting behaviours. Not all current smokers could be included in the sample due to missing data for some variables. For example, only 1,122 current smokers saw a dentist in the past 12 months, and thus the sample size in this paper is constrained by this number. After omitting observations with missing values, the final sample sizes are 963 and 958 for two models respectively.[7]

[4] The data were obtained from the ODESI website: http://search2.odesi.ca/home.xqy.
[5] More details about the sampling methods used can be found in http://search2.odesi.ca/home.xqy.
[6] Weights are used to compute population percentages.
[7] Two models contain same independent variables but different dependent variables.

Compared to previous empirical studies, the sample size used in this paper is larger than that of studies from Sweden, Europe and Taiwan.

As previously mentioned, the explanatory variables which I retrieved from the 2008 CTUMS are in accordance with the principle findings discussed in the above literature review. These variables are related to cessation products used, cigarette prices, the number of children in the household, smoking restrictions at home or in the workplace, prohibitions on smoking in public areas, level of education, employment status, province, age, gender, marital status and number of cigarettes smoked per day. Because of the limitations of the survey itself, some variables, such as cigarette prices, cannot be expressed as a dollar value or must be represented by proxies. For example, I chose the variable "buy discount price brand" to reflect the price effect on quitting behaviour. Furthermore, not all of the variables could be used directly in the model. In the next section, the construction of the new explanatory variables will be explained, and all the explanatory variables will be discussed.

2. Variables

Dependent variables

In examining the problem of how to evaluate smokers' cessation behaviours, previous empirical studies have used two different kinds of dependent variable. As I discussed in section II, one kind of dependent variable is based on the length of time that smokers quit smoking; another kind of dependent variable is based on the smoker's intention to or expectation of quitting smoking.

In this paper too, I examine both actual quitting and intentions to quit. In the 2008 CTUMS file, the variable SC_Q080 is defined as the answer to the question "in the past year,

how many times did you stop smoking for at least 24 hours because you were trying to quit?"[8] I use this variable to construct two alternative dependent variables. The first is a dummy variable (QUIT) that is equal to 1 if the number of attempts to stop smoking for 24 hours is greater than or equal to one. In the data file, the maximum number of attempts to quit is 94. The third dependent variable, NUMQUIT, is the actual number of times the smoker tried to quit during the past year, and is thus equal to the variable SC_Q080.

Intentions to quit are captured in the CTUMS variable SC_Q060, which contains the smoker's answer to the question "are you seriously considering quitting within the next 6 months?" Using this variable, I constructed a dummy variable (INQUIT) that is equal to 1 if a current smoker is seriously considering quitting smoking within the next 6 months, and 0 otherwise, as the second dependent variable.

In the remainder of this paper, when QUIT is the dependent variable, the model is called model 1; when the dependent variable is INQUIT, the model is called model 2; and when the dependent variable is NUMQUIT, the model is called model 3.

Independent variables

Increases in cigarette prices can prompt smokers to quit smoking, as reported by Feng (2005), Hammar and Fredrik (2005), Goel (2007) and Kan (2007). In this paper, the cigarette price is also considered to be an indispensable explanatory variable. However, in the 2008 CUTMS file, this variable cannot be found directly. As an alternative, one can use the variable DVPRICE in the CUTMS file, which is defined as "current smokers who seek to buy discount/regular price brand." Smokers who seek to buy discount price brand cigarettes are

[8] The definitions of all variables from the 2008 CTUMS can be found on the website: http://search2.odesi.ca/home.xqy.

probably more easily influenced by rising cigarette prices. Therefore this variable can substitute for cigarette prices as an explanatory variable appearing in this paper. I constructed a dummy variable (DISPRICE) that is equal to 1 if current smokers buy discount price brand cigarettes, and 0 otherwise.

Other variables related to the price of cigarette also exist in the 2008 CUTMS file. The variable CC_Q30 is defined as "did current smokers buy cigarettes from a First Nation Reserve?"; the variable CC_Q40 is defined as "did current smokers buy cigarettes from the internet?"; the variable CC_Q50 is defined as "did current smokers buy cigarettes by mail order?"; the variable CC_Q60 is defined as "did current smokers buy cigarettes from outside of their provinces?"; and the variable CC_Q70 is defined as "did current smokers buy cigarettes that may have been smuggled?" These variables relate to different ways to buy cheaper cigarettes. I constructed a new explanatory dummy variable (OTHERBUY) that is equal to 1 if current smokers buy cheaper cigarettes using at least one of the above methods.[9]

As an important explanatory variable, Schofield et al. (1995) report that a doctor's advice on quitting smoking is a key factor. In Canada, peoples' health care is funded by a publicly-funded health care system; therefore, smokers have easier access to medical resources when they get ill or desire help for quitting. As is well known, smoking can cause various diseases, so doctors' advice on quitting has an authoritative influence on smokers. In the 2008 CUTMS file, the variable HP_Q020 is defined as "did the doctor advise the current smoker to reduce or quit

[9] Since there are quite a few different methods of buying cheaper cigarettes, one might ask why I did not create separate dummy variables for each of these methods. The reason is that some of the resulting dummy variables take the value 1 for very few observations in the sample. Their estimated coefficients also proved to be extremely large. For example, only 5 respondents in my sample report that they have bought cigarettes from the internet; meanwhile 252 respondents report that they have bought cigarettes from outside their province. But the estimated coefficient of the first dummy variable (internet purchase) is 2.02, while the estimated coefficient of the second dummy variable (out-of-province purchase) is 0.03. These results are obviously unreasonable, probably because of the small number of observations that take the value 1. Therefore I combined these variables together to avoid this problem.

smoking?" I constructed a dummy variable (ADVDOCTOR) that is equal to 1 if current smokers who saw a doctor in the past year received advice from their doctors to reduce or quit smoking.

Dentists may also have an appreciable impact on smoking cessation. As a key factor, dentists' role on quitting appears in O'Shea and Corah (1984). They mention that dentists who are non-smokers can serve as a role model for their smoking patients. Furthermore, non-smokers often have better looking teeth than those of smokers, which may induce smokers to decide to quit after they get advice from their dentists. In the 2008 CUTMS file, the variable HP_Q050 is defined as "did the dentist or dental hygienist advise the current smoker to reduce or quit smoking?" I constructed a dummy variable (ADVDENTIST) that is equal to 1 if current smokers who saw a dentist or dental hygienist in the past year received advice from their dentist or dental hygienist to reduce or quit smoking. The valid cases for this variable are 1122 people, which directly determines the sample size of the models estimated in this paper.

Smoking cessation products can help smokers quit smoking. When smokers want to smoke fewer cigarettes or they are in public areas, such as in a meeting, on a plane or at school, a common option is for them to choose to use nicotine patches or chew gum instead of smoking. Avery et al. (2007) and Kozlowski et al. (2007) conclude that smoking cessation products play an important role in quitting smoking. In the 2008 CUTMS file, the variable CP_Q10 is defined as "used patch-gum to substitute smoking." I constructed a dummy variable (CEPRODUCT) that is equal to 1 if current smokers have ever used nicotine patches or gum when they want to smoke fewer cigarettes or were unable to smoke, and 0 otherwise.

Hammar and Fredrik (2005) indicate that smokers who receive advice from their children to quit smoking are more likely to quit. Unfortunately, in the 2008 CUTMS file a variable with this definition does not exist. However, there is a variable called AGE0014 which is defined as

"number of children in the household age 0-14." It can be used as an explanatory variable because the two variables have similar meanings when children are considered as a smoking cessation factor. I hypothesize that a smoker is more likely to reduce or quit smoking if there is at least one child in his/her household. The reason is that children are always given more care in today's society, and it is widely believed that things harmful to health should be kept away from children. I created a dummy variable (CHILDREN) that is equal to 1 if there is at least one child in a smoker's household.

Restrictive smoking policies at home exert an important role on quitting smoking, as reported by Goel (2007). Such policies may include not allowing anyone to smoke inside the home, including all family members and visitors. Restrictive policies at home ensure that non-smokers are protected from the smoking environment, whether the non-smokers are children or adults. In 2008 in Canada, 87.9% of families had restrictive smoking polices at home, and 82.1% of Canadians are non-smokers. These statistics suggest that restrictive policies also exist in some of the current smokers' homes. In the 2008 CUTMS file, the variable HS_Q20 is defined as "the number of people that smoke inside the home." I created a dummy variable (BANHOME) that is equal to 1 if no one is allowed to smoke at home, and 0 otherwise.

Keeler, Marciniak and Hu (1999) report that income is positively correlated with smokers' cessation behaviours. However, in their recent studies, Feng (2005), Goel (2007) and Kan (2007) find that income does not have a statistically significant effect on quitting smoking. In this paper, I would nonetheless like to include income as an independent variable, in order to test whether this variable is a key factor in smoking decisions in the Canadian case. However, there is no income variable in the 2008 CUTMS file. Instead, I use the variable LF_Q10, which is defined as "in the past 12 months, did you work at a job or business." This categorical variable does not

reflect the true income of a respondent, but does suggest that the individual has some employment income. Thus, I created a dummy variable (EMPLOYED) that is equal to 1 if a respondent worked at a job or business in the past 12 months.

Education is reported by Keeler, Marciniak and Hu (1999) and Feng (2005) as a key factor that prompts smokers to quit smoking. Whereas education also appears in the models of Goel (2007) and Kan (2007) as an independent variable, their results do not seem to support the point made by Keeler, Marciniak and Hu (1999) and Feng (2005). Why is the hypothesis that more educated people would better comprehend the harmful effects of smoking, and would be more likely to quit smoking, supported by some studies? Is it different in various countries? In this paper, I will include education as an independent variable to examine the Canadian case. In the 2008 CUTMS file, the variable DVEDUC is defined as "highest level (grade) of education." This variable contains four sub-categories: "less than secondary," "completed secondary," "completed community college" and "completed university." Using "less than secondary" as the reference group, I created three dummy variables named "HSDIPLOMA," "COLLEGE" and "UNIVERSITY" accordingly.

Smoking prohibition in public areas such as restaurants, bars and s is reported as a key factor in quitting decisions by Hammar and Fredrik (2005) and Kan (2007). Banning smoking in public areas can not only effectively prevent the public environment from being polluted by smoking, but also can control smokers' consumption of cigarettes. In the 2008 CUTMS file, two variables relate to smoking bans in public areas. The variable OS_Q10 is defined as "your opinions on smoking in restaurants;" while the variable OS_Q20 is defined as "your opinions on smoking in bars." I constructed a new dummy variable (BANPUBLIC) that is equal to 1 if a respondent answers "not allowed" to at least one of the above two questions, and 0 otherwise.

Kan's (2007) results suggest that restrictive smoking policies in the workplace exert an influence on the decision to quit smoking, but Goel's (2007) study implies that they do not significantly matter. As is well-known in Canada, smoking is illegal in the workplace. However, smokers who work are often permitted to smoke in a restricted area in the workplace. Nonetheless, this factor is worth including as an independent variable. In the 2008 CUTMS file, the variable OS_Q30 is defined as "your opinion on smoking in workplace." The questionnaire asks whether people agree with smoking bans in the workplace. I created a dummy variable (BANWORK) that is equal to 1 if a respondent gives the answer "not allowed" to the above question, and 0 otherwise.

Married people are more likely to quit smoking than single persons, as reported by Feng (2005). The intuitive explanation is that married people are more aware of smoking's harmful effects on their family members. In the 2008 CUTMS file, the variable DVMARST is defined as "Grouped marital status of respondent." I constructed a dummy variable (MARRIED) that is equal to 1 if a respondent is married or common-law, and 0 otherwise.

Feng (2005), Hammar and Fredrik (2005), Costa and Mossialos (2006) and Kan (2007) use age as an independent variable so as to examine whether some age groups find it easier to quit smoking than others. In the 2008 CUTMS file, the variable AGEGRP5 is defined as "age of respondent - 5 groups." This variable contains five sub-categories: "15-19 years," "20-24 years," "25-34 years," "35-44 years" and "45 years and over." Using "15-19 years" as the reference group, I created a dummy variable named "AGE2024" for "15-19 years;" a dummy variable named "AGE2544" for "25-34 years" and "35-44 years;" and a dummy variable named "AGE45" for those 45 and over.

Gender as an explanatory variable appears in Feng (2005), Hammar and Fredrik (2005), Costa and Mossialos (2006) and Kan (2007). These researchers want to investigate whether gender affects smokers' quitting behaviour. In the 2008 CUTMS file, the variable SEX is described as "respondent's sex." I created a dummy variable (MALE) that is equal to 1 if the respondent is a male, and 0 otherwise.

Region of residence appears as an independent variable in Feng (2005), to determine if there exist difference among regions. In the 2008 CUTMS file, the variable PROV is described "province of the respondent." This variable contains ten sub-categories representing the ten provinces of Canada. Using Ontario as the reference group, I constructed four dummy variables (EASTCOA), (QUEBEC), (PRAIRIE) and (BC). EASTCOA indicates that a respondent is from Nova Scotia, Prince Edward Island, Newfoundland and Labrador or New Brunswick. QUEBEC indicates that a respondent is from Quebec. PRAIRIE indicates that a respondent comes from Manitoba, Saskatchewan or Alberta and BC indicates that a respondent comes from British Columbia.

Feng (2005), Hammar and Fredrik (2005) and Goel (2007) also include the number of cigarettes consumed as an independent variable to examine the effect of smoking addiction on quitting smoking. They believe that more addictive smokers find it harder to quit smoking, but their results do not support this hypothesis. In this paper, I still include it as an independent variable. In the 2008 CUTMS file, the variable DVAVCIG7 is defined as "average number of cigarettes smoked per day." I rename this variable NUMCIG. It is the only non-dummy independent variable in the models of this paper. The maximum cigarette consumption of a smoker is 50 per day.

A complete list of the variables of the regression model 1 and model 2 and their definitions

is provided in table 2.

Descriptive statistics

The descriptive statistics for the sample of model 1 are shown in table 3. The sample includes only current smokers. Except for the variable NUMCIG, whose minimum and maximum values are 0 and 50, respectively, all the variables used in this paper are dummy variables with a maximum value of 1 and a minimum value of 0.

The mean of the dependent variable QUIT is 0.57, which means that 57% of current smokers in the sample tried to quit smoking for 24 hours at least once. Among current smokers, 31% have at least one child. Sixty-one percent of current smokers in the sample have home rules that no one is allowed to smoke at home, no matter whether the smokers are family members or visitors. This is less than the 88% of all survey respondents that have home smoking restrictions; this shows that current smokers have slightly more relaxed home smoking policies than do non-smokers.[10]

The mean of DISPRICE is 0.39, indicating that 39% of current smokers in the sample have bought discount price brand cigarettes. The mean of the variable OTHERBUY is 0.29, which shows that 29% of current smokers bought cigarettes using at least one of the methods "reserve, internet, mail order, outside province, smuggle." Cessation products seem not to be popular among quitters in the sample; only 13% of current smokers use nicotine patches or gum when they are not able to smoke or when they want to smoke fewer cigarettes.

The statistics show that 41% of current smokers in the sample were advised by their doctors to reduce or quit smoking; meanwhile 33% of current smokers have been advised to reduce or quit smoking by their dentists. Of all the current smokers, 85% have a job or a business.

[10] The survey includes non-smokers, but the sample in this paper does not include non-smokers.

Sixty-eight percent of current smokers are of the opinion that smoking should be prohibited in public areas such as restaurants or bars, whereas only 15% of them agree that smoking should not be allowed in the workplace.

Twenty-four percent of current smokers in the sample do not have a high school diploma and 48% of them report "completed secondary" as their highest level of education; current smokers who have attained the education level "completed community college" account for 17% of all current smokers, and 11% of current smokers have a university degree. Nine percent of respondents in the sample live in Ontario, 40% of respondents live in the four Atlantic provinces on the east coast of Canada, 12% of respondents are from Quebec, 32% of respondents live in the Prairie provinces of Canada, and 7% of respondents live in British Columbia.

The age distribution is fairly even in the sample. Twenty-three percent of current smokers are in the age group 15-19; 26% of current smokers are in the age group 20-24; 26% of current smokers belong to the age group 25-44; and 25% of current smokers are 45 and over. Of all the respondents in the sample, 49% are male, which shows that male and female smokers are almost even. Thirty-four percent of respondents are married or common-law in the sample. The average number of cigarettes consumed by a smoker per day is 10.6.

The descriptive statistics for the sample of model 2 are shown in table 4. The mean of the dependent variable INQUIT is 0.68, which means that 68% of current smokers in the sample were seriously considering quitting smoking within the next 6 months. The descriptive statistics of the independent variables are similar to model 1; therefore I do not discuss them further.

3. Econometric methods

Logit and probit models

The dependent variables QUIT and INQUIT are both defined as dichotomous variables. For both dependent variables, it is assumed that the following relationship holds:

$$y_i^* = \beta_0 + X_i'\alpha + Z_i'\beta + P_i'\gamma + R_i'\delta + K_i'\theta + \varepsilon. \qquad (1)$$

Here y_i^* is not observed. y_i^* would be defined as the propensity or ability to stop smoking for 24 hours in model 1, and the propensity to seriously consider quitting smoking within the next 6 months in model 2.

β_0 represents a constant term, while the other vectors are defined as follows: X_i represents a vector that contains the price-related variables DISPRICE and OTHERBUY; Z_i represents a vector that contains the health-related variables ADVDOCTOR and ADVDENTIST; P_i represents a vector that contains the smoking restriction variables CHILDREN, BANHOME, BANPUBLIC and BANWORK; R_i represents a vector that contains the demographic variables EASTCOA, QUEBEC, PRAIRIE, BC, AGE2024, AGE2544, AGE45, MALE and MARRIED; K_i represents a vector that contains the other explanatory variables CEPRODUCT, EMPLOYED, HSDIPLOMA, COLLEGE, UNIVERSITY and NUMCIG; and ε represents a random error term.

The Greek letters α, β, γ, δ and θ represent the coefficients of these vectors. What we observe is a dummy variable y_i defined by

$$y_i = \begin{cases} 1 & if\ y_i^* > 0 \\ 0 & otherwise \end{cases} \qquad (2)$$

From the relationships (1) and (2) we get:

$$p(y_i = 1)$$
$$= p(y_i^* > 0)$$

$$= p(\beta_0 + X_i'\alpha + Z_i'\beta + P_i'\gamma + R_i'\delta + K_i'\theta + \varepsilon > 0)$$
$$= p(\varepsilon > -(\beta_0 + X_i'\alpha + Z_i'\beta + P_i'\gamma + R_i'\delta + K_i'\theta))$$
$$= 1\text{-}F(-(\beta_0 + X_i'\alpha + Z_i'\beta + P_i'\gamma + R_i'\delta + K_i'\theta))$$
$$= F(\beta_0 + X_i'\alpha + Z_i'\beta + P_i'\gamma + R_i'\delta + K_i'\theta), \qquad (3)$$

where F is the cumulative distribution function of ε.

This is the foundation of the probit and logit models. If ε is assumed to be normally distributed, we should use a probit model to estimate the equation (3), otherwise we should use a logit model. In this paper, I do not make an assumption about ε. Instead, I will use both the probit and logit models to estimate the equation (3) for each model, and compare the results between them.

Possion model

The Poisson regression model is appropriate when the dependent variable is a count rather than a continuous variable, as is the variable NUMQUIT. As explained by Greene (2008, 907), the Poisson regression model assumes that the dependent variable y_i follows a Poisson distribution with mean and variance equal to μ_i. In its empirical implementation, the mean μ_i is often assumed to depend on a vector of explanatory variables. Here I assume that the mean is related to the vector of explanatory variables x_i in the following fashion:

$$\ln \mu_i = x_i'\beta, \qquad (4)$$

where β represents the vector of coefficients to be estimated. Under these assumptions, one can estimate β using the method of maximum likelihood.

In this paper, I use the Poisson model when NUMQUIT is the dependent variable. The independent variables are all same as those for model 1. This model is called model 3. The

advantage of this model is that it uses all the available information about attempts to quit smoking. However, it is not clear how the number of attempts to quit is related to actual success.

Before estimating the three regression models, a multicollinearity test is applied to check for potential data problems. The condition index method is used to test for multicollinearity. For models 1 and 3, the same data are used; for these data, the largest value of the condition index is 9.59, which indicates that there are no strong linear relationships between the explanatory variables in models 1 and 3.[11] For model 2, the largest value of the 23 condition indices is 9.60. Again, it is less than 20, implying that there is no multicollinearity problem in model 2. Therefore I do not need to do anything to correct for multicollinearity.

IV. Empirical Results

This section is divided into three parts that correspond to the three models estimated. In model 1, the dependent variable is QUIT, while in model 2 the dependent variable is INQUIT. Since model 1 and model 2 have the same independent variables and logit and probit versions of each are estimated for both, in discussing the two models I will compare the results of the logit and probit models. In contrast, model 3 has a different dependent variable from models 1 and 2 – NUMQUIT – but since it is estimated using the same sample as model 1, in discussing model 3, I will compare it to model 1.

Using the above econometric models, I can test all the theoretical hypotheses regarding the factors that influence the decision to quit smoking that were mentioned in section III. Since the logit and probit models are nonlinear, the estimated coefficient cannot be interpreted directly as in a linear regression model. Therefore, I will emphasize the interpretations of the signs of

[11] I also tried to test for heteroskedasticity. Unfortunately, SHAZAM was unable to carry out the test, probably because too many independent variables entered into the variance.

significant coefficients and their marginal effects on the probability of quitting or intending to quit. The interpretations of the Poisson model results will also focus on the signs of the coefficients and the marginal effects of changes in the explanatory variables.

In this paper, the reference person for the models is a smoker who has no child, whose family imposes a smoking ban, who buys regular price cigarettes or buys cigarettes using ordinary methods, who does not use cessation products, who does not receive quitting advice from doctors or dentists, who is employed, who agrees with policies to ban smoking in public areas, who does not agree with bans on smoking in the workplace, whose highest education level is less than secondary, who resides in Ontario, who is in the age range 15-19, who is female, and who is single.

1. Logit and probit results for model 1

The parameter estimates of the logit and probit versions of model 1 are given in table 5. Table 6 contains the marginal effects of changes in the explanatory variables on the probabilities. The dependent variable for model 1 is QUIT, which is equal to 1 if the smoker tried to quit smoking for 24 hours at least once during the previous year.

Comparing the results of the logit and probit models in tables 5 and 6, we can find some common features: first, the t-ratios of the coefficients of all the independent variables are similar, although the estimated coefficients are obviously different. Second, table 5 tells us that the likelihood ratio test statistic and Maddalas R^2 are almost the same for both methods. Third, table 6 shows that there are only slight differences between the two models in the marginal effects of all the independent variables.

According to Maddala (1992, 328) "we are not likely to get very different results using the logit or the probit method, unless the samples are large." He also suggests that the estimated coefficients of the probit method are comparable to the logit coefficients multiplied by 0.625. In table 5, if we multiply all logit coefficients by 0.625, we indeed get values similar to the probit coefficients. Therefore, although the error term ε is not assumed to be normality, using the logit or the probit model, we get similar results. In the following discussion, I will focus on the logit results, since the interpretations of the probit model are similar.

The likelihood ratio test statistic for the logit model is 51.93 with 23 degrees of freedom, and a p-value of 0.00051; this result indicates that the independent variables jointly have some explanatory power at the five percent significance level. The Maddala R^2 is 0.05, which is small; it also indicates some explanatory power.

Considering the variable CHILDREN, which indicates that a smoker has at least one child at home, table 5 shows that the t-ratio of the coefficient is not statistically significant at the 10 percent level, although the coefficient has the expected positive sign. Therefore we can conclude that the probability of quitting smoking of a smoker who has at least one child is equal to that of a smoker who does not have a child. This conclusion is contrary to the hypothesis posed earlier. The next variable, BANHOME, which represents a policy of banning smoking at home, also has a t-ratio that is not statistically significant at the 10 percent level; thus, we cannot conclude that restrictive smoking policies at home can prompt a smoker to quit smoking. The reason may be that Canadian smokers are used to smoking outside homes, so that restrictive policies at home do not matter in the Canadian case.

The variable DISPRICE, which indicates that a smoker bought discount price brand cigarettes, has a t-ratio of only 1.51, less than the 10 percent critical value. This indicates that the

probability of quitting smoking of a smoker who chooses to buy cheaper cigarettes is not significantly different from that of a smoker who buys regular price cigarettes, although the positive sign of the coefficient indicates it has some positive effect on the dependent variable. The next variable, OTHERBUY, also indicates that a smoker buys cheaper cigarettes, but by some other method; the t-ratio of the coefficient is not statistically significant at the 10 percent level. The results for the coefficients of these two variables suggest that Canadian smokers are not sensitive to cigarette prices.

CEPRODUCT is an independent variable which indicates that a smoker has used nicotine patches or gum when they want to smoke fewer cigarettes or were unable to smoke. The t-ratio of the coefficient is not statistically significant at the 10 percent level; therefore the probability of quitting appears to be no higher for smokers who chew gums than for those who do not.

Next consider the important independent variable ADVDOCTOR, which indicates that the smoker received advice from his/her doctor to reduce or quit smoking. The t-ratio of its coefficient is 2.55, which indicates that the coefficient of ADVDOCTOR is statistically significant at the 5 percent level. This result shows that there is a significantly positive effect of ADVDOCTOR on the dependent variable. This means that a doctor's advice on reducing or quitting smoking has a crucial impact on a smoker. This result is in accordance with the previous theoretical hypothesis. Table 6 indicates that the marginal effect of the variable is 0.10, which indicates that the probability of a smoker's quitting smoking after receiving a doctor's advice to do so is 10 percentage points higher than the probability of a smoker's quitting smoking without receiving a doctor's advice, if all other explanatory variables are held constant.

The results with respect to the independent variable ADVDENTIST, which indicates that a current smoker received advice from their dentist or dental hygienist to reduce or quit smoking,

are similar to those for the variable ADVDOCTOR. The estimated coefficient is statistically significant at the 5 percent level and its positive sign indicates that the variable has a significantly positive effect on the dependent variable. Therefore dentists also play an important role in smokers' quitting decisions, as predicted in the previous section. The marginal effect of the variable is 0.10 in table 6, which suggests that the probability of a smoker's quitting is 10 percentage points higher if he/she received a dentist's advice to do so than if no advice was received, holding all other variables constant.

The variable EMPLOYED, which indicates that a smoker worked at a job or business in the past 12 months, has an estimated coefficient that is not statistically significant at the 10 percent level. This result indicates that the probability of quitting smoking of a smoker who works at a job or business is not significantly different from that of a smoker who does not work.

With respect to smokers' opinions on smoking in public areas, table 5 shows that current smokers who are opposed to smoking in bars and restaurants are more likely to have tried to quit smoking. The coefficient of BANPUBLIC, which indicates individuals who think smoking in bars and restaurants should be banned, is statistically significant at the 5 percent level, and has a positive sign. This result is in accordance with expectations. The marginal effect of BANPUBLIC is 0.11 (see table 6), which implies that the probability of quitting is 11 percentage points higher among smokers who favour a ban on smoking in public areas, holding all else constant.

Although smokers who believe that smoking should be banned in bars and restaurants are more likely to try to quit than those who do not, the same is not true of smokers who believe that smoking should be banned at work. Instead, the coefficient of BANWORK, which indicates that a respondent disagrees with smoking in the workplace, is not statistically significant at the 10

percent level. The reason as I mentioned previously, is probably that in Canada, almost all companies have a smoking area in their workplaces. Thus smokers who agree with banning smoking in the workplace can still smoke during the working hours.

Turning now to the education factor, the reference group is respondents who do not have a high school diploma. However, the coefficient of the three variables HSDIPLOMA, COLLEGE and UNIVERSITY are not statistically significant at the 10 percent level. These results indicates that the probability of quitting smoking for a more educated smoker is no different from that of a smoker who does not finish high school, a finding which conflicts with those of the previous empirical studies.

With respect to the demographic variable region of residence, the reference group is Ontario. The four independent variables EASTCOA, QUEBEC, PRAIRIE and BC represent the remaining four main geographic regions of Canada. The results indicate that there are no significant differences between regions in the probability of quitting smoking.

Regarding the factor age, the comparison age group consists of respondents in the age range 15 to 19 years old. But since the three independent variables AGE2024, AGE2544 and AGE45 do not have statistically significant coefficients at the 10 percent level, one must conclude that the probability of quitting of a young smoker aged 15 to 19 is same as that of a smoker of any other age. This result is inconsistent with some previous empirical studies which found that young smokers tend to quit smoking more easily than adult smokers.

The demographic variable MALE represents male smokers. Table 5 tells us that its coefficient has a t-ratio of 1.84, which indicates that the coefficient is statistically significant at the 10 percent level. Its positive sign implies that male smokers are more likely to quit smoking than female smokers. According to table 6, the marginal effect of being male is 0.07, which

indicates that the probability of a male smoker's quitting smoking is 7 percentage points higher than the probability of a female smoker's quitting smoking, holding all other variables constant.

The independent variable MARRIED indicates that a respondent is married or living common-law. However, the t-ratio of its coefficient is not statistically significant at the 10 percent level. Therefore one must conclude that the probability of quitting smoking is the same for both married and single smokers.[12]

Finally, I discuss the independent variable NUMCIG, which is the average number of cigarettes smoked per day. Its coefficient has a t-ratio of -2.62, which indicates that it is statistically significant at the 5 percent level. Furthermore, its sign is negative. Thus as predicted earlier, the higher the average number of cigarettes a smoker smokes per day, the less likely it is that he/she will quit smoking. The marginal effect of NUMCIG is -0.006, which implies that the probability of quitting is 0.6 percentage points lower if the smoker consumes one more cigarette per day.

2. Logit and probit results for model 2

The parameter estimates of the logit and probit version of model 2 are given in table 7. Table 8 contains the marginal effects of changes in the explanatory variables on the probabilities. The dependent variable for model 2 is INQUIT, which is equal to 1 if a smoker is seriously considering quitting within the next 6 months.

As for model 1, the logit and probit results are similar, so in this section I will once again focus on the interpretation of the logit results. Because only the dependent variable has changed, all the independent variables are the same as for model 1. I will focus on the independent

[12] Single status includes single, widow, divorced and separated.

variables that have coefficients that are statistically significant at the 10 percent level or below. At the end of this section, I will compare the results of models 1 and 2.

The likelihood ratio test statistic for the logit model is 62.26 with a p-value of 0.00002, implying that the model has explanatory power at the 5 percent significance level. The Maddala R^2 is again low at 0.06.

According to table 7, the coefficient of BANPUBLIC is statistically significant at the 5 percent level, as was the case for model 1. It is positively correlated with the dependent variable, intending to quit. The marginal effect of the variable presented in table 7 is 0.12, which suggests that the probability that a smoker intends to quit is 12 percentage points higher if the smoker believes that smoking should be banned in public areas, holding all else constant.

Although model 1 did not reveal any province differences, table 7 shows that in model 2 the coefficient of QUEBEC is negative and statistically significant at the 5 percent level. This result is inconsistent with that of model 1. Since the comparison group is Ontario, the result indicates that the desire to quit smoking is lower in Quebec than in Ontario. Table 7 indicates that the marginal effect of the variable is -0.18, which suggests that the probability of intending to quit smoking of a Quebec smoker is 18 percentage points lower than that of an Ontario smoker, holding all other variables constant.

With respect to the important variable NUMCIG, the variable reflects the degree to which the smoker is addicted. The t-ratio of the coefficient is -2.36, which indicates that the coefficient of the variable is statistically significant at the 5 percent level; this result is same as in model 1. It indicates that the greater the average number of cigarettes a smoker smokes per day, the less likely he/she would seriously considering quitting smoking. According to table 8, the marginal

effect of NUMCIG is -0.005, which implies that the probability of quitting is 0.5 percentage points lower if the smoker consumes one more cigarette per day.

The variables ADVDOCTOR and ADVDENTIST both relate to advice from health care professionals, and both were found to play an important role as in model 1. Table 7 shows that these two variables also have statistically significant coefficients (at the 10 percent level) in model 2. Once again both variables have a positive effect on the dependent variable, which in this case is the intent to quit. However, the marginal effects of the two variables are both 0.10 in model 1, and table 8 shows that the two variables also have same marginal effects of 0.06 in model 2, which indicates that the probability of a smoker's quitting smoking after receiving a doctor's or dentist's advice to do so is 6 percentage points higher than the probability of a smoker's quitting smoking without receiving a doctor's or dentist's advice, if all other explanatory variables are held constant.

Comparing the results for models 1 and 2, one can see that whether or not the dependent variables reflects an actual attempt to stop smoking or simply the intention to stop smoking in the near future, the variables ADVDOCTOR, ADVDENTIST, BANPUBLIC, and NUMCIG matter. In other words, smokers who received advice from a doctor to reduce or quit smoking, who received advice from a dentist to reduce or quit smoking, who think smoking should be banned in public areas, and/or smoke few cigarettes per day are more likely to quit or to intend to quit smoking. Interestingly, gender influences the probability of attempting to quit but not intentions to quit, while living in Quebec is associated with a lower probability of intending to quit but not the probability of actually attempting to quit.

3. Poisson results (model 3)

The parameter estimates of the Poisson model, model 3, are given in table 9. The sample in model 3 is the same as that of model 1, and the dependent variables of model 1 and model 3 are derived from the same variable, SC_Q080 in the 2008 CUTMS file. The difference between the two models is that the dependent variable is a dummy variable in model 1 and a count variable in model 3. The dependent variable for model 3 is NUMQUIT, which measures the number of attempts to stop smoking for 24 hours. In the remainder of this section, I will discuss the results for model 3 and compare them with those for model 1.

Like the logit model, the Poisson model is nonlinear in parameters, so the coefficient estimates cannot be interpreted as direct measures of the effect on the average number of attempts to quit of changes in the explanatory variables. Therefore, I will emphasize the interpretations of the signs of significant coefficients and their marginal effects. The statistic $R^2(p)$ in table 9 is 0.43, which is good for a model with 23 independent variables.[13] The result indicates that the model as a whole has some explanatory power.

The most striking feature of the results in table 9 is that all but two of the coefficients are statistically significant at the 5 percent level. Only the constant term and the dummy variable QUEBEC do not have significant coefficients. This result contrasts sharply with those for models 1 and 2, in which only a few of the coefficients were significantly different from zero. It is not clear why the results should be so different.

Turning now to the interpretation of the estimated coefficients, one can see that many of them have signs that are consistent with theoretical expectation. For example, the positive coefficient of CHILDREN implies that smokers with children make more attempts to quit than smokers without children. Similarly, with respect to the variable CEPRODUCT, its positive sign

[13] Greene (2008, 909) mentions that "$R^2(p)$ can rise when a variable is dropped from model."

also implies that a smoker who uses nicotine patches or gums makes more attempts to quit than a smoker who does not use them.

Table 9 also shows that the health-related variable ADVDENTIST has a significantly positive effect on the dependent variable, which implies that a smoker who received a dentist's advice to quit makes more attempts to quit than a smoker who does not. Next, the variable EMPLOYED's positive coefficient implies that a smoker who works at a job or business makes more attempts to quit than a smoker who does not work.

The two policy-related variables, BANPUBLIC and BANWORK, both have positive signs. These results imply that smokers who agree with policies to ban smoking in public areas or in workplaces make more attempts to quit than smokers who disagree with them. Considering the important variable NUMCIG, again it has a significantly negative effect on the dependent variable, which implies that a smoker who smokes more cigarettes per day makes fewer attempts to quit than a smoker who smokes fewer cigarettes.

However, for some key variables, the signs of the coefficients are inconsistent with expectations and the results are contrary to those for model 1. The negative coefficient of BANHOME implies that a smoker whose family has a policy of banning smoking in the home makes fewer attempts to quit than a smoker whose family is open to smokers. The two price-related variables, DISPRICE and OTHERBUY, both have negative signs, which imply that a smoker who buys cheaper cigarettes makes fewer attempts to quit than a smoker who buys regularly price cigarettes.

The variable ADVDOCTOR has negative coefficient, which implies that a smoker who received a doctor's advice to quit makes fewer attempts to do so than a smoker whose doctor did not advise him/her to quit. The education-related variable HSDIPLOMA, COLLEGE and

UNIVERSITY all have negative coefficients, which imply that a smoker with more education makes fewer attempts to quit than a smoker without a high school diploma. The negative coefficient of MARRIED implies that a smoker who is married makes fewer attempts to quit than a smoker who is single.

According to table 9, the demographic variables have some significant effects: a smoker who resides in the east coast region, the Prairie provinces, or British Columbia makes more attempts to quit than a smoker who resides in Ontario. Male smokers also make more attempts to quit than female smokers. A smoker whose age is 20 or over makes more attempts to quit than a smoker whose age is 15 to 19 years old.

The marginal effects of the independent variables for model 3 can be found in table 9. The maximum value is 1.14 for the variable AGE2024, which indicates that a smoker aged 20-24 will make, on average, 1.14 more attempts to quit than a smoker aged 15-19. The minimum value is -0.34 for the variable UNIVERSITY, which indicates that a smoker who has university degree makes 0.34 fewer attempts to quit than a smoker who has not finished high school. The interpretation of the remaining marginal effects is similar; here I do not discuss them any further.

Comparing the results of models 1 and 3, both have in common the key factors ADVDENTIST, BANPUBLIC, MALE and NUMCIG, which indicate that a smoker who received a dentist's advice to quit smoking, who agrees with banning smoking in public areas, who is male and who smokes fewer cigarettes per day, makes more attempts to quit. In addition, model 3 includes other key factors that lead a smoker to make more attempts to quit: having at least one child at home (CHILDREN), using cessation products (CEPRODUCT), working (EMPLOYED), and favouring a ban on smoking in the workplace (BANWORK). In comparison

to a smoker who is aged 15-19, a smoker who is older makes more attempts to quit (AGE2024, AGE2544 and AGE45).

According to table 9, the factors that prompt a smoker to make fewer attempts to quit in model 3 include: the smoker agrees with banning smoking at home (BANHOME), buys discount price brand cigarettes (DISPRICE), buys cheaper cigarettes in other methods (OTHERBUY), is married (MARRIED), has an education level beyond "less than secondary", and received a doctor's advice to quit smoking (ADVDOCTOR). In contrast, in model 1 the last factor, ADVDOCTOR, appeared to be one of the key factors that could prompt a smoker to quit smoking.

V. Conclusion

In this paper, I investigate the key factors that are correlated with smokers' quitting behaviours. Using the Canadian Tobacco Use Monitoring Survey (CTUMS) allows me to include not only the crucial factors that were used in previous empirical studies, but also some related factors. In addition to applying the logit and probit models used by many previous studies, I introduce another econometric model -- the Poisson model -- to study smoking cessation; from this point of view, my study enriches the existing literature. Using both the logit and probit models, I examine both actual attempts to quit and smokers' intentions to quit smoking. Using the Poisson model, I re-examine the empirical results for attempts to quit smoking by redefining the dependent variable to be the actual number of attempts to quit smoking rather than just a dummy variable.

Several conclusions about the factors that affect smokers' quitting behaviours can be drawn from this study. First of all, my study confirms that a dentist's advice has a positive effect

on quitting. But the effect of a doctor's advice differs depending on the type of model estimated. In a logit or probit model, a doctor's advice has a positive effect on quitting, whereas using a Poisson model, the result is the opposite: a doctor's advice would prompt a smoker to make fewer attempts to quit.

My empirical results suggest that the probability of quitting for a smoker who agrees that smoking should be banned in public areas is higher than that of a smoker disagree those policies. According to my results, the more cigarettes smoked per day, the less likely a smoker is to quit smoking. My empirical results suggest that in Canada, a male smoker is more likely to quit than a female smoker. My empirical results also suggest that a smoker who has at least one child makes more attempts to quit than a smoker with no children.

The empirical results regarding region of residence differ somewhat depending on econometric models. One empirical result suggests that the probability of intending to quit is lower for a Quebec smoker than for a smoker from another region. The other empirical result suggests that there are no differences between Quebec and Ontario smokers, but smokers who reside in the east coast provinces, Prairie provinces or British Columba make more attempts to quit than Ontario or Quebec smokers.

My empirical results suggest that cessation products would prompt a smoker to make more attempts to quit smoking. My empirical results also suggest that a smoker who works makes more attempts to quit than a smoker who does not work. The empirical results suggest that a smoker makes more attempts to quit if the smoker is in favour of banning smoking in the workplaces. In addition, my study examined effect of age on quitting smoking; one result suggests that teenager smokers make fewer attempts to quit than do older smokers, whereas another result shows that age has no effect on quitting smoking.

The empirical results suggest that a smoker makes fewer attempts to quit if there are restrictions on smoking in the smoker's home. My empirical results show that a smoker makes fewer attempts to quit if the smoker is married. My empirical results also suggest that a smoker makes fewer attempts to quit if the smoker had an education level higher than "less than secondary". In addition, my study suggests that a smoker makes fewer attempts to quit if the smoker bought cheaper cigarettes.

Finally, this study has several limitations. First, an important limitation of my study is that my data source has no detailed information on several important factors, such as income and price. Instead, I use some related variables, such as EMPLOYED, DISPRICE and OTHERBUY. Therefore, the empirical results do not directly reflect the effects of these two factors. As a result, the model's explanatory power and the significance of the other independent variables may be affected to some extent.

Second, the striking differences between the logit and probit estimates on the one hand, and the Poisson estimates on the other, raises the question of whether or not these results are believable. It is particularly surprising that nearly all the estimated coefficients are statistically significant for the Poisson model, but not for the other models. Perhaps the Poisson model's underlying restriction that the mean and variance of attempts to quit are the same is not valid, but exploration of alternative models has been left to future research.

Last but not least, because of data limitations, in this paper there is no information about smokers who are successful quitters. As a continuation of this study, using the available up-to-date CTUMS files, I would like to investigate the key factors correlated with successfully quitting smoking.

References

Avery, Rosemary, Donald Kenkel, Dean Lillard and Alan Mathio (2007) "Regulating advertisements: the case of smoking cessation products." *Journal of Regulatory Economics* vol. 31, pp. 185–208.

Chaloupka, F. J. and K. E. Warner (2000) "The economics of smoking, in handbook of health economics" Vol. 1,(Eds) A.J. Culyer and J.P. Newhouse, North-Holland, Amsterdam, pp. 1539-1627.

Costa, Joan and Elias Mossialos (2006) "Which policies effectively enable smoking cessation? evidence from the European Union." *International Journal of Social Economics,* Vol. 33, pp. 77-100.

DeCicca, Philip, Don Kenkel and Alan Mathios (2008) "Cigarette taxes and the transition from youth to adult smoking: Smoking initiation, cessation, and participation." *Journal of Health Economics*, vol. 27, pp.904-917.

Evans, William N., Matthew C. Farrelly and Edward Montgomery (1999) "Do workplace smoking bans reduce smoking?" *The American Economic Review*, vol. 89, pp. 728-747.

Feng, Shuaizhang (2005) "Rationality and self-control: the implications for smoking cessation." *The Journal of Socio-Economics*, vol. 34, pp.211-222.

Gilleskie, D. and K. Strumpf (2002) 'The behavioural dynamics of youth smoking,' *NBER Working Paper* No. 7838.

Goel, Rajeev K. (2007) "Costs of smoking and attempts to quit." *Applied Economics*, vol. 39, pp. 853-857.

Goel, R. K. and M. A. Nelson (2006) "The effectiveness of anti-smoking legislation: a review." *Journal of Economic Surveys*, vol. 20, pp. 325-355.

Gospodinov, Nikolay and Ian Irvine (2005) "A 'long march' perspective on tobacco use in Canada." *The Canadian Journal of Economics,* Vol. 38, pp. 366-393.

Greene, William H. (2008) *Econometric analysis,* 6th edition. Upper Saddle River, NJ: Prentice Hall.

Hammar, Henrik and Fredrik Carlsson (2005) "Smokers' expectations to quit smoking." *Health Economics*, Vol.14, pp. 257–267.

Harrison, Glenn W., James P. Feehan, Alison C. Edwards and Jorge Segovia (2003) "Cigarette smoking and the cost of hospital and physician care." *Canadian Public Policy*, Vol. 29, pp. 1-20.

Hersch, Joni (2005) "Smoking restrictions as a self-control mechanism." *The Journal of Risk and Uncertainty*, vol. 31, pp.5–21.

Kan, Kamhon (2007) "Cigarette smoking and self-control." *Journal of Health Economics*, vol. 26, pp. 61-81.

Keeler, Theodore E., Martin Marciniak and Teh-wei Hu (1999) "Rational addiction and smoking cessation: An empirical study." *The Journal of Socio-Economics*, vol. 28, pp.633-643.

Kozlowski, Lynn T., Gary A. Giovino, Beth Edwards, Joseph DiFranza, Jonathan Foulds, Richard Hurt, Raymond Niaura, David P.L. Sachs, Peter Selby, Katherine M. Dollar, Deborah Bowen, K. Michael Cummings, Mona Counts, Brion Fox, David Sweanor and Frank Ahern (2007) "Advice on using over-the-counter nicotine replacement therapy-patch, gum, or lozenge-to quit smoking." *Addictive Behaviors*, vol. 32, pp. 2140–2150.

Maddala, G.S. (1992) *Introduction to Econom trics*, 2th edition. Englewood Cliffs, NJ: Prentice Hall

O'Shea, Robert M. and Norman L. Corah (1984) "The dentist's role in cessation of cigarette smoking" *Public Health Reports*, vol. 99, pp. 510-514.

Ross, Hana, Lisa M. Powell, John A. Tauras and Frank J. Chaloupka (2005) " New evidence on youth smoking behaviour based on experimental price increase." *Contemporary Economic Policy,* vol. 23, pp.195-210.

Schofield, Penelope E., David J. Hill, Colin I Johnston and Jonathan A. Streeron (1995) "Do doctors stop giving quit-smoking advice when other programs are reaching their patients." *Medical Care*, vol. 33, pp. 161-169.

Table1. Summary of Empirical Studies of Quitting Smoking

Authors	Data source & country	Dependent variable & Model	Independent variables
Schofield at al. (1995)	Questionnaire answered doctors Australia N=515	the extent of encourage to quit; the five items measuring techniques usually employed by the doctor; two items that focussed on the doctor's last working day (dummy variable, logit)	Hospital, time, type of doctor
Evans at al. (1999)	1991,1993 National Health Interview Survey (NHIS) United States N=19956	cigarettes / day for smokers (OLS)	With work area smoking ban V.S Without work area smoking ban
Keeler, Marciniak, & Hu (1999)	1999 California Tobacco Survey & 1992 Tobacco Tax Initiative United States N_1=2728 N_2=7456 N_3=6560	current & former smokers quit smoking for one year categories: (dummy variable; multinomial logit) Y=1: unsuccessful quitters Y=2: successful quitters reference: Y=3: non-quitters	Age, Gender, Race, Income, Education
Ross at al (2005)	1996 The Study of Smoking and Tobacco Use Among Yong People United States N=17287	the probability of future quitting conditioned on a current smoker (dummy variable, probit)	Mix of price increase, $0.50 price increase, $1 price increase, $2 price increase, $4 price increase,

Hersch (2005)	(CPS) Tobacco Use Supplement 1992-93, 1995-96, 1998-99, and 2001-02 United States N=130262	respondent favours banning smoking in that public area (dummy variable; probit) characteristic: Restaurants, Hospitals, Indoor work areas, Bar & cocktail lounges, Indoor sporting events, Indoor shopping malls	Age, Gender, Family income, Married, Previously married, Education, Race, Employed, Cigarettes per day, Tried to quit, Plans to try again, Plans to try to quit for first time
Feng (2005)	(CPS) Tobacco Use Supplements Sep1995, Jan1996 and May 1999. United States N=38709	quit smoking less than 12 months and more than 1 month (dummy variable; probit)	Consider to quit, Family income, Age, Education, Gender, Race, Married status, Region of living, Employed, age when started to smoke, Anti-smoking sentiment index, Restrictions working place, cigarettes consumed per day, Price, Drug use
Hammar & Fredrik (2005)	2004 (WHO) MONICA Project Sweden N=378	Individuals expect to quit smoking (dummy variable; probit)	Price, Cessation subsidy, Purchased restriction, Gender, Partner, Prohibition at workplace, Intent to quit with nicotine, Advice from doctor, Advice from partner, Advice from children, Spouse is a smoker, Children, Health risk are consider, Cigarette consumption, Years smoking, Non-daily smoker, Age, Prohibition at restaurants
Avery at al. (2006)	1989-2002 Competitive Media Reporting (CMR) 1985-2002 The Smoking Cessation Advertisement (SCADS) United States	a smoker attempted to quit; a smoker is a successful quitter	smoking cessation product advertisements seen in past year (0, 5, 10, 15, 20)
Costa & Mossialos (2006)	1995 Eurobarometer survey 43. Europe N=1000	The decision of a smoker to quit smoking (dummy variable; probit)	Household member, Age, Age square, Married status, Gender, Experience with cancer, Smoking cause cancer, Tobacco price index, High regulation country, Advertisement, Medical treatment, Nichotine chew, Patches, Hypnosis, Acupunture, Drug consumption, Ex-smoker, Wishes to quit, Wishes to reduce smoking, Number of times has failed quitting, People smoke at work, Friends smoke

Goel (2007)	2002 CDC, Tax Burden on Tobacco, Statistical Abstract of the U.S N=51	smoker try to quit smoking for 1day or longer (percent of quitters who have tried to quit smoking; OLS)	Price, Education, Income, Medical cost, Smoking restrictions at home, Smoking restrictions at work, People have no health insurance, Per-capita cigarette, consumption in the previous period, and Producer
Kan (2007)	2004 Panel Study of Family Dynamics Taiwan N= 669	smoker intend to quit smoking (dummy variable; probit)	Cigarette tax, A ban on smoking in public areas, A ban on smoking in workplace, Education, Age, Gender, Married status, Health, Income, Number of children, Second hand smoke at home or in workplace, Aware of risk of smoking, Weight control programs
DeCicca & Kenkel (2008)	1992, 2000 Wave of the National Education Longitudinal Study (NELS) United States N_1= 10706 N_2 = 8759 N_3 = 1947	smoking behaviours: Y_1: smoking participation Y_2:smoking initiation Y_3:smoking cessation (dummy variable; probit)	Cigarette tax, Anti-smoking sentiment, Gender, Race, Age, Region of living

Table 2. Variable descriptions

Variable	Description
QUIT	Equals 1 if the number of attempts stop smoking for 24 hours larger than or equals to one
INQUIT	Equals 1 if a current smoker is seriously considering quitting within the next 6 months
CHILDREN	Equals 1 if there is at least one child in a smoker's household
BANHOME	Equals 1 if none people is allowed to smoke at home
DISPRICE	Equals 1 if current smokers buy discount price brand cigarettes
OTHERBUY	Equals 1 if current smokers buy cheaper cigarettes using at least one of the methods "reserve, internet, mail order, outside province, smuggle"
CEPRODUCT	Equals 1 if current smokers have even used nicotine patches when they to smoke fewer cigarettes or were unable to smoke
ADVDOCTOR	Equals 1 if current smokers who saw a doctor and the doctor gives him an advice to reduce or quit smoking
ADVDENTIST	Equals 1 if current smokers who saw a dentist and the dentist gives him an advice to reduce or quit smoking
EMPLOYED	Equals 1 if a respondent has a job or business
BANPUBLIC	Equals 1 if a respondent disagree to smoke in restaurants or bars
BANWORK	Equals 1 if a respondent disagree to smoke in workplaces
Education level:	
Reference	Equals 1 if a respondent highest level is less than secondary
HSDIPLOMA	Equals 1 if a respondent highest level is completed secondary
COLLEGE	Equals 1 if a respondent highest level is completed community college
UNIVERSITY	Equals 1 if a respondent highest level is completed university
Region of residence:	
Reference	Equals 1 if a respondent is from Ontario
EASTCOA	Equals 1 if a respondent is from "N.L." or "P.E.I" or "N.S" or "N.B."
QUEBEC	Equals 1 if a respondent is from Quebec
PRAIRIE	Equals 1 if a respondent is from Manitoba or Saskatchewan or Alberta

BC	Equals 1 if a respondent is from B.C.
Age:	
Reference	Equals 1 if a respondent is in the age 15-19 year old
AGE2024	Equals 1 if a respondent is in the age 20-24 year old
AGE2544	Equals 1 if a respondent is in the age 25-44 year old
AGE45	Equals 1 if a respondent is in the age 45 and over
MALE	Equals 1 if a respondent is a male
MARRIED	Equals 1 if a respondent is married or common-law
NUMCIG	Number of cigarettes smoked per day

Table 3. Descriptive statistics of model 1 (sample size: 963)

Variables	Mean	Standard deviation
QUIT	0.57	0.49
CHILDREN	0.31	0.46
BANHOME	0.61	0.49
DISPRICE	0.39	0.49
OTHERBUY	0.29	0.45
CEPRODUCT	0.13	0.34
ADVDOCTOR	0.41	0.49
ADVDENTIST	0.33	0.47
EMPLOYED	0.85	0.35
BANPUBLIC	0.68	0.46
BANWORK	0.15	0.35
HSDIPLOMA	0.48	0.50
COLLEGE	0.17	0.38
UNIVERSITY	0.11	0.31
EASTCOA	0.40	0.49
QUEBEC	0.12	0.32
PRAIRIE	0.32	0.47
BC	0.07	0.26
AGE2024	0.26	0.44
AGE2544	0.26	0.44
AGE45	0.25	0.43
MALE	0.49	0.5
MARRIED	0.34	0.47
NUMCIG	10.62	8.11
NUMQUIT	3.36	9.20

Table 4. Descriptive statistics of model 2 (sample size: 958)

Variables	Mean	Standard deviation
INQUIT	0.68	0.47
CHILDREN	0.30	0.46
BANHOME	0.61	0.49
DISPRICE	0.39	0.49
OTHERBUY	0.29	0.45
CEPRODUCT	0.13	0.34
ADVDOCTOR	0.41	0.49
ADVDENTIST	0.32	0.47
EMPLOYED	0.86	0.35
BANPUBLIC	0.68	0.46
BANWORK	0.15	0.35
HSDIPLOMA	0.48	0.50
COLLEGE	0.17	0.38
UNIVERSITY	0.11	0.31
EASTCOA	0.40	0.49
QUEBEC	0.12	0.32
PRAIRIE	0.32	0.47
BC	0.07	0.26
AGE2024	0.27	0.44
AGE2544	0.26	0.44
AGE45	0.25	0.43
MALE	0.49	0.5
MARRIED	0.35	0.47
NUMCIG	10.47	8.13

Table 5. Logit and Probit Results of Model 1, Canada, 2008

Variable	Logit model Dependent variable: QUIT	Probit model Dependent variable: QUIT
	Coefficient (t-ratio)	Coefficient (t-ratio)
CHILDREN	0.10 (0.60)	0.06 (0.61)
BANHOME	0.11 (0.73)	0.07 (0.70)
DISPRICE	0.22 (1.51)	0.13 (1.52)
OTHERBUY	0.11 (0.75)	0.07 (0.76)
CEPRODUCT	0.05 (0.22)	0.03 (0.23)
ADVDOCTOR	0.38 (2.55)*	0.24 (2.56)*
ADVDENTIST	0.42 (2.75)*	0.26 (2.76)*
EMPLOYED	0.24 (1.23)	0.15 (1.20)
BANPUBLIC	0.44 (2.92)*	0.27 (2.93)*
BANWORK	-0.14 (-0.69)	-0.08 (-0.70)
HSDIPLOMA	0.15 (0.79)	0.09 (0.79)
COLLEGE	0.13 (0.54)	0.08 (0.54)
UNIVERSITY	-0.20 (-0.76)	-0.13 (-0.77)
EASTCOA	0.03 (0.13)	0.02 (0.15)
QUEBEC	-0.26 (-0.85)	-0.16 (-0.85)
PRAIRIE	0.11 (0.41)	0.07 (0.41)
BC	-0.02 (-0.05)	-0.01 (-0.04)
AGE2024	0.06 (0.27)	0.04 (0.30)
AGE2544	-0.01 (-0.05)	-0.01 (-0.06)
AGE45	-0.13 (-0.51)	-0.08 (-0.51)
MALE	0.27 (1.84)**	0.16 (1.84)**
MARRIED	-0.02 (-0.09)	-0.01 (-0.10)
NUMCIG	-0.02 (-2.62)*	-0.01 (-2.65)*
Constant	-0.64 (-1.67)	-0.39 (-1.66)
Sample size	963	963
Likelihood Ratio Test	51.93 with 23 D.F. (P-Value=0.00051)	51.99 with 23 D.F. (P-Value=0.00050)
Maddala R^2	0.05	0.05

* denotes statistical significance at the 5% level.
**denotes statistical significance at the 10% level.

Table 6. Marginal Effects of Explanatory Variables of Model 1, Canada, 2008

Variable	Logit model Dependent variable: QUIT	Probit model Dependent variable: QUIT
	Marginal effect	Marginal effect
CHILDREN	0.02	0.02
BANHOME	0.03	0.03
DISPRICE	0.05	0.05
OTHERBUY	0.03	0.03
CEPRODUCT	0.01	0.01
ADVDOCTOR	0.10*	0.09*
ADVDENTIST	0.10*	0.10*
EMPLOYED	0.06	0.06
BANPUBLIC	0.11*	0.11*
BANWORK	-0.03	-0.03
HSDIPLOMA	0.04	0.04
COLLEGE	0.03	0.03
UNIVERSITY	-0.05	-0.05
EASTCOA	0.008	0.009
QUEBEC	-0.06	-0.06
PRAIRIE	0.03	0.03
BC	-0.005	-0.004
AGE2024	0.01	0.02
AGE2544	-0.003	-0.003
AGE45	-0.03	-0.03
MALE	0.07**	0.07**
MARRIED	-0.004	-0.004
NUMCIG	-0.006*	-0.006*
Probability of quitting for reference person	0.47	0.47

* denotes statistical significance at the 5% level.
**denotes statistical significance at the 10% level.

Table 7. Logit and Probit Results of Model 2, Canada, 2008

Variable	Logit model Dependent variable: INQUIT	Probit model Dependent variable: INQUIT
	Coefficient (t-ratio)	Coefficient (t-ratio)
CHILDREN	0.04 (0.26)	0.03 (0.30)
BANHOME	0.15 (0.90)	0.08 (0.84)
DISPRICE	0.01 (0.09)	0.01(0.12)
OTHERBUY	0.19 (1.14)	0.11 (1.17)
CEPRODUCT	0.22 (0.98)	0.13 (1.00)
ADVDOCTOR	0.27 (1.67)**	0.17 (1.74)**
ADVDENTIST	0.27 (1.68)**	0.16 (1.60)
EMPLOYED	-0.12 (-0.54)	-0.07 (-0.56)
BANPUBLIC	0.51(3.25)*	0.31 (3.22)*
BANWORK	0.17 (0.78)	0.11 (0.84)
HSDIPLOMA	0.12 (0.62)	0.08 (0.63)
COLLEGE	0.22 (0.85)	0.13 (0.83)
UNIVERSITY	0.48(1.57)	0.29(1.57)
EASTCOA	-0.06 (-0.20)	-0.04 (-0.23)
QUEBEC	-0.74 (-2.28)*	-0.46 (-2.33)*
PRAIRIE	0.23 (0.80)	0.13 (0.74)
BC	-0.17 (-0.47)	-0.10 (-0.46)
AGE2024	-0.30 (-1.29)	-0.18 (-1.29)
AGE2544	0.01 (0.06)	0.01 (0.07)
AGE45	0.009 (0.34)	0.05 (0.33)
MALE	0.07 (0.46)	0.04 (0.46)
MARRIED	0.03 (0.19)	0.02 (0.18)
NUMCIG	-0.02 (-2.36)*	-0.01 (-2.35)*
Constant	0.28 (0.68)	0.19 (0.75)
Sample size	958	958
Likelihood Ratio Test	62.26 with 23 D.F. (P-Value=0.00002)	62.37 with 23 D.F. (P-Value=0.00002)
Maddala R^2	0.06	0.06

*denotes statistical significance at the 5% level.
** denotes statistical significance at the 10% level.

Table 8. Marginal Effects of Explanatory Variables of Model 2, Canada, 2008

Variable	Logit model Dependent variable: QUIT	Probit model Dependent variable: QUIT
	Marginal effect	Marginal effect
CHILDREN	0.01	0.01
BANHOME	0.03	0.03
DISPRICE	0.003	0.004
OTHERBUY	0.04	0.04
CEPRODUCT	0.05	0.05
ADVDOCTOR	0.06**	0.06**
ADVDENTIST	0.06**	0.06
EMPLOYED	-0.03	-0.03
BANPUBLIC	0.12*	0.12*
BANWORK	0.04	0.04
HSDIPLOMA	0.03	0.03
COLLEGE	0.04	0.05
UNIVERSITY	0.10	0.10
EASTCOA	-0.01	-0.01
QUEBEC	-0.18*	-0.18*
PRAIRIE	0.05	0.05
BC	-0.04	-0.04
AGE2024	-0.07	-0.07
AGE2544	0.003	0.004
AGE45	0.02	0.02
MALE	0.02	0.02
MARRIED	0.008	0.007
NUMCIG	-0.005*	-0.005*
Probability of quitting for reference person	0.64	0.64

*denotes statistical significance at the 5% level.
** denotes statistical significance at the 10% level.

Table 9. Poisson Results of Model 3, Canada, 2008

Variable	Poisson model Dependent variable: NUMQUIT	
	Coefficient (t-ratio)	Marginal effect[†]
CHILDREN	0.26 (6.60)*	0.23
BANHOME	-0.34 (-8.61)*	-0.22
DISPRICE	-0.10 (-2.48)*	-0.07
OTHERBUY	-0.11 (-2.62)*	-0.08
CEPRODUCT	0.20 (3.67)*	0.17
ADVDOCTOR	-0.26 (-6.46)*	-0.18
ADVDENTIST	0.29 (7.39)*	0.26
EMPLOYED	0.52 (8.26)*	0.52
BANPUBLIC	0.73 (14.98)*	0.82
BANWORK	0.49 (10.93)*	0.49
HSDIPLOMA	-0.27 (-5.48)*	-0.18
COLLEGE	-0.34 (-5.41)*	-0.22
UNIVERSITY	-0.59 (-7.59)*	-0.34
EASTCOA	0.19 (2.36)*	0.16
QUEBEC	0.02 (0.21)	0.015
PRAIRIE	0.39 (4.98)*	0.37
BC	0.21 (2.06)*	0.18
AGE2024	0.91 (15.81)*	1.14
AGE2544	0.48 (7.37)*	0.47
AGE45	0.30 (4.08)*	0.27
MALE	0.27 (7.08)*	0.24
MARRIED	-0.30 (-6.46)*	-0.20
NUMCIG	-0.04 (-15.02)*	-0.03
Constant	0.16 (1.34)	
Sample size	963	
Poisson R^2 (p)	0.43	

* denotes statistical significance at the 5% level.
[†] marginal effects were calculated by the author.