

# **Three Essays on the Determinants of and Returns to Volunteering**

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## **Dedication**

I dedicate my dissertation to my family. A special feeling of gratitude to my loving parents, Shamsi Pishnamazi and Mohammad Mehdi Seifi for love and support throughout my life. My sisters Farzaneh Seifi and Iesha Crofoot who have never left my side and are very special.

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## Abstract

This thesis consists of three essays on the determinants of and returns to volunteering.

The first essay, ‘volunteer opportunities and volunteering’ examines the relationship between physical access to charitable organizations and volunteering. Formal volunteer activities usually take place within a charitable or non-profit organization. While the physical presence of these organizations is required for citizens who want to contribute to their communities, the availability of charitable organizations (number and type) varies from neighbourhood to neighbourhood. Until now, no one has examined the role played by charity proximity on volunteer decisions. In this paper I use information on the location of registered charities in Canada (from the CRA T3010 registered charity returns) merged with survey information on volunteering (from General Social Surveys conducted by Statistics Canada) to examine how physical access affects volunteer behaviour. Careful attention is paid to the possibility that the measure of access might be endogenous: organizations and individuals may respond to the same unobservable factors when deciding where to locate. Various strategies including an instrumental variables procedure are undertaken to deal with this possibility. My results suggest that access does matter for the decision to volunteer as well as for the amount of time devoted to volunteering. My estimates imply that increasing the number of charitable organizations within a one-kilometre buffer around an individual’s place of residence by 6% (the growth rate of the number charities in Canada (between 2003 to 2009)), increases the predicted probability of volunteering by 5%.

The second essay, ‘the returns to working for free’ examines the relationship between volunteering and income. Previous studies have shown volunteering to be associated with an earnings premium, but many of these studies fail to take into account the possible endogeneity between volunteering and income. Using data from the General Social Surveys (2003, 2005, 2008, 2010 and 2013), I investigate the causal relationship between volunteering and income. I employ a novel instrument, a measure of access to charitable organizations around an individual’s place of residence, along with more conventional ones, like membership or participation in different groups or organizations, to examine this relationship and try to understand how volunteering might affect earned income. Identifying the effect of volunteering of the different subgroups affected by the different instruments provides a (surprisingly) large range of estimates. For example estimates in the upper range found in the literature (53%) are found for individuals who are induced to volunteer because of their membership or participation in sport or recreational organizations, no returns are found for those induced to volunteer because of their membership or participation in school or civic groups, negative returns (22%) are found for those induced to volunteer because of their membership or participation in religious affiliated groups and very large (47%), but imprecise estimates are found for those induced to volunteer because of proximity to charitable organizations.

The third essay, ‘doing good, feeling good: causal evidence from Canadian volunteers’ examines the relationships between volunteering and health, and volunteering and life satisfaction. A literature suggests that volunteers are healthier and happier than their non-volunteering counterparts. But this ‘observation’ is fraught with problems of endogeneity. Some papers have addressed the endogeneity problem with an instrumental variable technique; mostly relying on measures of ‘religiosity’ as instruments. However, no studies of such nature have been conducted in Canada. Using data from the General Social Surveys, I again employ the measure of physical access to charitable organizations within a three-kilometer radius of an individual’s place of residence as the main identifying instrument to examine the causal relationship between volunteering, health and life satisfaction for individuals aged 15 years old and over. Employing a conditional mixed process (CMP) to estimate the model, I conclude that volunteering is a significant predictor of health, and it has a statistically significant effect on life satisfaction for female and middle-aged individuals.

**Key words:** Volunteer, Income, Health, Geo-coding, Endogeneity, Proximity to charities, Charitable organizations.

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## **Introduction**

Contributing to society through volunteering has a long tradition in Canada. According to the most recent Canadian Survey of Giving, Volunteering and Participating (CSGVP), nearly one-half of Canadians aged 15 and over take part in formal volunteer activities. These Canadians contributed 2.1 billion total hours with an average of 156 hours per person in 2010 (Statistics Canada, 2012).

It has been well established that demographic (age, gender and marital status) and socioeconomic (income, education and employment) factors have an important influence on an individual's decision to volunteer. However, studies that examine the impact of contextual factors, like social and environmental characteristics of neighbourhoods on volunteering are rare. The most relevant studies in this area are the ones that investigate the association between neighbourhood characteristics and participating in community activities. For instance, Baum and Palmer (2002) use data from 40 in-depth interviews that were conducted between 1997 and 2000 in the western suburbs of Adelaide in Australia, and show that access to recreational facilities, open spaces and gathering spaces encourages community involvement, whereas a lack of such opportunities deters community participation. Bowling and Stafford (2007) use cross sectional data from Britain to investigate the relationship between socioeconomic characteristics of the neighbourhood, individuals' perception of their neighbourhood, and social and physical functioning of older people. They find that residents who live in an affluent area, perceived to be more neighbourly, with good facilities are more likely to have high social activity. Ziersch et al. (2011), use cross sectional survey data (2004) of 6,768 persons from four suburbs of different socioeconomic level in metropolitan Adelaide in Australia and find that the perceived social

cohesion and higher ratings for local stores and recreational facilities have a positive effect on local community group participation.

Despite the recognition of the importance of neighbourhood factors, there is little understanding of how the physical characteristics of a neighbourhood may affect participation in the community activities. The studies mentioned above mainly rely on subjective indicators to assess the perception of the neighbourhood physical environment on local community participation. My thesis examines in detail one objective physical characteristic of a neighbourhood, namely the number of charitable organizations around a person's place of residence. I focus on the postal code of the individual as the measure of place of residence; and I construct measures of the number of charitable organizations around this residence. All three chapters rely on measures of accessibility to charitable organizations in order to address three different questions.

In chapter 1, I look at whether access to charitable organizations affects individuals' decisions to volunteer. Charity and non-profit organizations are vehicles for citizens who want to contribute to their community, many of which are locally focused and provide services within their own neighbourhood, city, town or rural municipality. However, they are not uniformly distributed across Canada. This spatial difference raises the questions: 1) whether physical access to charitable organizations encourages individuals to undertake more volunteering and 2) whether persons with more access to charitable organizations devote more of their time to volunteer jobs. To date no one has looked at this potentially important determinant of volunteering, and hence addressing these questions constitutes the first chapter of my thesis.

After addressing the endogeneity of access to charitable organizations, I find that individuals who are surrounded by a higher number of charitable organizations are more likely to volunteer,

and likely to volunteer more, relative to others. For example, increasing the number of charitable organizations within one kilometre of an individual's place of residence by 6% (representing the average growth in the number of charities in Canada between 2003 and 2009) raises the predicted probability of volunteering by 5%, a result that is robust to several specifications.

The two remaining chapters use this measure of access to charitable organizations as the primary identifying instrument to examine the causal relationships between volunteering and income (chapter 2) and health and life satisfaction (chapter 3). Both chapters contribute to small literatures on the respective topics and are the first to examine these causal relationships in the Canadian context/with Canadian data.

The striking result from the existing literature examining the causal effect of volunteering on income is the incredibly wide range of estimates found; Cozzi et al. (2013) find a 94% return to volunteering while Bruno and Fiorillo (2016) find a significantly more modest return of only 2%. In chapter 2, in addition to my measure of access, I use three other more conventional instruments: membership or participation in sports or recreational organizations; religious-affiliated groups and school groups, neighbourhood, civic or community groups. An important finding in this chapter is the sensitivity of the estimate of the impact of being a volunteer on income to choice of instruments. For instance, using membership or participation in sport or recreational organizations to identify volunteers, I find that, *ceteris paribus*, taking part in volunteer activities for those who are induced to donate their time for free because of membership or participation in sport or recreational organizations increases income by 53%. However, using membership or participation in religious affiliations as an instrument, reveals a negative causal effect of volunteering on income (22%).

These results provide a way to better understand the wildly different estimated effects of volunteering on income found in the literature. I discuss the fact that the IV estimates are based on a Local Average Treatment Effect (LATE) which helps to explain some of these large differences across specifications. Relying on different instruments means that one is estimating the LATE arising from different groups of compliers (individuals who induced to change their behaviour by the instrument), which can lead to very different estimated effects.

In the final chapter I find that volunteering has a positive causal effect on self-reported health. Volunteering increases the probability of a respondent reporting excellent/very good health status by about 24% point and decreases the probability of respondent reporting of good and fair/poor health status by 10% and 14% points respectively. But, these volunteering effects vary across age groups; its impact on health is found only for younger and middle-aged individuals. Being a volunteer has a positive influence on self-reported life satisfaction for women and middle-aged individuals. Volunteering increases the probability of a women (middle-aged) reporting being very satisfied with life by about 16% (13%) point and decreases the probability of woman (middle-aged) reporting of somewhat and very dissatisfied with life by 13% (11%) and 3% (3%) points respectively.

# Chapter One: Volunteer Opportunities and Volunteering

## 1.1 Introduction

According to the most recent Canadian Survey of Giving, Volunteering and Participating (CSGVP 2010), nearly one half of Canadians aged 15 years and over take part in formal volunteer activities.<sup>1</sup> These individuals contributed 2.1 billion hours in total, with an average of 156 hours per person in 2010, and, according to Statistics Canada (2012) these volunteers' hours are equivalent to about 1.1 million full-time jobs (Vézina and Crompton, 2012). The economic value of volunteering is estimated to be approximately \$50 billion Canadian dollar each year, roughly equal to 3% of gross domestic product (DePratto, 2014).

This estimate of the economic value of volunteering does not take account of all of the benefits associated with volunteer work. Volunteering brings multiple benefits for individual volunteers, society as a whole and the organizations that are active in this sector. Volunteering provides individuals with opportunities to hone their skills on a variety of fronts, to gain important experience and networking opportunities, to have better health and self-esteem and facilitate contributions to community life (e.g., Prouteau and Wolff, 2006; Piliavin and Siegl, 2007). Volunteering strengthens social connections, builds strong, safe and cohesive communities, enhances civic engagement and delivers public goods and service to society (Wu, 2011; Jones, 2006). Charitable organizations often rely upon unpaid labour to run their organizations and deliver their services.<sup>2</sup> For these reasons, a better understanding of the determinants of the volunteering is crucial.

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<sup>1</sup> Formal volunteering is defined as any unpaid help which takes place on behalf of a group or an organization. Informal volunteering is defined as any unpaid help carry out individually outside of a group or an organization. (Vézina and Crompton, 2012).

<sup>2</sup> About 40% of charitable organizations rely of unpaid labour to run their organizations. This number is based on the authors' calculations from the Public Economics Data Analysis Laboratory (PEDAL) database. PEDAL was established in 2002 at McMaster University. It is "a medium security facility that specializes in transforming and



Many determinants of volunteer behaviour have been documented in the literature, including the positive impact of education, income, religiosity and health on volunteering (Fischer et al., 1991; Sundeen, 1988; Caro and Bass, 1997; Rotolo et al., 2010; Sundeen and Raskoff, 1994). In addition, there is evidence that volunteering and community participation are influenced by the physical characteristics of an individual's place of living (Baum and Palmer, 2002). Some studies highlight the influence of neighbourhood services and amenities on volunteering, demonstrating, for example, that individuals who perceive their neighbourhood to be friendlier for walking with easy access to resources such as good quality and affordable foods, library and cultural centers, and sports and recreational facilities, are more likely to participate in social and volunteering activities (Richard et al., 2009; Ziersch et al., 2011; Dury et al., 2016).

A related but yet unexplored aspect of one's environment that might affect volunteer behaviour is access to volunteer opportunities. Being closer to more volunteering opportunities may influence volunteering behaviour in at least two ways. First, proximity is likely to be associated with an increased awareness of volunteer opportunities. Indeed, in the context of job search previous studies have shown that individuals who live further from jobs acquire less information about jobs opportunities, adversely affecting their employment outcomes (Wasmer and Zenou, 2002). Second, individuals may be discouraged from volunteering if they feel that the commute is too long or too difficult. Many non-volunteers cite insufficient free time as the reason they do not take part in volunteer activities (Cleave and Doherty, 2005); a long commute to volunteer jobs might be considered as a barrier that reduces volunteering. Previous studies report a negative relationship between time spent commuting and social participation (Flood and Barbato, 2005). In a recent study, Newman et al. (2014) find that while time spent working does

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analyzing administrative data collected for purposes other than research" (Public Economic Data Analysis Laboratory website, [www.socialsciences.mcmaster.ca/pedal](http://www.socialsciences.mcmaster.ca/pedal), accessed April 18, 2017). PEDAL manages databases which include T3010 data on all registered charities across Canada.

not affect political participation, time spent commuting has a significant negative effect on political participation.

Formal volunteering occurs in non-profit organizations. The term ‘non-profit’ applies to both registered charities and to those organizations that are bound by a non-profit constraint but are not registered charities.<sup>3</sup> Of the 161,000 non-profit organizations in the volunteer sector in Canada, over one and a half are registered charities (Hall, 2005). In 1994, there were 71,413 charitable organization and foundations across Canada, and by 2009 this number reached to 83,668.<sup>4</sup> Over 40% of registered charities have no paid staff and rely exclusively on volunteers to carry out their missions. Many of these organizations are locally focused and provide services within their own neighbourhood, town or rural municipality. However, the number of charitable organizations varies from neighbourhood to neighbourhood. While some neighbourhoods contain a large number of charitable organizations, there are many neighbourhoods with no charitable organizations at all.

In this chapter, I link nationally representative survey data about formal volunteer participation with administrative records about the location of nearby charities. The main questions I ask are: 1) does proximity to charitable organizations affect the decision to volunteer

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<sup>3</sup> According to the *Income Tax Act* the main difference between charitable and other non-profit organizations is that charitable organizations must apply to the Canada Revenue Agency to be approved as a registered charity whereas non-profits do not. Registered charities must file a CRA form (T3010 form) every year; they may issue tax receipts for private donations, permitting the individual to reduce their income-tax obligations; non-profits cannot. Table 1.A1 provides a detailed list of types of organizations that can obtain registered charity status and their activities. Non-profit organizations often include social, recreation or hobby groups (curling clubs, golf clubs), certain amateur sports organizations (hockey associations, baseball leagues) and certain festival organizations (parades, seasonal celebrations).

<sup>4</sup> The CRA designates a registered charity as a charitable organization, a public foundation or a private foundation. The primary mission of charitable organizations is to deliver goods and services while foundations raise funds and distribute these funds among charitable organizations. Both foundations and charitable organizations can provide volunteer opportunities. More than 80% of foundations rely only on unpaid staff to run their organizations. For this reason I do not distinguish between charitable organizations and foundations in my analysis; I use the word charity to refer to all organizations that are registered as charities.

and 2) do persons with more access to charitable organizations devote more of their time to volunteer jobs?

Using the General Social Surveys (2003, 2005, 2008 and 2010) from Statistics Canada and information from the annual submission to the Canada Revenue Agency (CRA) by all registered charities of the form T3010 (2000-2012), I examine the link between access to charitable organizations and the volunteer outcomes. I construct two different measures of access to charitable organizations from an individual's place of residence: (i) the count of charitable organizations within 1-5 km radii and (ii) the distance from an individual's home to the nearest charitable organization. Identifying the causal relationship between proximity to charitable organizations and volunteering is complicated because neither individuals nor charitable organizations randomly select their locations. Unobservable characteristics of a neighbourhood might be correlated with the location decisions of individuals and/or charities and individuals' propensities to volunteer. I address this potential endogeneity in a variety of ways including a control function approach.

I find that individuals who are surrounded by a higher number of charitable organizations are more likely to volunteer, and likely to volunteer more, relative to others. For example, increasing the number of charitable organization within 1km of an individual's place of residence by 6% (representing the average growth in the number of charities in Canada between 2003 to 2009) increases the predicted probability of volunteering by 5%, a result that is robust to several specifications. The estimated effect of proximity is greatest for measures of access capturing smaller buffers (ex. 1km from the individual's place of residence) and decreases as the buffer size is expanded. I also find some evidence to suggest that proximity to charitable organizations is more important to individuals with full-time jobs, and those who have higher

income level, relative to poorer, less employed individuals. I find no heterogeneity in the effect of access by gender or by age group. My results confirm that there is unobserved factors affecting the location of individuals and/or charitable organizations and that not controlling for such endogeneity leads to an underestimation of the effect of access to charitable organizations on volunteering.

The remainder of this paper is organized as follows. In section 2, I introduce the literature on the determinants of volunteer activity. In section 3, I provides a summary of the survey data, and the steps taken to create the access variable. In section 4, I present the methodology. In section 5, I present the results and in section 6 I make a brief conclusion.

## **1.2. Literature Review**

Although no papers have looked at how the presence of charitable organizations affects individuals' decisions to volunteer, a vast literature examines other determinants of volunteering. This work can be grouped into studies that look primarily at individual's socio-demographic characteristics; studies that examine the community factors at the macro and micro levels; and, studies that investigate the relationship between volunteer opportunities and volunteer participation for specific types of volunteer activities. In addition, other studies examine the importance of access to opportunities in contexts other than volunteering.

It is well established that individuals with higher levels of education, greater income (Fischer et al., 1991), who are middle aged (Sundeen, 1988), with better health (Caro and Bass, 1997), who have lived for a longer time at their current residency (Berger, 1991), who own their home (Rotolo et al., 2010) and who attend religious services regularly (Sundeen and Raskoff, 1994) are more likely to participate in volunteer activities than others. In regards to labour force status, the highest amount of volunteering is found among those who are employed. Some studies find that

working full-time is associated with higher rates of participation (Smith, 1994) while others find that working part-time is linked to the higher rates of volunteering (Choi, 2003).

Some studies find that although women participate more in volunteering activities, they devote less of their time to volunteering compared to men (Marriott Senior Living and the U.S. Administration on Aging, 1991). Others find no significant difference between male and female volunteer activities (Fischer et al., 1991). The effect of marital status is similarly hard to pin down: some find that married people are more likely to participate in volunteer activity than others (Chambré, 1984); others find no difference (Fischer et al., 1991). Sundeen (1990) concludes that single people without children do more volunteer work than married people. In regards to family size, studies show that participation in volunteer activities increases with the number of children in the household (Berger, 1991); but parents with older children volunteer more than parents with younger ones (Sundeen, 1990).

In addition to individual-level factors, participation in volunteer activities may also be affected by factors that characterize the physical and the social environment of an individual. Early studies measure residential context at a macro-level such as: the community size, rural versus urban or regional contexts. Curtis et al. (1992) undertake a cross-sectional study using the World Values Survey (1983) for fifteen industrialized countries to investigate whether Americans compared with those from other nations are more likely to participate in volunteer activities. They use community size to control for contextual factors and find that people who live in smaller communities (rural areas and small towns) are more likely to participate in volunteer activities than people from big cities. Hooghe and Botterman (2012), in a cross sectional study, use the 'Social Cohesion Indicator in Flanders' (SCIF) survey of 2,080 persons from 40 different communities in the Flanders region of Belgium to investigate the impact of

urbanization on volunteer associations. They use population density, city size and belonging to a metropolitan area to control for contextual factors, and find no evidence of an urban-rural divide on the scope or intensity of participation in volunteer associations. However when they distinguish between different types of volunteer organizations, they find that urbanization has a negative effect on the participation in traditional associations like senior citizens or family groups. Choi, (2003) use the Asset and Health Dynamics Among the Oldest Old (AHEAD) (1993) survey of 6,465 persons aged 70 and older in the United States to investigate the importance of physical place of living along with personal characteristics on taking part in volunteer activities. She uses the region and a measure of urbanicity to control for environmental factors and finds that people living in the South of the United States are less likely to take part in volunteer activities relative to those living in the West.

Sundeen and Raskoff (1994), in a cross sectional study using the 1991 Gallup national survey of 1,404 teenagers aged twelve to seventeen years old in the United States, examine whether contextual factors, among others, have an independent effect on an individual's decision to take part in volunteer activities. They use a measure of urbanization, community ties and the size of the community in which the individual resides along with the school context (e.g., whether the school requires or encourages volunteer activities) to control for the contextual factors that shape an individual's volunteering. They find that only the community size matters for the decision to take part in volunteer activities. Teenagers residing in smaller cities are more likely to take part in volunteer activities than individuals residing in larger cities. Oliver (2000), use the 1990 American Citizen Participation Study (CPS) and the 1990 Census of 2,500 individuals from more than 800 different places in the United States to investigate associations between city size and local civic participation. They find that individuals living in smaller communities are much

more likely to participate in a variety of local civic activities than individuals living in larger cities. Rotolo and Wilson (2012), in a cross sectional study use the Current Population Survey (CPS) of 273,901 individuals living in the 50 U.S. states, to investigate the association of an institutional factors (the number of non-profit organizations per 1000 persons living in a state) on general, religious, and secular volunteer rates. They find a positive and significant relationship between the density of non-profit organizations and volunteering and this relationship is stronger for those who volunteer in secular organizations.

Volunteer activities take place within a local context. Measuring the context at the macro and aggregated level might be too large to reflect influences on individual volunteering. Studies that examine the associations between contextual factors and volunteering at a local level are very rare. Dury et al. (2016), in a cross sectional study use the Belgian Aging Studies (BAS) survey of 67,144 individuals to investigate the associations between neighbourhood characteristics and taking part in volunteer activities by older people in Belgium. They use the respondents' perceptions of the physical-social dimensions of their neighbourhoods and objective municipality features to control for environmental factors, and find that neighbourhood connectedness, neighbourhood satisfaction and the presence of services have a positive effect on the volunteer activities of older individuals.

Some studies investigate the association between neighbourhood characteristics and participating in community activities. Baum and Palmer (2002) use data from 40 in-depth interviews conducted between 1997 and 2000 in the western suburbs of Adelaide in Australia, and find a relationship between urban infrastructure and participation in social and civic activities. In particular, community involvement is encouraged with access to recreational facilities, open spaces and gathering spaces, and discouraged when these opportunities are

lacking. Bowling and Stafford (2007) use cross sectional data from Britain to investigate the relationship between socioeconomic characteristics of the neighbourhood, individuals' perception of their neighbourhood, and the social and physical functioning of older people. Residents of affluent areas who perceive their neighbourhood to be more neighbourly with good facilities are more likely to be more socially active.

Ziersch et al. (2011) use cross sectional survey data (2004) of 6,768 persons from four socioeconomic suburbs in metropolitan Adelaide in Australia to investigate the association between the perceived characteristics of neighbourhoods and the level of participation in community groups. Perceived social cohesion and higher ratings for local shops and recreational facilities have a positive effect on local community group participation. Buffel et al. (2014) use the Belgian Ageing Studies (BAS), a cross sectional study of 1877 individuals aged 60 years and over, from six medium sized cities in Flanders, Belgium, to examine neighbourhood perceptions and social participation. They use both a range of subjective (such as: neighbourhood services and amenities, neighbourhood user-friendliness, social dimension of neighbourhood) and objective (such as: population size, city resources) measures to control for environmental factors. They find that the subjective neighbourhood assessment of older individuals has a stronger positive effect on formal participation than on informal social activity.

Richard et al. (2013) investigate associations between neighbourhood resources and the social participation of 520 older adults aged 67 to 84 years old in Montreal, Quebec. They use both perceived subjective and objective measures to control for local services and amenities within a neighbourhood. Proximity to selected locations, controlling for individuals' perceptions of neighbourhood characteristics, has a positive effect on social participation. Richard et al. (2009) interviewed 282 older adults aged 58 years old and over in Montreal, Canada, to



investigate the associations between perceived neighbourhood characteristics and participation in social activities. They conclude that the satisfaction associated with dwelling in a neighbourhood, the sense of belonging to the neighbourhood, the user-friendliness of the walking environment, the proximity to social networks and proximity to key services and amenities in a neighbourhood have significant positive effects on participating in social activities.

Charitable and other non-profit organizations represent vehicles for citizen engagement. None of the studies mentioned above investigates the link between access to volunteer opportunities and volunteering. A couple of studies examine the importance of access to blood donation clinics for blood donations. Saberton et al. (2009) using cross-sectional study data include geo-coded data on donor clinics and blood donors from the Canadian Blood Services (2006) to investigate the association between accessibility to donor clinics and blood donations at the census tract level for 40 Census Metropolitan Areas (CMAs), in Canada. They find a significant positive relationship between access and blood donations. Cimaroli et al. (2012) use geo-coded data on blood donor locations and donor clinics (Canadian Blood Service, 2008) to examine the relationship between the frequency of blood donations and clinic locations in the Toronto metropolitan area, Canada. In addition to the donor's characteristics at the individual level, they use a range of the socio economic variables such as: education, number of children and unemployment status, as well as information on access to clinics at the dissemination level (DA). They find that individuals with higher levels of accessibility to the clinics are more likely to return back to donate blood. Esita (2012) uses a similar approach but focuses on the Hamilton (Canada) CMA. She uses the distance to the Central Business District (CBD) and accessibility to clinics to control for the physical environmental factors. She finds a positive and significant relationship between the accessibility to clinics and blood donations.

Although little is known about the importance of accessibility in philanthropic studies, proximity to opportunities and services has been identified as a crucial factor in other contexts. For instance, Chen et al. (2009) use the Adult Needs Assessment Survey (2005) of 3,550 individuals and food landscape data from the Marion County Health Department (2005) to examine the relationship between access to fast food restaurants and grocery stores on obesity in Indianapolis, United States. Along with the socio-demographics and health characteristics of the individual, they count the number of fast food restaurants, grocery stores and serious crime events within a 0.5 mile buffer of an individual's home address to measure neighbourhood characteristics. They find that proximity to fast food restaurants and grocery stores has a significant but small effect on an individual's BMI.

Spence et al. (2009) examine the relationship between the local food environment and obesity among adults in Edmonton, Canada. They use cross-sectional Population Health Survey data from 2002, and find a positive relationship between the numbers of fast-food restaurants, convenience grocery stores and produce vendors near an individual's house and the risk of becoming obese. Åslund et al. (2010) in a quasi-experimental study use a sample of 21,745 refugees, arriving in Sweden in 1990-1991 from the Upsala University geographical database PLACE (compiled by Statistics Sweden) to investigate the impact of job proximity on individuals' employment and earnings. They count the number of jobs within a 5 km buffer of an individual's place of residence to measure the access to job variable. After adjusting for an individual's socio-demographic factors as well as social and environmental characteristics, they find that individuals with poor job access are adversely affected in terms of job outcomes.

Empirical studies on philanthropy and social participations recognize the importance of neighbourhood factors on volunteering and engagement in social activities, but no studies look at

the link between proximity to volunteer opportunities and volunteering. I intend to fill this gap. Moreover, I take account of the endogeneity arising from unobserved factors that affect both neighbourhood selection and volunteer outcomes in order to determine the causal relationship between access to opportunities and volunteering.

### **1.3. Data**

The data for this study come from two main sources; 1) the General Social Surveys (GSS); and 2) the T3010 data from Canada Revenue Agency (CRA) on registered charities. The GSS, first undertaken by Statistics Canada in 1985, is a nationally representative cross-sectional telephone survey that covers one topic annually.<sup>5</sup> The GSS on time use (2005 and 2010) and social engagement (2003 and 2008) collect data on the formal volunteer activities of Canadians, from the volunteer module that asks whether the respondent did unpaid volunteer work for any organization in the past 12 months.<sup>6, 7</sup> The average number of hours per month the respondent volunteered is collected in a categorical variable format. Unlike most social participation surveys, this survey includes the location of the respondent's place of residence at the postal code level, as well as other pertinent information on socio-demographics, health and family characteristics of the individuals.<sup>8</sup>

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<sup>5</sup> The GSS cycle topics are: health; time use; victimization; education, work and retirement, family; social support and aging; access to and use of ICT; social engagement; and volunteering, giving and participation. Each cycle repeats every five years. Computer assisted telephone interviewing (CATI) is used to gather the data across the 10 provinces in Canada.

<sup>6</sup> The GSS on time use is available for the years 1986, 1992, 1998, 2003 and 2010. In this study I use only the data from 2005 and 2010, because: 1) The GSS on time use (1992 and 1998) do not make a clear distinction between formal and informal volunteering, and 2) The GSS on time use (1986, 1992 and 1998) do not provide the postal codes or the addresses of the respondents in the main file which I need to construct my measure of access to charitable organizations.

<sup>7</sup> The time use cycles (2005 and 2010) also gather data on volunteer activities from the time diary component that asks individuals about the total amount of time (in minutes) they dedicated to a range of volunteer activities over the past 24-hours. However, the sample size of respondents that take part in these volunteer activities in the past 24-hours is very small. For this reason I do not include this information in my analysis.

<sup>8</sup> The two main surveys that gather information about Canadian contributory behaviour, including giving, volunteering and participating are the National Survey of Giving, Volunteering and Participation (NSGVP) and Canada Survey of Giving, Volunteering and Participation (CSGVP). I do not use these surveys because the only

Under the *Income Tax Act* registered charities in Canada must file a Registration Charity Return (Form T3010) every year in order to maintain their charitable status. Although these data are publicly available, work has to be done to render the information comparable on a year-to-year basis. Analysts at the Public Economics Data Analysis Laboratory (PEDAL) at McMaster University, Canada have devoted much time to rendering the T3010 data research ready.<sup>9</sup> I accessed the T3010 data remotely from PEDAL, including information on the name, location, field of activity and business numbers of charitable organizations across Canada from 2003 to 2009.

There were 78,205 registered charities across Canada in 2003 and 83,668 in 2009. About 90% are charitable organizations and 10% are charitable foundations. Over 80% of these organizations are located in four provinces: Ontario (35%), Quebec (20%), British Columbia (14%) and Alberta (11%).<sup>10</sup> Religious organizations are the most common and comprise some 39% of the sample, followed by social welfare (21%), education (11%), and culture and arts (9%).

Table 1.1 summarizes the sample size for each cycle of the GSS survey. Starting with a total of 80,339 observations when combining the GSS 2003, 2005, 2008 and 2010, I restrict my sample to individuals 19 years old and over in order to avoid confounding my estimates with volunteering associated with ‘mandatory’ volunteering policies in high-schools in Ontario,

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geographic identifiers for these two surveys are the province and the census metropolitan area (CMA) which is not sufficiently specific for my analysis. Respondents are asked about their place of residence but this information is not available to researchers.

<sup>9</sup> For instance, the PEDAL data set has dealt with duplicates, arising from charities filling more than one return in a given year. Such duplication could arise if a charity changed business numbers or changed their fiscal year.

<sup>10</sup> On a per capita basis while Saskatchewan (5 per 1,000), Prince Edward Island (4 per 1,000) and Manitoba (4 per 1,000) lead the country, Quebec (2 per 1,000) and Newfoundland (2 per 1,000) have the fewest number of charities per capita.

British Columbia and Newfoundland.<sup>11</sup> I also exclude individuals who do not report their volunteer activity (0.7%), and those who do not provide their residential six digit postal code correctly (11%). After these restrictions, I am left with 68,023 observations. To keep as many observations as possible I include individuals who do not respond to other questions of interest by adding controls in the regressions for missing values.<sup>12</sup>

I use two questions from the GSS for describing an individual's participation in volunteer work: did they take part in a formal volunteer activity in the past 12 months, coded as dichotomous yes/no response; and, the average amount of time spent on volunteer work per month over the past year, recorded in the following four categories: more than 15 hours per month; 5 to 15 hours per month; 1 to 4 hours per month; less than 1 hour per month. Following Turcotte and Gaudet (2013), I recode this variable into three categories and I consider people who did an average of five or more hours of volunteer work per month in the past year as regular volunteers, people who did fewer than five hours as irregular volunteers and people who did not volunteer as non-volunteers. I use both measures of volunteering as dependent variables. Table 1.2 presents the definition of all the variables used in this study.

To estimate the models, I include the following socio-demographic variables: sex, age, marital status, education, employment status, household income, indicators for the age of youngest child in the household, and measures of religiosity. I also include measures of perceived health status, the length of time that the respondent lived in current neighbourhood, and immigration status. Variables reflecting the characteristics of the community in which the

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<sup>11</sup> In 1999, Ontario required every high school student to complete 40 hours of community service outside the school before graduating. The two other provinces; British Columbia and Newfoundland and all three territories; Yukon, Northwest Territories, Nunavut have since followed suit.

<sup>12</sup> As a robustness check, instead of including controls for missing responses I drop those observation with missing information. My results are essentially the same.

individual resides are also used in the analysis, including an urban indicator. Systematic differences between provinces are picked up by a set of dummy variables. The friendliness of communities is a subjective measure of the individual's perception of friendliness of their place of residence at the neighbourhood level. To capture possibly non-linear secular trend I include a set of dummy variables for years 2003, 2005, 2008 (2010 is the reference year).

Population density may independently affect volunteer outcomes. On the one hand, closer geographical proximity may create bridges between people to share concerns about common problems and promote civic engagement (e.g., Stein et al., 2004), on the other hand it may spoil social networks and connectedness between citizens. A dense population may require a more complex bureaucracy that would increase the difficulty of participation (e.g., Oliver, 2000) or more generally may mean there is a greater competition for volunteer jobs. I derive population size at the 1-5km buffers from information about population size at dissemination block area.<sup>13</sup> To get population size at 1-5km buffers first I calculate population in each postal code across Canada;<sup>14</sup> then I use the postal code conversion file (PCCF) to find the corresponding coordinates (longitude and latitude) of each postal code;<sup>15</sup> then I construct circles at 1-5km radii distances around each postal code and finally I sum the population for each postal code that falls within the radius distance bands.

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<sup>13</sup> “The dissemination block (DB) is equivalent to a city block bounded by intersecting streets” (Statistics Canada website, [www12.statcan.ca/census-recensement/2011/ref/dict/geo014-eng.cfm?=&wbdisable=true](http://www12.statcan.ca/census-recensement/2011/ref/dict/geo014-eng.cfm?=&wbdisable=true), accessed April 18, 2017).

<sup>14</sup> Data on population size at the postal code level are not available, for this reason I use the geographic attribute files from the 2006 and 2011 censuses which contain population data at the dissemination block level, the lowest geographic level after the postal code level. Then, in order to find out how many postal codes are attributed to each dissemination block, I merge the geographic attribute files with the PCCF file. Finally I divide the population size at the dissemination block by the total number of postal codes that each dissemination block encompasses, which effectively assumes that the population is distributed evenly across postal codes.

<sup>15</sup> The postal code conversion file (PCCF) from the Statistics Canada contains all historical as well as current records for each postal code in Canada. The PCCF in addition to providing a link between six-character postal codes and other Census geographic areas, provides the latitude and longitude coordinates which I use to approximate the location of each postal code.

### 1.3.1. Measuring Accessibility of Charitable Organizations

The accessibility variable is an objective measure reflecting access to charitable organizations at the neighbourhood level. This variable is designed to capture the quantity of volunteer opportunities available to an individual. The literature from urban planning suggests a number of ways in which to measure accessibility. Two commonly used methods, upon which I rely on here, are the coverage and minimum distance approaches (e.g. Talen and Anselin, 1998).<sup>16</sup>

The coverage approach counts the number of organizations within a specified distance from the individual's place of residence. To construct the access variable using this approach, first I use the PCCF to find the corresponding longitude and latitude of the postal codes of individuals from the GSS surveys and for the charitable organizations from the T3010 database.<sup>17</sup> The process of assigning geographic identifiers (x, y coordinates) is called *geocoding* which allows data to be linked geographically to place on the earth (GIS dictionary, [www.esri.com](http://www.esri.com)). I geocoded both GSS and T3010 using the full six digit postal code.<sup>18</sup>

Postal codes in Canada consist of six characters. When the street address is available, postal codes are geocoded based on block-face representative points while in the absence of this

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<sup>16</sup> The simplest method to measure access is the container approach. This approach, adds up the total number of charitable organizations within a defined geographic unit (e.g. postal code, census tracts, Forward Sortation Area (FSA)). However, there are several problems associated with the container approach. First, the container approach is subject to the boundary problem. This means that the container approach would inaccurately report 'weak access' for an individual who lives close to a charitable organization that is located in a different geographic boundary unit. Similarly, it might wrongly report 'high access' for an individual who lives far from a charitable organization that is located in the same geographic boundary unit as the individual.

<sup>17</sup> Given that few changes in the number of charitable organizations occur at a neighbourhood level over a one year period, I use the number of charitable organizations from 2009 for survey data corresponding to 2010.

<sup>18</sup> The geocoding can be based on either a street address or postal code, with the former, being more accurate because it precisely reflects the coordinates of the address. In this study, the GSS survey does not provide the street address of the individual's residence; it only reports the postal code. Both the street and postal code address of the charitable organizations are available in the T3010 data; some of the charitable organizations do not provide their street address correctly and some only provide their post box offices number. For these reasons, I use the postal codes to find the corresponding coordinates of the location of the charitable organizations and the individuals in the sample.

information they are linked to dissemination block (DB) or in some cases to dissemination area (DA) representative points.<sup>19</sup> The block face is the lowest geographical level used by Statistics Canada; for example one side of a city block: “A block-face is one side of a street between two consecutive features intersecting that street” (Statistics Canada, Census dictionary, 2011). After the block face, the dissemination block and dissemination area represent larger geographic units respectively. Constructing a buffer around these representative points is problematic if a postal code covers a large geographic area. If a charitable organization and an individual have the same postal code, then employing geocoding technique based on postal codes rather than the street address might mistakenly assign the distance between an individual’s place of residence and the charitable organizations to be zero while in reality the distance between them could be much larger.

Postal codes in rural areas cover large geographic areas. For this reason, the potential problems just discussed are likely to be more acute. As an alternative measure of access I calculate the minimum distance from each rural postal code to the nearest charitable organization. I find that for more than 80% of rural postal codes, the nearest charitable organization is more than zero kilometers away. This implies that the probability that an individual in the GSS sample has exactly the same postal code as a charitable organization is low.

The second step in calculating the access variable using the coverage approach requires that I calculate a circle of five different radii (1km to 5km) around each individual’s place of living. Third, I count the number of charitable organizations that fall within each circle. I have restricted

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<sup>19</sup> “The dissemination block (DB) is equivalent to a city block bounded by intersecting streets. The dissemination area (DA) composed of one or more neighbouring dissemination blocks, with a population of 400 to 700 persons. All Canada is divided to DB and DA areas” (Statistics Canada, [www.statcan.gc.ca](http://www.statcan.gc.ca)).



access to both the GSS survey and PEDAL databases, which complicates the merging of them. I have to construct buffers at 1-5km radii distances around each 839,000 postal codes in Canada using the PEDAL database and then I merge this file with the GSS surveys.<sup>20</sup> Calculating buffers for such a large data set is computationally intensive; hence I do them on a province by province basis. This may result in; I mistakenly do not count the charitable organizations for individuals who live close to the border of two provinces. I map the data and find out the sample sizes that locate close to the borders are very small (0.2%, 0.9%, 1.4%, 1.9%, and 2.2% for the 1-5km radii respectively).

### **1.3.2. Descriptive Statistics**

Table 1.3 presents some descriptive statistics for my sample. About 37% of GSS respondents were involved in formal volunteer activities within the past 12 months. Among these respondents 22% volunteered over five hours per month and 15% volunteered between one to four hours per month. The mean age of the respondent is 46 years old, with no difference in average age between volunteers and non-volunteers. Nearly, 51% of the respondents are women; they participate more in volunteer activities compared to men. Most of the respondents (67%) are either married or living common law and compared to others they participate more in volunteer activities. On average about 70% of the sample has more than high school education and volunteers have a higher level of education than non-volunteers. Approximately 21% of individuals live in households that earn an annual income of less than \$40,000 and volunteering is more common among individuals with higher household income. Employed people, either in full-time or part-time work have a higher volunteer rate than those who are unemployed. About 54% of individuals report that they are in excellent or in a very good health and taking part in

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<sup>20</sup> The COOL RDC is part of the Statistics Canada, Social Science and Humanities Research Council and university consortium created to secure access for researchers to confidential versions of Statistics Canada databases.

volunteer activity is higher among these groups. The average population within 1-5 km radii of the individual's place of residence is: 6,603, 21,421, 42,027, 68,130 and 97,894 respectively.

The volunteering rate varies considerably across provinces; Saskatchewan with 48%, has the highest volunteer rate and Quebec with 26% has the lowest.<sup>21, 22</sup> Nearly 20% of the sample lives in rural areas and the volunteer rate is higher among for this group at 42% compared with 36% for those living in urban areas. The average numbers of charitable organizations within 1-5 km radii of the individual's place of living is 18, 59, 115, 184 and 264 respectively. Substantial variation is found in the access to charitable organizations across individuals in the sample. Figures 1.1-1.5 presents the distribution of charitable organizations within ranges of five fixed radii from the individual's residential location. Approximately 10% of individuals have zero charitable organizations within 1km radii of their home. By increasing the size of the threshold to 5km radii, the number of respondent with zero charities drops to 1%. Within the 1km radii distance more than 60% of the sample has 1-20 charitable organizations; while at the 5km radii distance 60% of the sample have more than 80 numbers of charitable organizations. I find that the distribution of charities varies dramatically between individuals living in urban and rural areas. In urban areas about 11% of individuals have zero charities within 1km radii distance from their residential location while in rural areas this number is 65%.

The highest numbers of charitable organizations at the 1-5km buffers are found for postal codes located in the primary central business district (CBD) areas in larger cities such as Toronto, Vancouver and Montreal. For example, an individual living in downtown Toronto is

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<sup>21</sup> Having information about the total number observations (68,023), the proportion of volunteers and proportion of individuals in each province from the full sample and volunteers subsamples, it is possible to calculate the volunteer rate across provinces.

<sup>22</sup> CSGVP (2010, 2007 and 2004) and NSGVP (2000) surveys also find that Saskatchewan has the highest volunteer rate and Quebec has the lowest. However, overall volunteer participation according to the GSS surveys is lower. For example in 2010 as reported by GSS 38% of Canadian take part in formal volunteer activities compared to 48% in the 2010 CSGVP.

surrounded, on average, by 695 charitable organizations at 1km radii from his or her home. Looking carefully at these organizations, I find that 51% are charitable organizations, 38% are private foundations and 12% are public foundations. Social services (35%) followed by education (22%), health (12%) and culture and arts (10%) constitute the highest number of these organizations. Of these 695 charities, 306 charities have unique addresses, 264 charities share addresses with at least one other charities, but have unique suite numbers, and 125 charities share a suite with at least one other charity. Although each charitable organization has a unique business number, their extensive concentration in one place may cause them to share volunteers to perform joint tasks.

Charitable organizations are distributed heterogeneously. For example, in Ottawa, charitable organizations are located throughout the city, but mainly situated in a tight geographic area in the downtown known as Centretown. Figure 1.6 shows the distribution of charitable organizations in Ottawa. The areas in red depict neighbourhoods which contain large number of charitable organizations and areas in blue indicate neighbourhoods which contain fewer organizations. There are around 1,731 charitable organizations in Ottawa, and roughly one of every six charitable organizations is located in Centretown, even though the district contains less than one% of the geographical area of the city. There are approximately 134 charitable organizations per square kilometer in Centretown, while there only three charitable organizations per square kilometer in the remainder of the city.

#### **1.4. Methodology**

My first research question is whether access to volunteer opportunities encourages volunteer participation. The latent model representation takes the following form:

$$V_{it}^* = \gamma_1 A_{it} + \gamma_2 A_{it}^2 + X'_{it} \beta + u_{it} \quad (1)$$

$$V_{it} = \begin{cases} 1 & V_{it}^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

where  $V_{it}^*$  is the unobserved latent variable, and  $V_{it}$  (which is observed) takes the value one if individual  $i$  at time  $t$  did any unpaid volunteer activities during the past 12 months, and zero otherwise;  $A_{it}$  is the access to charitable organizations and  $A_{it}^2$  (access squared) is introduced to capture potential nonlinearity.  $X_{it}$  is the vector of socioeconomic controls.<sup>23</sup> Finally, the error term,  $u_{it}$ , is assumed to be normal which implies a probit model.

The parameter of interest is the marginal effect; how does the probability of volunteering change with a one unit change of an explanatory variable (e.g., access at 1km radius).

The second question of interest is whether access to volunteer opportunities encourages participation, where participation is measured in a more detailed fashion. Over the last 12 months, the individual did not participate, participated up to (and not including) five hours per month or participated more than five hours per month. The latent model representation takes the following form:

$$V_{it}^* = \gamma_1 A_{it} + \gamma_2 A_{it}^2 + X_{it}' \beta + u_{it} \quad (2)$$

$$V_{it} = \begin{cases} 3 & V_{it}^* > \tau_2 \\ 2 & \tau_1 < V_{it}^* \leq \tau_2 \\ 1 & \text{otherwise} \end{cases}$$

where again  $V_{it}^*$  is the unobserved latent variable but now,  $V_{it}$  takes on three possible values: the value three if the latent variable is above  $\tau_2$  (respondent volunteered on average more than five hours per month), the value two if it is between  $\tau_1$  and  $\tau_2$  (respondent volunteered on average between zero and five hours per month), and the value one if it is less than  $\tau_1$  (respondent did not

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<sup>23</sup>The socioeconomic factors includes gender, age, marital status, education level, employment status, household income, presence of children in the household, health status, length of time living in Canada, religious attendance, individual's perception about his/her neighbourhood, length of time living in city or local community, set of geographic identifies such as urbanicity, population density and province and years dummies. Please see table 1.2 for the full description of the variables.

volunteer at all).  $A_{it}$ ,  $A_{it}^2$  and  $X_{it}$  are the same as in equation (1). Finally, the error term,  $u_{it}$ , is assumed to be normal, which implies in this case an ordered probit model.

The parameter of interest is the marginal effect; how does the probability of being in bin  $j$  (where  $j$  can be either 1, 2 and 3) change with a one unit change of an explanatory variable (e.g., access at 1km radius).

The parameter of interest is the marginal effect of access to charitable organizations which shows that *ceteris paribus* increasing the number of charitable organization by one unit (e.g., at 1km radius) how much the probability of becoming regular, irregular and non-volunteers changes.

### **1.4.1. Endogeneity**

The models introduced above do not control for the possibility that number of charitable organizations within a threshold distance of the individual's residence may be endogenous. Measures of access may be correlated with unobserved factors associated with individuals' and/or charitable organizations' location decisions and individuals' unobserved propensity to volunteer. For example, individuals predisposed to volunteering may choose to locate in neighbourhoods that support their preferences and have a greater number of volunteer opportunities. Charitable organizations may choose to locate where there is a greater availability of workers and volunteers with specific skills.

My main strategy to address the endogeneity problem is to use IV technique.<sup>24, 25</sup> Note that the standard instrumental variables method (2SLS) is not appropriate when the dependent

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<sup>24</sup> A number of studies in the health and labour economics literature that investigate the importance of neighbourhood characteristics on health and labour market outcomes also employ the instrumental variable technique to deal with endogeneity. For example, Kostova (2011) uses a US cross sectional survey to investigate the effect of urban sprawl and park density on obesity and physical activity. In order to address the endogeneity problem he uses the growth rate of the average park size and rate of increase in the number of parks as instruments for residential sprawl and proximity to neighbourhood parks. Zick et al. (2013), use the number of churches, number

variable is not-continuous as estimates are found to be biased and inconsistent. I use the Control Function (CF) approach which has been proposed by Papke and Wooldridge (2008) to deal with this problem.

Control function requires an identifying instrument that is highly correlated with the accessibility measure; the instrument should only affect the volunteer outcomes through its effect on charitable organization locations, and it should be unrelated to the unobserved individual characteristics affecting volunteering. I use the number of charitable organizations at 35km radius as an instrument for the number of charitable organizations within 1-5km radiuses. The 35km radius includes the number of charities in the 1-5km radiuses. The logic behind using the 35km is that an individual's decision to live in a larger geographic area (say, Ottawa) is determined by a range of factors (like job or school availability) not associated with neighbourhood characteristics per se; the corresponding decision to locate in a specific

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of schools and the proportion of the neighbourhood population under age 16 as exogenous variables which influence the choice of living in a walkable neighbourhood but not obesity. Combes et al. (2008) use long lags of population density and a set of geological variables such as the water capacity of the subsoil as instruments for employment density when estimating the relationship between employment density and market potential on wages for French municipalities. Håkansson and Isacson (2013) use the amount of land and spatial lag of employment density as instruments for the employment density in a model looking at the effect of employment density on wages in Sweden.

<sup>25</sup> An alternative strategy to identify the role of access on volunteering – that would not require an identifying instrument – would be to exploit the variation over time in the number of charities at the postal code level. This estimation strategy would make use of the pooled data, and would include the access and access squared variables as previously defined, and fixed effects for postal codes. Unfortunately, only 11% of postal codes are repeated across cycles – see the table below. To calculate these numbers I keep only one record of the postal code in each cycle. Therefore, including postal fixed effects would mean that 92% of observations from my current sample would not contribute to the identification of the estimated effect of access. Further, the identification would only come from those postal codes for which the number of charities changed between the cycles for which they are observed in the survey data. While this would clearly reduce the observations contributing to identification, it is worth noting that between 2005 and 2009, more than 90% of postal codes across Canada had variations in the number of charities within a 5km radius.

	Frequency	%
Unique postal codes	46,387	89.27
Postal codes repeated two times	3,985	7.66
Postal codes repeated three times	1,009	1.94
Postal codes repeated four times	578	1.11

neighbourhood (say, Centretown) is a choice that is influenced by such characteristics. The 35km radius distance is comparable to the average land area of CMAs in Canada. Since the IV (access at 35km radius) contains the endogenous variables (access at 1-5km radiuses) there exists an obvious correlation between the IV and the endogenous variable. However, this type of instrument (i.e., one that includes the endogenous part) has been employed by previous studies (e.g., Evans et al., 1992; Bertrand et al., 2000 and Deri, 2005). For example, in a Canadian study Deri (2005) uses the endogenous variable constructed based on the larger geographic area (Consolidated Census Sub-Division) as an instrument for the endogenous variable constructed based on the smaller geographic area (Census Sub-Division) without excluding the endogenous part from the instrument when examining the effect of social networks on healthcare utilization. In another context, Kpelitse et al. (2014) use household income at census dissemination area as an instrument for personal income when examining the relationship between income and obesity.<sup>26</sup>

The general idea of the CF approach is to add a (generated) control to the original model, which breaks the correlation between the endogenous explanatory variable and unobservables that are in the error term. It is a two-step approach. In the first step, I calculate the generated control. This is done by regressing my endogenous variable (access within 1-5km radius) on my instrument (access within 35km radius) and the other covariates from the original model. In the second step, I take the residuals from the regression in step 1, and include them as an additional

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<sup>26</sup> To avoid making the number of charitable organizations at 35km radius artificially a good predictor for the number of charitable organizations at 1-5km radiuses, I exclude the number of charitable organizations at 1-5km radiuses from the 35km radius. I use the number of charitable organizations at 1-35km, 2-35km, 3-35km, 4-35km and 5-35km radius bands as instruments for the number of charitable organizations at 1-5km radiuses. I find essentially the same results reported in 1.6 (model 1). For example, at the 1km radius the magnitude of access is 0.33, which is very close to its equivalence number reported in 1.6 (model 1) (i.e., 0.34).

control in my probit (or ordered probit) model.<sup>27, 28</sup> The CF approach requires i)  $(u,v)$  be independent of  $z$ , ii)  $(u,v) \sim$  Bivariate normal, and iii)  $E(u|z, A, v) = \rho v$ , where  $u$  is the error term of the latent model, i.e., equation (1) in the probit case,  $v$  is the error term of the model estimated in step 1 of the CF approach,  $z$  is a vector that includes the instrument, and the other control variables of equation (1) and  $A$  is the endogenous (access) variable. The third identifying assumption, that the conditional expectation be linear, is needed because the original model also has a quadratic access term. The assumptions in the CF approach are stronger than for the 2SLS estimator, which only required that  $z$  and  $u$  not be correlated; but recall that one should not use a 2SLS method when the model is non-linear, as in the probit (ordered probit) case.

Two additional exercises are considered to further examine the importance/severity of endogeneity. First I compare the estimated effect of access at different radii (1-5km); a decreasing estimated effect as the radius distance increases would be consistent with a causal effect. Second, I restrict the sample to individuals who have lived in their neighbourhood for more than ten years, assuming that their residential locations can be considered more ‘exogenous’. More details about these robustness checks are provided below.

## 1.5. Results

I start the analysis by estimating the probability of volunteering and its intensity, equations (1) and (2), ignoring the problem of endogeneity. The marginal effects reported in tables 1.4 and 1.5 give the associations between the probability of taking part in a volunteer activity and the probability of becoming a regular, irregular and non-volunteer and my access variables

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<sup>27</sup> Note that in the CF approach, one still only adds one additional generated control to the probit (or ordered probit) model, even in the case of multiple instruments. This is in contrast to the 2SLS method where if one has, for example, two endogenous variables, one must estimate two first stage equations (one for each endogenous variable).

<sup>28</sup> The standard errors obtained from the first stage regression when manually carrying out control function are generally inappropriate. I apply bootstrapping techniques for the second stage to obtain the adjusted standard errors (Lewbel et al., 2012).



calculated for 1km to 5km buffers from an individual's place of residence. Other individual characteristics and community factors previously discussed were taken into account, the full results are reported in table 1.B1 in the appendix 1.B. Model (1) in tables 1.4-1.5 reveal a positive and significant correlation between the probability of taking part in a volunteer activity and becoming a regular and irregular volunteer and access to charitable organizations and a negative and significant correlation between the probability of becoming a non-volunteer and access to charitable organizations, for the full sample.<sup>29</sup> For example at the 1km buffer size, increasing the number of charitable organization by the growth rate of charities over the years spanned by my data (an increase of 6%), increases the predicted probability of volunteering by 2%, of becoming a regular volunteer (at least 5 hours per month) by 3% and of becoming an irregular volunteer (fewer than 5 hours per month) by 1%. It decreases the probability of becoming a non-volunteer by 1%.<sup>30</sup> Comparing the marginal effects of access variable with the other variables I find that physical proximity to volunteering opportunities has a considerable impact on volunteering. For example, if individuals were to go from non-frequent religious attendance to frequent, it would increase their likelihood of volunteering by 22% point. An increase of one standard deviation (37) in access to charitable organizations at the 1km buffer would increase the probability of volunteering by 13% point (*ceteris paribus*) – a 59% of the impact of religious attendance.

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<sup>29</sup> The summary statistics (table 1.3) and distribution of charitable organizations (figures 1-5) demonstrate that some individuals in the sample are surrounded by huge number of charitable organizations around their residential place of residence. To avoid outliers, I redid the models excluding individuals who have more than 200 charitable organizations within a 1km buffer distance around their homes. The results show that the role of access to charitable organizations on volunteer outcomes is robust to dropping outliers.

<sup>30</sup> The marginal effects are not computed precisely. More specifically, I calculate the marginal effects only for the access variable because the magnitudes for the access squared are very small. However, to check how these imprecise calculations would affect the interpretations of my results, I compute the precise marginal effect for some of the models. To do this, I calculate the marginal effect for the quadratic term (Prediction  $(A+1)^2$ ) and add it to the marginal effect for the non-quadratic term. I conclude that considering the marginal effects of the quadratic term would not change the interpretation of the results. For example, the precise marginal effect for urban areas (CF model, probit) is not exactly the same as the imprecise one, but the differences occur at fourth/fifth decimals, which would not affect the reported numbers in 1.6 (model 1).

Since rural areas are characterized by lower access to volunteer opportunities, and rural commuters on average commute longer distances than their urban counterparts, I would expect access to volunteer opportunities to have a different impact on volunteer outcomes depending on whether an individual lives in an urban or rural area. I thus divide the sample into individuals from urban and rural areas, and find that access to charitable organizations only matters for individuals who live in urban areas (tables 1.4-1.5, Models 2 and 3). Access measured at the 1 to 5km buffers may be too small to capture the relevant volunteer opportunities for most individuals living in a rural area. For this reason I also use the minimum distance approach, to measure the access variable. The idea is that increasing the distance from an individual's home to the closest charitable organization should negatively affect the likelihood of volunteering. This result is found for individuals living in rural areas. The instantaneous rate of change for the minimum distance is 0.16 with a negative sign; for individuals living in rural areas (who do not typically have charities close by), increasing the distance to the nearest charitable organization adversely affects their volunteering behaviour. Individuals living in urban areas have more access to charitable organizations close to home relative to their rural counterparts, and thus do not necessarily choose the closest charitable organization for volunteering.

### **1.5.1. Causal effects of Access to Volunteer Opportunities**

As previously mentioned, the number of charitable organizations within a specified radius of an individual's place of residence might be correlated with the error term in equations (1) and (2). To deal with this problem, I calculate an access variable for a 35km buffer around place of residence and use this as instruments for access within 1-5km radii.

Table 1.6 presents the results from the control function approach of the impact of access to charitable organizations on the probability of participation, and the intensity of volunteering

(equations 3 and 4). The following diagnostic tests are performed. I use the Durbin-Wu-Hausman test to test for the endogeneity of access to charitable organizations.<sup>31</sup> I reject the null hypothesis of exogeneity of the access variable indicating that the probit and order probit estimates are inconsistent and IV is to be preferred.<sup>32</sup> I rely on the Cragg-Donald Wald F statistics to verify the correlation between the spatial lag of access to the charitable organization (35km) and the number of charitable organizations at 1-5km is above their boundary. The F statistics above 10 which shows the instrument is highly correlated with the access variable (i.e., is not a weak instrument).<sup>33</sup> This indicates that the instrument is highly correlated with access variable.<sup>34</sup> The first stage regression results for the probability of volunteering are reported in table 1.C1 in the appendix 1.C.

The results reported in table 1.6 show that after taking account of the endogeneity between access and volunteering, access to charitable organizations is found to have a positive and significant effect on both the decision to volunteer and the intensity of volunteering. The marginal effects indicate that the instantaneous rates of changes for access to charitable organizations are 0.34, 0.10, 0.05, 0.03, and 0.02 for the 1-5km radii distances respectively. Interpreting these magnitudes based on the growth rate of charities over the years spanned by my data, I find that for example at the 1km buffer increasing the number of charitable organizations by 6% increases the predicted probability of volunteering, regular and irregular volunteer by 5%, 7% and 2% respectively and decreases the probability to become non-volunteer by 3%.

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<sup>31</sup> The identifying assumption is that the instrument (access at 3km radius) is a valid instrument.

<sup>32</sup> This is holds true for five different regressions where access is measure in five different ways (1-5km radius).

<sup>33</sup> The correlation ( $F > 10$ ) between the endogenous and the exogenous variables holds true for five different regressions where access is measure at 1-5km radius distances.

<sup>34</sup> To investigate how sensitive the results would be to the choice of the buffer size I re-estimated the models with 25km radii distance as an instrument for the access variables (1-5km). The results are similar to those obtained from using the 35km spatial lag.

Here the magnitudes of the control function coefficients are larger than those reported for the probit and ordered probit models. This finding corroborates those reported elsewhere in different contexts. For instance, Håkansson and Isacson (2013) and Åslund et.al (2010), find, after controlling for residential sorting, that access to jobs has a larger impact on employment when outcomes compared to the OLS specification. This can be as result of the measurement error in access variable might bias the estimated regression coefficients of probit and ordered probit models downward.<sup>35</sup>

Focusing on the average marginal effect of this continuous access variable on the probability of volunteering is unlike to provide an accurate picture of the effect of a one unit change in access (Royston, 2013), because the level of access is quite different across neighbourhoods. For this reason following Royston (2013) I compute the average adjusted prediction (AAP) (or predictive margins) for each of the observed values of access to the charitable organizations.<sup>36</sup> Figures 1.7-1.16 show the predicted probability of taking part in volunteer activities and the intensity of volunteering for different values of access to charitable organizations at different buffer sizes for the control function approach. It is clear from the graphs that individuals with low access to charitable organizations are less likely to take part in volunteer activities and less likely to donate their time.

By increasing the number of charitable organizations, the probability of taking part in volunteer activities and becoming a regular or irregular volunteer increases while the probability of becoming a non-volunteer decreases. For example at the 1km buffer size, increasing the

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<sup>35</sup> I also compared the estimated coefficients of access from the 2SLS and the control function approaches. The results reported in the appendix 1.E table 1.E1 shows that these two different approaches are compatible with each other, specifically for larger geographic areas.

<sup>36</sup> There are two methods of estimating the predicted probability. The average adjusted prediction (AAP) method is computed by averaging the discrete or partial changes over all observations. The adjusted prediction at means (APM) is computed by using the marginal effects at fixed values of the independent variables. In the literature the AAP is favored to APM (Bartus, 2005).

number of charitable organization by the growth rate of charities over the years spanned by my data (6%), increases the predicted probability of volunteering, regular and irregular volunteer by 5%, 7% and 2% respectively and decreases the probability to become non-volunteer by 3%.<sup>37, 38</sup>

Looking at the sample separated into urban and rural residents, I find that volunteer outcomes are clearly affected by access to charitable organizations in urban areas. For example at 1km buffer, increasing the number of charitable organizations by its growth rate (8%) increases the likelihood of volunteering by 7% for urban areas. Furthermore, adding more charitable organization increases the probability of becoming a regular and irregular volunteer by 9% and 3% respectively while decreasing the probability of becoming non-volunteer by 3%. However, for individuals who live in rural areas, proximity to the charitable organizations does not affect their probability of volunteering or its intensity.

The estimated coefficients of the access quadratic term are negative and statistically significant, but very small across all specifications. This indicates that although volunteering increases with access to charitable organizations, it does so at a decreasing rate, and eventually begins to fall with access. Figures 1.7-1.16 demonstrate that at the 1-3km buffer distances as access increases, the predicted probability of volunteering increases. For instance, from figure 1.7 I see that increasing the number of charitable organizations at the one kilometer buffer around a person's residence from zero to 616 increases the likelihood of volunteering from 33%

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<sup>37</sup> In 2003 there were 78,433 registered charitable organizations in Canada and by 2009 this number reached to 83,684. The growth rate is 6% between 2003 and 2009. The growth rate is not even across areas; in urban areas the growth rate is 8% while in rural areas the growth rate is 2%.

<sup>38</sup> In the probit model the marginal effects are in percentage points rather than percentage changes. I chose to present the results as percentage changes because percentage points are not always informative when it comes to indicating the magnitude of the effect – a 10% point increase when the predicted probability is 0.85 is a much smaller effect than the same increase when the predicted probability is 0.30. I calculate the effects in percentage point terms by dividing the marginal effects by the predicted probability of taking part in the volunteer activity (multiplied by 100). The predicted probabilities are reported in the tables.

to 95%. Obviously, this increase is more than one would expect to occur; these figures show that for most people, increasing access increases volunteering. Also it is clear from figures 1.7-1.16 that as the buffer size increases from 1km to 5km, individuals become less sensitive to an increase in charitable organizations (although the slope continues to be positive). The implication here is that, having an extra charitable organization is more valuable for an individual who lives closer to charitable organizations than for an individual who lives farther away from these organizations.

Although physical proximity to the charitable organizations has a statistically significant positive effect on volunteering, one needs to ask if the small marginal coefficient from the regression has economic significance. To put this coefficient in perspective, I compare it with some of the other variables which have been shown to have an impact on volunteering. For example, if an individual were to go from having post-secondary diploma or certificate to having a university degree, it would increase their likelihood of volunteering by 34% point. An increase of one standard deviation (37) in access to charitable organizations at the 1km buffer for urban residents would increase the probability of volunteering by 13% point (*ceteris paribus*) – a 38% of the impact of education. The physical proximity to volunteering opportunities has a considerable impact on volunteering.

### **1.5.2. Robustness Checks and Subsamples**

Using a CF approach with access at the 35 kilometer buffer as an identifying instrument, I find a causal link between access and volunteering. To assess the robustness of this causal result, I employ three additional strategies. First, I measure access at different radius distances (1-5km) to see if the impact of access on volunteer outcomes changes with its distance to an individual's place of residence. In fact, if the impact of access disappears quickly as the distance between

charitable organizations and homes increases, this would suggest that the impact of access is fairly local, meaning that individuals who are located closer to charitable organizations might have more information about the volunteer opportunities in their neighbourhood and this increases their probability of taking part in volunteer activities. The estimated effect of access on volunteering falls as the buffer size increase. The results presented in table 1.6 and figures 1.7-1.16 show clearly that the physical distance of charitable organizations from an individual's place of residence decreases the probability of taking part in volunteer activities and its intensity. This is consistent with a causal link between proximity and volunteering, supporting my CF results.

However, one might argue that the reason for the decreasing estimated effects of access on volunteering associated with increasing buffer size is due to the fact that the bigger the buffer, the more charitable organizations it contains. A one charity increase in a smaller area should have a greater effect as compared to a one charity increase in a larger area. To address this criticism, I construct the same size circles (1km radii) around each individual's place of residence within each of the five different circles: (i) the number of charitable organizations at 1km radii, (ii) the number of charitable organizations between the 2km and 1km radii, (iii) the number of charitable organizations between 3km and 2km radii, (iv) the number of charitable organizations between 4km and 3km radii, (v) the number of charitable organizations between 5km and 4km radii. The results reported in table 1.F1 in the appendix 1.F show that increasing the physical distance from an individual's place of residence to charitable organizations decreases the probability of taking part in volunteer activities and its intensity. This, again, supports the causal interpretation.

As a third strategy to verify the robustness of my causal interpretation, I also restrict the sample to a group of individuals for whom the residential location can be considered as exogenous with respect to the volunteer behaviour outcomes. Individuals who have lived a long time in one neighbourhood are less likely to have made the location decision based on the same unobservable factors influencing the location of charities. Following Di Paolo et al. (2017), I restrict the sample to individuals who have lived in their dwelling for more than 10 years and find that the marginal effect of access to charitable organizations on the probability of taking part in volunteer activities and becoming an active volunteer very similar to the baseline model (table 1.7).<sup>39</sup> Increasing the number of charitable organizations by its growth rate (6%) increases the probability of volunteering for both individuals live in the neighbourhood more than and less than 10 years old by 2%, supporting a causal link between access and volunteering.

In addition to checking the robustness of the causal nature of the link between access and volunteering, it is important to verify that the results are not an artifact of a particular data sample. Aside from charitable organizations, non-profit organizations also provide volunteering opportunities for individuals. However, data on the location of all non-profit organizations are not generally available. To help overcome part of this problem, I use the Enhanced Point of Interest (EPOI) file from Digital Mapping Technologies Inc (DMTI), and I add the location of primary schools, secondary schools and libraries, accounting for 12,000 non-profit organizations across Canada to the PEDAL database. Table 1.D1 in the appendix 1.D presents the results from the control function approach of the impact of access to charitable and non-profit organizations on the probability of participating and the intensity of volunteering. The results suggest that the addition of these non-profit organizations makes little difference: the marginal effects of access

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<sup>39</sup> The sample restriction method might not be able to overcome the endogeneity problem, if the omitted unobserved factors are long-standing (Di Paolo et al., 2017).



on volunteering are not much different from the baseline models which do not contain any non-profit organizations.

For a given individual, the correct access measure is arguably the one that not only takes into account the number of charitable organizations within a specified neighbourhood but also allows for the diversity of charity organizations across areas. In order to overcome this problem, I include a richness diversity index measure into the CF model. Appendix 1.G includes a table reporting the estimates (table 1.G1) as well as a description of the diversity index. Incorporating the diversity index into the analysis does not affect meaningfully the impact of access.

It is likely that some groups might be more responsive to access than others. For this reason I split the sample by gender, employment status, age and income level and run the control function approach for these groups. As with the results of the full sample, the econometric tests show that number of charitable organizations at 35km radii is a valid instrument for each subsample analysis. The first stage F statistics and Cragg- Donald Wald F ( $F > 10$ ) statistics indicates that the instrument is sufficiently correlated with the access to charitable organizations at 1-5km buffer sizes. Moreover, the endogeneity test shows that access to charitable organizations at 1-5km buffer sizes are endogenous with respect to volunteer outcomes. In order to conserve space I do not report the test statistics here.

When it comes to philanthropic activities, some studies find that males and females behave differently (e.g., Brown and Lankford, 1992). Further, the literature that looks at gender differences in commuting and spatial access to employment suggests that males commute longer distances than females (Kim, 1994). For these reasons, I estimate separate regressions for males and females. The results reported in table 1.8 reveal that proximity to charitable organizations is

positively related to the probability of volunteering for both male and female, and that this access does not affect female and male differently.

The extent to which an individual does unpaid volunteer work for organizations is affected by the amount of free time he or she possesses. Recognizing that time is even scarcer for individuals who have full-time jobs with busy and inflexible schedules I would expect that proximity to the charitable organizations would be more crucial for this group. I split the sample into those who work full-time versus those who work part-time or not at all to see how proximity to charitable organizations affects the volunteer behaviour of these two groups. Consistent with my expectation, the results reported in table 1.9 suggest that proximity to charitable organizations has larger effects on the probability of participation and intensity of volunteering for individuals who have full-time jobs. For example at the 1km buffer, increasing the number of charitable organizations by its growth rate (6%) increases the probability of taking part in volunteer activities by 7% for individuals with full-time jobs while increase the probability of volunteering by 4% for individuals with part-time jobs or not employed. It should be noted that the larger marginal effect for the full time workers is also consistent with greater measurement error in the access variable for full-time workers. If full time workers volunteer close to their place of work, my access variable cannot capture all the volunteer opportunities available to these people. Therefore, my access variable is measured with more error for people who work full time versus people who are unemployed. However, I cannot verify this directly because I do not know where individuals in my sample work.

As mobility issues often decrease with age, it is expected that proximity to volunteer opportunities may become more important for older people (Bowling and Stafford, 2007). I group the sample by different age groups to see if the distance from volunteer opportunities

differs across these ages. The results reported in table 1.10 suggest that in terms of access to charitable organizations there is little difference between the volunteer behaviour of the elderly groups and others. For example at the 1km buffer, increasing the number of charitable organizations by its growth rate (6%) increases the probability of taking part in volunteer activities by 6% for both the elderly group and others.

Proximity to volunteer opportunities can be particularly challenging for low-income individuals who have less access to automobiles and for whom transportation costs may act as an important barrier to travelling. I split the sample and run the two separate regressions for individuals with household's annual income less than \$40,000 and for the individuals with household's annual income more than \$80,000. I find that access to charitable organizations significantly affects individuals with high income levels rather than low (table 1.11). One possible explanation is that, access reflects the opportunity cost of volunteering, and individuals with higher income may have higher opportunity costs.

## **1.6. Conclusion**

The aim of this paper is to investigate the effects of access to charitable organization on volunteer behaviour in Canada using geocoded data on individuals and charitable organizations. This is the first paper to do so. Paying careful attention to the problem of endogeneity, I find a robustly positive impact of access on the probability of volunteering and the amount of volunteering that takes place. Basically, if the number of charitable organizations within a one-kilometer buffer area of an individual residing in an urban area were to increase by one standard deviation, the likelihood that this individual would volunteer increases by 13% point. As a point of comparison, if the same individual were to go from having a post-secondary diploma or

certificate to being a university graduate, the probability of volunteering would go up by 34% point.

My analysis shows that proximity to charitable organizations is causally related to an individual's volunteering behaviour. Two research questions arise from this work. First, does the fact that access to volunteer opportunities influences volunteering suggest a way to explore the causal link between unpaid work and the paid labour market? Indeed, addressing this question is the goal of chapter two of my thesis. In particular, I use proximity to volunteer opportunities as a novel instrument for volunteering to examine the causal link between volunteering and labour market outcomes. Addressing the causal link between volunteering and labour market outcomes is important from a policy perspective insofar as policies like that of mandatory volunteering (community service) for high-school students enacted in Ontario in 1999, is founded on the idea that, among other things, such experience is beneficial for future employment.

A second question arising from my results is the extent to which volunteering may affect individual's health and life-satisfaction. Again, the presence of access as an instrumental variable helps identify the causal relationship between volunteering and these outcomes. This question is tackled in chapter three of my thesis.

Like with all empirical analyses, there are limitations associated with this study. First, the T3010 returns only provides data on the locations of charitable organizations, not on the locations of non-profit organizations which are considered to be an alternative major source for volunteer opportunities. However, I extend the database to capture some type of these organizations (schools and libraries) and I find my results to be robust. Another data limitation may arise because multiple locations/branches of a charity may not be captured in the database if only one T3010 tax form is filed. It is difficult to know the extent of this problem. Also, the 1-

5km buffers around each postal code are created separately for individuals residing in each of the ten provinces. This means that for individuals who live close to the border of two provinces (less than 5km), I would mistakenly not count the charitable organizations that fall in the neighbouring province. In order to see whether this might affect the results, I map all the individuals in the sample and identify those whose places of residence might have intersections with adjacent provinces. At the 1-5km radii around individuals' postal codes, only 0.2%, 0.9%, 1.4%, 1.9%, and 2.2% of the sample crosses the borders of neighbouring provinces. I do not think that this problem is crucial.

Recognizing the importance of physical access to charitable organization on individuals' volunteer behaviour has implications for both charitable organizations and the volunteers themselves. Access to sufficient numbers of volunteers is important for the performance of many charitable organizations and hence it would be useful to understand how their physical locations affect individuals' decisions to volunteer their time. Should charities locate in populated but, potentially, expensive locations, or can they attract enough volunteers if they locate in more remote, but cheaper, areas? Volunteering also provides individuals with opportunities to hone their skills on a variety of fronts, to gain important experience and networks, and facilitate contributions to community life. If individuals who live farther away from volunteering opportunities are discouraged from undertaking this activity, does this have implications for their future wellbeing? I gain additional insight into this question later in the thesis.

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**Table 1.1: The sample size of GSS survey**

Cycle	Year	GSS topic	Original sample size	Sample Size
17	2003	Social engagement	24,951	20,511
19	2005	Time use	19,597	16,145
22	2008	Social engagement	20,401	17,873
24	2010	Time use	15,390	13,494

Source: Statistics Canada, General Social Survey

**Table 1.2: Variable definition****Dependent variables**

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Volunteer	Dummy variable 1, if the respondent took part in a formal volunteer activity during the past 12 month
Volunteer intensity	Ordered variable, 3 if the respondent volunteered on average more than five hours per month (regular volunteer); 2 if the respondent volunteered on average between zero and five hours per month (irregular volunteer); 1 the respondent did not volunteer at all (non-volunteer)

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**Independent variables**

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Age	Continuous variable takes range 19 years old and above
Male	Dummy variable 1, if the respondent sex is male, 0 otherwise
Married/common law	Dummy variable 1, if the respondent is married/ common law, 0 otherwise, <b>base group</b>
Single/never married	Dummy variable 1, if the respondent is single/ never married, 0 otherwise
Separated/divorced	Dummy variable 1, if the respondent is separated/ divorced, 0 otherwise
Widow /widower	Dummy variable 1, if the respondent is widow/ widower, 0 otherwise
Less than high school	Dummy variable 1, if the respondent did not finish high school, 0 otherwise
Graduated from high school	Dummy variable 1, if the respondent graduated from high school, 0 otherwise
Some post-secondary	Dummy variable 1, if the respondent obtained some post-secondary diploma or certificate, 0 otherwise
Post-secondary diploma or certificate	Dummy variable 1, if the respondent obtained post-secondary diploma or certificate, 0 otherwise, <b>base group</b>
University degree	Dummy variable 1, if the respondent obtained university degree, 0 otherwise
Full-time	Dummy variable 1, if the respondent has a full-time job, 0 otherwise, <b>base group</b>
Part-time	Dummy variable 1, if the respondent has a part-time job, 0 otherwise
Not-employed	Dummy variable 1, if the respondent is not employed, 0 otherwise
Less than \$20,000	Dummy variable 1, if the income of the household is less than 20,000 dollars per year, 0 otherwise
\$20,000-\$39,999	Dummy variable 1, if the income of the household is between 20,000-39,999 dollars per year, 0 otherwise
\$40,000-\$59,000	Dummy variable 1, if the income of the household is between 40,000-59,999 dollars per year, 0 otherwise
\$60,000-\$79,999	Dummy variable 1, if the income of the household is between 60,000-79,999 dollars per year, 0 otherwise

**Table 1.2: Variable definition**

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\$80,000-\$99,999	Dummy variable 1, if the income of the household is between 80,000-99,999 dollars per year, 0 otherwise
Over \$100,000	Dummy variable 1, if the income of the household is over 100,000 dollars per year, 0 otherwise, <b>base group</b>
No children in household	Dummy variable 1, if there are no children in the household, 0 otherwise, <b>base group</b>
Youngest child in household is <5 years old	Dummy variable 1, if the youngest child in the household is less than 5 years old, 0 otherwise
Youngest child in household is 5-14 years old	Dummy variable 1 if the youngest child in the household is between 5 and 14 years old, 0 otherwise
Youngest child in household is >14 years old	Dummy variable 1, if the youngest child in the household is over 14 years old, 0 otherwise
Frequent religious attendance	Dummy variable 1, if the respondent takes part in religious activity at least one a month/ at least once a week, 0 otherwise
Non-frequent religious attendance	Dummy variable 1, if the respondent takes part in religious activity, few times a year/ at least once a year/ not at all, 0 otherwise , <b>base group</b>
Live in city or local community (<5 years)	Dummy variable 1, if respondent lives in city or local community less than five years , 0 otherwise
Live in city or local community (between 5 to 10 years)	Dummy variable 1, if respondent lives in city or local community between five to 10 years, 0 otherwise
Live in city or local community (>10 years)	Dummy variable 1, if respondent lives in city or local community over 10 years, 0 otherwise, <b>base group</b>
Born in Canada	Dummy variable 1, if respondent born in Canada, 0 otherwise, <b>base group</b>
Immigrant (<15 years)	Dummy variable 1, if respondent is an immigrant and has lived in Canada less than 15 years , 0 otherwise
Immigrant (>15 years)	Dummy variable 1, if respondent is an immigrant and has lived in Canada over 15 years , 0 otherwise
Excellent/very good health	Dummy variable 1, if the health status of the respondent is excellent/very good, 0 otherwise, <b>base group</b>
Good health	Dummy variable 1, if the health status of the respondent is good, 0 otherwise
Fair/poor health	Dummy variable 1, if the health status of the respondent is fair/poor, 0 otherwise
Newfoundland and Labrador	Dummy variable 1, if respondent lives in Newfoundland and Labrador, 0 otherwise
Prince Edward Island	Dummy variable 1, if respondent lives in Prince Edward Island, 0 otherwise
Nova Scotia	Dummy variable 1, if respondent lives in Nova Scotia, 0 otherwise
New Brunswick	Dummy variable 1, if respondent lives in New Brunswick, 0 otherwise
Quebec	Dummy variable 1, if respondent lives in Quebec, 0 otherwise
Ontario	Dummy variable 1, if respondent lives in Ontario, 0 otherwise, <b>base group</b>
Manitoba	Dummy variable 1, if respondent lives in Manitoba, 0 otherwise

**Table 1.2: Variable definition**

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Saskatchewan	Dummy variable 1, if respondent lives in Saskatchewan, 0 otherwise
Alberta	Dummy variable 1, if respondent lives in Alberta, 0 otherwise
British Columbia	Dummy variable 1, if respondent lives in British Columbia, 0 otherwise
Urban	Dummy variable 1, if respondent lives in urban centers (census metropolitan area (CMA)/census agglomeration (CA)), 0 otherwise
Rural	Dummy variable 1, if respondent lives in rural area or small town (non-CMA/non-CA), 0 otherwise, <b>base group</b>
People help each other in this neighbourhood	Dummy variable 1, if respondent think that people in his/her neighbourhood help each other, 0 otherwise, <b>base group</b>
People do not help each other in this neighbourhood	Dummy variable 1, if respondent think that people in his/her neighbourhood does not help each other, 0 otherwise
year 2003	Dummy variable 1, if the survey is done in year 2003, 0 otherwise
year 2005	Dummy variable 1, if the survey is done in year 2005, 0 otherwise
year 2008	Dummy variable 1, if the survey is done in year 2008, 0 otherwise
Year 2010	Dummy variable 1, if the survey is done in year 2010, 0 otherwise, <b>base group</b>
Population size (1-5km)	Continuous variable, representing the number of population within 1km to 5km radii from an individual's place of residence
Access (1-5km)	Continuous variable, counts the number of charitable organizations within 1km to 5km radii from an individual's place of residence
Minimum distance	Continuous variables, the distance from individual place of residence to his/her nearest charitable organization
Diversity index (richness) (1-5km)	It is a diversity index, which counts the number of different types of charitable organization within a 1-5km radii distances

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**Table 1.3: Summary statistics for the full sample and volunteer and non-volunteer subgroups**

Variable	Full sample	Min	Max	Volunteer	Non-Volunteer
<b>Dependent variable (%)</b>					
Volunteer	0.37			-	-
Regular volunteer (five hours or more)	0.22			-	-
Irregular volunteer (less than five hours)	0.15			-	-
Non-volunteer	0.63			-	-
<b>Age</b>					
Age	46.38			46.25	46.46
<b>Sex (%)</b>					
Male	0.49			0.46	0.51
<b>Marital status (%)</b>					
Married/common law	0.67			0.70	0.65
Single/never married	0.21			0.19	0.22
Separated/divorced	0.07			0.07	0.08
Widow/widower	0.05			0.04	0.06
<b>Education level (%)</b>					
Less than high school	0.15			0.09	0.19
Graduated from high school	0.14			0.12	0.16
Some post-secondary	0.16			0.17	0.16
Post-secondary diploma or certificate	0.28			0.28	0.28
University degree	0.26			0.34	0.21
<b>Labour force status (%)</b>					
Full-time	0.43			0.42	0.43
Part-time	0.25			0.27	0.23
Not employed	0.33			0.31	0.33
<b>Household income (%)</b>					
Less than \$20,000	0.07			0.05	0.08
\$20,000-\$39,999	0.14			0.12	0.15
\$40,000-\$59,000	0.16			0.15	0.17
\$60,000-\$79,999	0.13			0.14	0.13
\$80,000-\$99,999	0.10			0.11	0.10
Over \$100,000	0.21			0.27	0.18
<b>Age of youngest child in the household (%)</b>					
No children in household	0.57			0.54	0.59
Youngest child in household is <5 years old	0.12			0.11	0.13
Youngest child in household is between 5-	0.16			0.21	0.14

**Table 1.3: Summary statistics for the full sample and volunteer and non-volunteer subgroups**

Variable	Full sample	Min	Max	Volunteer	Non-Volunteer
14 years old					
Youngest child in household is >14 years	0.14			0.15	0.14
<b>Religious attendance (%)</b>					
Frequent religious attendance	0.29			0.40	0.23
Non-frequent religious attendance	0.71			0.59	0.76
<b>Length of time respondent has lived in current dwelling (%)</b>					
Less than five years	0.40			0.36	0.41
Five to 10 years	0.18			0.19	0.18
Over 10 years	0.42			0.45	0.41
<b>Length of time living in Canada (%)</b>					
Born in Canada	0.79			0.82	0.78
Less than 15 years	0.06			0.05	0.07
Over 15 years	0.15			0.13	0.15
<b>Health status of the respondent (%)</b>					
Excellent /very good	0.54			0.59	0.51
Good	0.31			0.30	0.32
Fair/poor	0.14			0.11	0.16
<b>Province of residence of the respondent (%)</b>					
Newfoundland and Labrador	0.02			0.02	0.02
Prince Edward Island	0.00			0.04	0.03
Nova Scotia	0.03			0.01	0.00
New Brunswick	0.02			0.02	0.02
Quebec	0.24			0.17	0.28
Ontario	0.38			0.40	0.37
Manitoba	0.04			0.04	0.03
Saskatchewan	0.03			0.04	0.02
Alberta	0.10			0.12	0.09
British Columbia	0.14			0.15	0.13
<b>Urban/Rural indicator (%)</b>					
Urban	0.81			0.78	0.82
Rural	0.19			0.22	0.18
<b>Friendly neighbourhood (%)</b>					
People help each other in this neighbourhood	0.78			0.82	0.76
People do not help each other in this neighbourhood	0.17			0.14	0.19
<b>Population size (#)</b>					
Population size-1 km	6,603	0	71,568	6,028	6,941



**Table 1.3: Summary statistics for the full sample and volunteer and non-volunteer subgroups**

Variable	Full sample	Min	Max	Volunteer	Non-Volunteer
Population size-2 km	21,421	0	140,725	19,613	22,479
Population size-3 km	42,027	0	286,979	38,387	44,156
Population size-4 km	68,130	0	428,488	62,221	71,585
Population size-5km	97,894	0	593,531	89,156	103,002
<b>Accessibility (#)</b>					
Access -1 km	18	0	692	17	18
Access -2 km	59	0	1,505	57	60
Access -3 km	115	0	1,940	111	118
Access -4km	184	0	2,403	176	189
Access -5km	264	0	2,899	251	272
Minimum distance (kilometer)	1.26	0	452	1.31	1.23
<b>Diversity index</b>					
HHI index_1km	3.34			3.30	3.37
HHI index_2km	5.02			4.95	5.06
HHI index_3km	5.81			5.73	5.86
HHI index_4km	6.29			6.21	6.34
HHI index_5km	6.62			6.54	6.67
<b>Number of observations</b>	68,023			25,169	42,854

1- Source is the General Social Survey cycles 2010, 2008, 2005 and 2003. 2- The summary statistics of the data are weighted by the personal frequency weight. 3- The not-employed is a general category that includes students, retirees, people who are looking for jobs and etc.

**Table 1.4: The effect of access to charitable organizations on the probability of volunteering for full sample and by rurality**

Access to charitable organizations	Full Sample	Geographical location	
	Model (1)	Model (2)	Model (3)
	Full Sample	Urban	Rural
	pr(v=1)	pr(v=1)	pr(v=1)
	dy/dx	dy/dx	dy/dx
Access_1km	0.13*** (8.14)	0.13*** (7.49)	0.18*** (2.08)
Access_1km <sup>2</sup>	-2.13e-04*** (-5.67)	-1.99e-04*** (-5.12)	-2.71e-03** (-2.42)
<b>Marginal effect 1km</b>	<b>0.12</b>	<b>0.11</b>	<b>0.16</b>
Access_2km	0.05*** (6.93)	0.04*** (6.54)	0.04 (0.72)
Access_2km <sup>2</sup>	-2.51e-05*** (-3.99)	-2.34e-05*** (-3.69)	-1.93e-04 (-1.47)
<b>Marginal effect 2km</b>	<b>0.04</b>	<b>0.04</b>	<b>0.03</b>
Access_3km	0.03*** (5.87)	0.02*** (5.55)	0.04 (0.97)
Access_3km <sup>2</sup>	-6.75e-06*** (-2.58)	-6.22e-06** (-2.38)	-2.64e-05 (-1.24)
<b>Marginal effect 3km</b>	<b>0.02</b>	<b>0.02</b>	<b>0.04</b>
Access_4km	0.02*** (4.92)	0.02*** (4.71)	0.06 (1.51)
Access_4km <sup>2</sup>	-1.65e-06 (-1.12)	-1.56e-06 (-1.06)	-1.61e-05 (-1.20)
<b>Marginal effect 4km</b>	<b>0.01</b>	<b>0.01</b>	<b>0.06</b>
Access_5km	0.01*** (3.68)	0.01*** (3.61)	0.06 (1.62)
Access_5km <sup>2</sup>	5.36e-07 (0.60)	4.32e-07 (0.49)	-9.43e-06 (-0.94)
<b>Marginal effect 5km</b>	<b>0.01</b>	<b>0.01</b>	<b>0.05</b>
Minimum distance	-0.11*** (-2.85)	0.41** (2.03)	-0.16*** (-3.79)
Number of observations	68,023	51,599	16,424
Predicted probability	0.37	0.36	0.42

1- The marginal effects and coefficient estimates for access and access<sup>2</sup> are scaled by 100 2-The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5% and 1% levels respectively.3-The numbers in the parentheses are Z values 3-As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 4- When displaying the marginal effects, Stata displays separate terms for the linear (access at1-5km) and quadratic terms (access at 1\_5km<sup>2</sup>) of the access variable. To get the total marginal effects, I first compute the average adjusted prediction (AAP) at the mean value of “access at1-5km” while all other variables are left at their observed value, then I do this again but fix the “access at1-5km” at another value ( mean+1) and finally I take the difference between these two numbers. 5- The regression models are weighted by the probability weight. 6- All the other control variables are suppressed for brevity.

**Table 1.5: The effect of access to charitable organizations on the intensity of volunteering for full sample and by rurality**

Access to charitable organizations	Full sample			Geographical location					
	Model (1)			Model (2)			Model (3)		
	Full sample			Urban			Rural		
	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	
Access_1km	0.09*** (8.28)	0.03*** (8.19)	-0.13*** (-8.27)	0.09*** (7.65)	0.03*** (7.57)	-0.12*** (-7.65)	0.15*** (2.33)	0.04*** (2.31)	-0.19*** (-2.33)
Access_1km <sup>2</sup>	-1.56e-04*** (-6.04)	-5.35e-05*** (-6.01)	2.10e-04*** (6.04)	-1.44e-04*** (-5.51)	-5.19e-05*** (-5.48)	1.96e-04*** (5.51)	-2.55e-03*** (-2.78)	-7.08e-04*** (-2.75)	3.26e-03*** (2.78)
<b>Marginal effect 1km</b>	<b>0.09</b>	<b>0.03</b>	<b>-0.12</b>	<b>0.09</b>	<b>0.02</b>	<b>-0.11</b>	<b>0.14</b>	<b>0.03</b>	<b>-0.18</b>
Access_2km	0.03*** (6.90)	0.01*** (6.83)	-0.04*** (-6.89)	0.03*** (6.47)	0.01*** (6.40)	-0.04*** (-6.47)	0.03 (0.83)	0.01 (0.82)	-0.04 (-0.83)
Access_2km <sup>2</sup>	-1.71e-05*** (-3.89)	-5.86e-06*** (-3.87)	2.30e-05*** (3.88)	-1.56e-05*** (-3.57)	-5.61e-06*** (-3.55)	2.12e-05*** (3.56)	-1.94e-04** (-2.00)	-5.34e-05** (-1.99)	2.48e-04** (2.00)
<b>Marginal effect 2km</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.04</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.04</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.04</b>
Access_3km	0.02*** (5.74)	0.01*** (5.70)	-0.02*** (-5.74)	0.02*** (5.38)	0.01*** (5.33)	-0.02*** (-5.37)	0.04 (1.09)	0.01 (1.09)	-0.05 (-1.09)
Access_3km <sup>2</sup>	-4.44e-06 ** (-2.42)	-1.52e-06** (-2.41)	5.96e-06** (2.42)	-3.93e-06** (-2.17)	-1.41e-06** (-2.16)	5.34e-06** (2.17)	-2.74e-05* (-1.80)	-7.51e-06* (-1.80)	3.49e-05* (1.80)
<b>Marginal effect 3km</b>	<b>0.02</b>	<b>0.00</b>	<b>-0.02</b>	<b>0.02</b>	<b>0.00</b>	<b>-0.02</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.04</b>
Access_4km	0.01*** (4.78)	0.00*** (4.75)	-0.02*** (-4.78)	0.01*** (4.54)	0.00*** (4.51)	-0.01*** (-4.53)	0.04 (1.36)	0.01 (1.36)	-0.06 (-1.36)
Access_4km <sup>2</sup>	-9.50e-06 (-0.93)	-3.26e-07 (-0.93)	1.28e-06 (0.93)	-8.33e-07 (-0.82)	-3.00e-07 (-0.82)	1.13e-06 (0.82)	-1.53e-05 (-1.62)	-4.20e-06 (-1.62)	1.95e-05 (1.62)
<b>Marginal effect 4km</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.01</b>	<b>0.04</b>	<b>0.01</b>	<b>-0.05</b>
Access_5km	0.01*** (3.30)	0.00*** (3.29)	-0.01*** (-3.30)	0.01*** (3.20)	0.00*** (3.19)	-0.01*** (-3.20)	0.04 (1.46)	0.01 (1.45)	-0.05 (-1.46)
Access_5km <sup>2</sup>	6.40e-07 (1.03)	2.20e-07 (1.03)	-8.60e-07 (-1.03)	5.84e-07 (0.95)	2.11e-07 (0.95)	-7.95e-07 (-0.95)	-9.27e-06 (-1.31)	-2.54e-06 (-1.31)	1.18e-05 (1.31)
<b>Marginal effect 5km</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.01</b>	<b>0.04</b>	<b>0.01</b>	<b>-0.05</b>
Minimum distance	-0.06** (-2.00)	-0.02** (-2.00)	0.08** (2.00)	0.33** (2.40)	0.12** (2.40)	-0.45** (-2.40)	-0.09*** (-2.86)	-0.03*** (-2.85)	0.12*** (2.86)

**Table 1.5: The effect of access to charitable organizations on the intensity of volunteering for full sample and by rurality**

Access to charitable organizations	Full sample			Geographical location					
	Model (1)			Model (2)			Model (3)		
	Full sample			Urban			Rural		
	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Number of observations	68,023			51,599			16,424		
Predicted probability	0.20	0.16	0.65	0.19	0.15	0.66	0.23	0.17	0.60

1- The marginal effects and coefficient estimates for access and access<sup>2</sup> are scaled by 100 2-The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5% and 1% levels respectively.3-The numbers in the parentheses are Z values 3-As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 4- When displaying the marginal effects, Stata displays separate terms for the linear (access at1-5km) and quadratic terms (access at1\_5km<sup>2</sup>) of the access variable. To get the total marginal effects, I first compute the average adjusted prediction (AAP) at the mean value of “access at1-5km” while all other variables are left at their observed value, then I do this again but fix the “access at1-5km” at another value ( mean+1) and finally I take the difference between these two numbers. 5- The regression models are weighted by the probability weight. 6- All the other control variables are suppressed for brevity.

**Table 1.6: The effect of access to charitable organization on volunteer outcomes for full sample and by rurality, control function approach**

Access to charitable organizations	Full Sample				Geographical location							
	Model (1)				Model (2)				Model (3)			
	Full Sample				Urban				Rural			
	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	
Access_1km	0.34*** (7.45)	0.25*** (6.77)	0.08*** (6.63)	-0.33*** (-6.74)	0.31*** (7.14)	0.22*** (6.16)	0.08*** (6.11)	-0.29*** (-6.16)	0.42 (0.19)	0.27 (0.22)	0.07 (0.22)	-0.34 (-0.22)
Access_1km <sup>2</sup>	-1.73e-04*** (-5.06)	-1.42e-04*** (-5.49)	-4.89e-05*** (-5.47)	1.91e-04*** (5.49)	-1.64e-04*** (-5.02)	-1.34e-04*** (-4.66)	-4.82e-05*** (-4.69)	1.82e-04*** (4.67)	-2.70e-03** (-2.04)	-2.72e-03*** (-2.62)	-7.54e-04*** (-2.63)	3.48e-03*** (2.63)
<b>Marginal effect 1km</b>	<b>0.34</b>	<b>0.24</b>	<b>0.06</b>	<b>-0.30</b>	<b>0.30</b>	<b>0.21</b>	<b>0.06</b>	<b>-0.27</b>	<b>0.42</b>	<b>0.26</b>	<b>0.06</b>	<b>-0.31</b>
Access_2km	0.10*** (7.55)	0.07*** (7.04)	0.02*** (6.98)	-0.10*** (-7.40)	0.09*** (7.11)	0.06*** (6.38)	0.02*** (6.20)	-0.09*** (-6.35)	0.38 (0.40)	0.26 (0.46)	0.07 (0.46)	-0.33 (-0.46)
Access_2km <sup>2</sup>	-1.83e-05*** (-3.50)	-1.44e-05*** (-3.10)	-4.95e-06*** (-3.09)	1.94e-05*** (3.10)	-1.78e-05*** (-3.01)	-1.36e-05*** (-3.20)	-4.91e-06*** (-3.17)	1.85e-05*** (3.19)	-2.36e-04 (-0.20)	-2.43e-04 (-0.21)	-6.68e-05 (-0.21)	3.10e-04 (0.21)
<b>Marginal effect 2km</b>	<b>0.10</b>	<b>0.07</b>	<b>0.02</b>	<b>-0.09</b>	<b>0.09</b>	<b>0.06</b>	<b>0.02</b>	<b>-0.08</b>	<b>0.38</b>	<b>0.25</b>	<b>0.05</b>	<b>-0.30</b>
Access_3km	0.05*** (6.86)	0.04*** (6.25)	0.01*** (6.38)	-0.05*** (-6.29)	0.05*** (6.91)	0.03*** (5.43)	0.01*** (5.30)	-0.04*** (-5.40)	0.30 (0.68)	0.22 (0.64)	0.06 (0.64)	-0.28 (-0.64)
Access_3km <sup>2</sup>	-4.11e-06** (-1.91)	-3.23e-06 (-1.58)	-1.11e-06 (-1.58)	4.34e-06 (1.58)	-4.09e-06* (-1.77)	-3.05e-06* (-1.64)	-1.10e-06 (-1.63)	4.14e-06* (1.64)	-3.39e-05 (-0.06)	-3.58e-05 (-0.08)	-9.82e-06 (-0.08)	4.56e-05 (0.08)
<b>Marginal effect 3km</b>	<b>0.05</b>	<b>0.04</b>	<b>0.01</b>	<b>-0.04</b>	<b>0.05</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.04</b>	<b>0.30</b>	<b>0.21</b>	<b>0.04</b>	<b>-0.25</b>
Access_4km	0.03*** (6.05)	0.02*** (6.12)	0.01*** (6.07)	-0.03*** (-6.12)	0.03*** (5.81)	0.02*** (5.63)	0.01*** (5.55)	-0.03*** (-5.61)	0.33 (1.19)	0.24* (1.72)	0.07* (1.93)	-0.30* (-1.76)
Access_4km <sup>2</sup>	-5.49e-07 (-0.39)	-4.11e-07 (-0.40)	-1.41e-07 (-0.40)	5.52e-07 (0.40)	-7.20e-07 (-0.57)	-4.79e-07 (-0.48)	-1.73e-07 (-0.48)	6.51e-07 (0.48)	-2.18e-05 (-0.06)	-2.11e-05 (-0.55)	-5.80e-06 (-0.57)	2.69e-05 (0.55)
<b>Marginal effect 4km</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>-0.03</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>-0.02</b>	<b>0.33</b>	<b>0.23</b>	<b>0.05</b>	<b>-0.27</b>
Access_5km	0.02*** (5.27)	0.01*** (4.76)	0.00*** (4.61)	-0.02*** (-4.72)	0.02*** (5.36)	0.01*** (4.66)	0.00*** (4.64)	-0.02*** (-4.66)	0.52*** (2.64)	0.40 (1.50)	0.11 (1.44)	-0.50 (-1.49)
Access_5km <sup>2</sup>	9.23e-07	8.72e-07	3.00e-07	-1.17e-06	6.98e-07	7.17e-07	2.59e-07	-9.76e-07	-1.47e-05	-1.44e-05	-3.97e-06	1.84e-05

**Table 1.6: The effect of access to charitable organization on volunteer outcomes for full sample and by rurality, control function approach**

Access to charitable organizations	Full Sample				Geographical location							
	Model (1)				Model (2)				Model (3)			
	Full Sample				Urban				Rural			
	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
	(1.13)	(1.56)	(1.56)	(-1.56)	(0.85)	(1.19)	(1.19)	(-1.19)	(-0.09)	(-0.10)	(-0.10)	(0.10)
<b>Marginal effect 5km</b>	<b>0.02</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.02</b>	<b>0.02</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.02</b>	<b>0.51</b>	<b>0.39</b>	<b>0.07</b>	<b>-0.46</b>
Number of observations	68,023			68,023	51,599		51,599		16,424		16,424	
Predicted probability	0.38	0.20	0.16	0.65	0.36	0.19	0.15	0.66	0.42	0.23	0.17	0.60

**Statistic tests for the validity of the instruments (full sample)**

	Cragg-Donald Wald F statistics	Endogeneity test	Cragg-Donald Wald F statistics	Endogeneity test
Access_1km	12	30	12	21
Access_2km	101	27	101	19
Access_3km	222	24	222	16
Access_4km	265	22	265	14
Access_5km	393	20	393	13

1- The marginal effects and coefficient estimates for access and access<sup>2</sup> are scaled by 100 2-The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5% and 1% levels respectively.3-The numbers in the parentheses are Z values 3-As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 4- When displaying the marginal effects, Stata displays separate terms for the linear (access at 1-5km) and quadratic terms (access at 1\_5km<sup>2</sup>) of the access variable. To get the total marginal effects, I first compute the average adjusted prediction (AAP) at the mean value of “access at 1-5km” while all other variables are left at their observed value, then I do this again but fix the “access at 1-5km” at another value ( mean+1) and finally I take the difference between these two numbers. 5- The regression models are weighted by the probability weight. 6-The standard errors in parentheses are bootstrapped (150 replications).7- All the other control variables are suppressed for brevity.

**Table 1.7: The effect of access to charitable organizations on volunteer outcomes by length of time living in neighbourhood**

Access to charitable organizations	Length of time living in a neighbourhood							
	Model (1)				Model(2)			
	Live in neighbourhood more than 10 years				Live in neighbourhood less than 10 years			
	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	
Access_1km	0.15*** (5.08)	0.11*** (5.03)	0.03*** (4.98)	-0.14*** (-5.03)	0.11*** (5.98)	0.08*** (6.20)	0.03*** (6.14)	-0.11*** (-6.20)
Access_1km <sup>2</sup>	-2.28e-04*** (-3.27)	-1.61e-04*** (-3.13)	-4.78e-05*** (-3.12)	2.09e-04*** (3.13)	-1.96e-04*** (-4.39)	-1.42e-04*** (-4.86)	-5.42e-05*** (-4.84)	1.96e-04*** (4.86)
<b>Marginal effect 1km</b>	<b>0.14</b>	<b>0.11</b>	<b>0.02</b>	<b>-0.13</b>	<b>0.11</b>	<b>0.08</b>	<b>0.02</b>	<b>-0.10</b>
Access_2km	0.05*** (4.21)	0.04*** (4.50)	0.01*** (4.45)	-0.05*** (-4.49)	0.04*** (5.17)	0.03*** (5.00)	0.01*** (4.97)	-0.04*** (-5.00)
Access_2km <sup>2</sup>	-2.43e-05** (-2.05)	-1.95e-05** (-2.35)	-5.76e-06** (-2.34)	2.52e-05** (2.35)	-2.34e-05*** (-3.27)	-1.47e-05*** (-3.00)	-5.63e-06*** (-2.99)	2.03e-05*** (3.00)
<b>Marginal effect 2km</b>	<b>0.05</b>	<b>0.04</b>	<b>0.01</b>	<b>-0.05</b>	<b>0.04</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.03</b>
Access_3km	0.03*** (3.97)	0.02*** (4.14)	0.01*** (4.10)	-0.03*** (-4.14)	0.02*** (4.08)	0.01*** (3.87)	0.01*** (3.85)	-0.02*** (-3.87)
Access_3km <sup>2</sup>	-9.00e-06* (-1.90)	-7.03e-06** (-2.06)	-2.08e-06** (-2.06)	9.11e-06** (2.06)	-5.32e-06* (-1.73)	-3.03e-06 (-1.45)	-1.16e-06 (-1.45)	4.20e-06 (1.45)
<b>Marginal effect 3km</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>-0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.02</b>
Access_4km	0.02*** (3.59)	0.02*** (3.77)	0.00*** (3.74)	-0.02*** (-3.77)	0.01*** (3.16)	0.01*** (2.91)	0.00*** (2.90)	-0.01*** (-2.91)
Access_4km <sup>2</sup>	-3.44e-06 (-1.36)	-2.76e-06 (-1.56)	-8.18e-07 (-1.55)	3.58e-06 (1.56)	-5.43e-07 (-0.31)	4.40e-08 (0.04)	1.69e-08 (0.04)	-6.09e-08 (-0.04)
<b>Marginal effect 4km</b>	<b>0.02</b>	<b>0.02</b>	<b>0.00</b>	<b>-0.02</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.01</b>
Access_5km	0.01**	0.01**	0.00**	-0.01**	0.01**	0.00**	0.00**	-0.01**

**Table 1.7: The effect of access to charitable organizations on volunteer outcomes by length of time living in neighbourhood**

Access to charitable organizations	Length of time living in a neighbourhood							
	Model (1)				Model(2)			
	Live in neighbourhood more than 10 years				Live in neighbourhood less than 10 years			
	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	
	(2.48)	(2.53)	(2.52)	(-2.53)	(2.45)	(2.00)	(1.99)	(-1.99)
Access_5km <sup>2</sup>	-1.04e-07	-1.28e-07	-3.80e-08	1.66e-07	9.51e-07	1.06e-06	4.08e-07	-1.47e-06
	(-0.07)	(-0.12)	(-0.12)	(0.12)	(0.88)	(1.42)	(1.43)	(-1.43)
<b>Marginal effect 5km</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>-0.01</b>
Number of observations	28,822			28,822	39,201		39,201	
Predicted probability	0.39	0.22	0.16	0.63	0.35	0.18	0.15	0.67

1- The marginal effects and coefficient estimates for access and access<sup>2</sup> are scaled by 100 2-The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5% and 1% levels respectively.3-The numbers in the parentheses are Z values 3-As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 4- When displaying the marginal effects, Stata displays separate terms for the linear (access at 1-5km) and quadratic terms (access at 1\_5km<sup>2</sup>) of the access variable. To get the total marginal effects, I first compute the average adjusted prediction (AAP) at the mean value of “access at 1-5km” while all other variables are left at their observed value, then I do this again but fix the “access at 1-5km” at another value ( mean+1) and finally I take the difference between these two numbers. 5- The regression models are weighted by the probability weight. 6- All the other control variables are suppressed for brevity.



**Table 1.8: The effect of access to charitable organizations on the volunteer outcomes by gender, control function approach**

Access to charitable organizations	Gender							
	Model (1)				Model (2)			
	Female				Male			
	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	
Access_1km	0.35*** (5.68)	0.25*** (4.52)	0.08*** (4.47)	-0.34*** (-4.51)	0.33*** (4.44)	0.24*** (5.04)	0.09*** (5.05)	-0.32*** (-5.05)
Access_1km <sup>2</sup>	-1.19e-04** (-2.36)	-1.03e-04*** (-2.64)	-3.36e-05*** (-2.64)	1.36e-04*** (2.64)	-2.21e-04*** (-4.07)	-1.78e-04*** (-4.76)	-6.44e-05*** (-4.68)	2.42e-04*** (4.75)
<b>Marginal effect 1km</b>	<b>0.35</b>	<b>0.25</b>	<b>0.06</b>	<b>-0.30</b>	<b>0.32</b>	<b>0.23</b>	<b>0.06</b>	<b>-0.29</b>
Access_2km	0.11*** (6.59)	0.08*** (6.52)	0.02*** (6.64)	-0.10*** (-6.57)	0.10*** (5.18)	0.07*** (4.54)	0.02*** (4.63)	-0.09*** (-4.57)
Access_2km <sup>2</sup>	-1.03e-05 (-1.31)	-8.36e-06 (-1.38)	-2.74e-06 (-1.38)	1.11e-05 (1.38)	-2.43e-05*** (-2.68)	-1.88e-05** (-2.33)	-6.80e-06*** (-2.90)	2.56e-05*** (2.92)
<b>Marginal effect 2km</b>	<b>0.10</b>	<b>0.07</b>	<b>0.02</b>	<b>-0.09</b>	<b>0.10</b>	<b>0.07</b>	<b>0.02</b>	<b>-0.09</b>
Access_3km	0.05*** (5.72)	0.04*** (5.03)	0.01*** (4.94)	-0.05*** (-5.01)	0.05*** (4.80)	0.04*** (4.35)	0.01*** (4.28)	-0.05*** (-4.34)
Access_3km <sup>2</sup>	-1.82e-06 (-0.61)	-2.16e-06 (-0.78)	-7.06e-07 (-0.79)	2.86e-06 (0.78)	-6.10e-06* (-1.74)	-4.10e-06 (-1.33)	-1.48e-06 (-1.33)	5.59e-06 (1.33)
<b>Marginal effect 3km</b>	<b>0.05</b>	<b>0.04</b>	<b>0.01</b>	<b>-0.05</b>	<b>0.05</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.04</b>
Access_4km	0.03*** (4.66)	0.02*** (4.72)	0.01*** (4.68)	-0.03*** (-4.72)	0.03*** (4.29)	0.02*** (3.61)	0.01*** (3.58)	-0.03*** (-3.61)
Access_4km <sup>2</sup>	2.21e-07 (0.12)	-2.86e-07 (-0.22)	-9.35e-08 (-0.22)	3.79e-07 (0.22)	-1.51e-06 (-0.75)	-6.90e-07 (-0.39)	-2.50e-09 (-0.39)	9.40e-07 (0.39)
<b>Marginal effect 4km</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>-0.03</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>-0.03</b>
Access_5km	0.02*** (4.12)	0.01*** (3.92)	0.00*** (3.88)	-0.02*** (-3.91)	0.02*** (3.54)	0.01*** (3.03)	0.00*** (3.00)	-0.02*** (-3.02)

**Table 1.8: The effect of access to charitable organizations on the volunteer outcomes by gender, control function approach**

Access to charitable organizations	Gender							
	Model (1) Female				Model (2) Male			
	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Access_5km <sup>2</sup>	1.25e-06 (1.19)	1.06e-06 (1.31)	3.48e-07 (1.31)	-1.41e-06 (-1.31)	4.50e-07 (0.39)	5.87e-07 (0.62)	2.13e-07 (0.62)	-8.00e-07 (-0.62)
<b>Marginal effect 5km</b>	<b>0.02</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.02</b>	<b>0.02</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.02</b>
Number of observations	38,599			38,599	29,424		29,424	
Predicted probability	0.40	0.21	0.16	0.63	0.36	0.18	0.15	0.67

1- The marginal effects and coefficient estimates for access and access<sup>2</sup> are scaled by 100 2-The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5% and 1% levels respectively.3-The numbers in the parentheses are Z values 3-As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 4- When displaying the marginal effects, Stata displays separate terms for the linear (access at 1-5km) and quadratic terms (access at 1\_5km<sup>2</sup>) of the access variable. To get the total marginal effects, I first compute the average adjusted prediction (AAP) at the mean value of “access at 1-5km” while all other variables are left at their observed value, then I do this again but fix the “access at 1-5km” at another value ( mean+1) and finally I take the difference between these two numbers. 5- The regression models are weighted by the probability weight. 6-The standard errors in parentheses are bootstrapped (150 replications).7- All the other control variables are suppressed for brevity.

**Table 1.9: The effect of access on volunteer outcomes by employment status, control function approach**

Access to charitable organizations	Employment status							
	Model (1) Full-time				Model (2) Part-time/not employed			
	pr(v=1) dy/dx	pr(r-v=1) dy/dx	pr(ir-v=1) dy/dx	pr(no-v=1) dy/dx	pr(v=1) dy/dx	pr(r-v=1) dy/dx	pr(ir-v=1) dy/dx	pr(no-v=1) dy/dx
Access_1km	0.44*** (6.37)	0.31*** (5.88)	0.13*** (5.73)	-0.44*** (-5.86)	0.28*** (5.12)	0.20*** (4.57)	0.06*** (4.51)	-0.27*** (-4.56)
Access_1km <sup>2</sup>	-1.94e-04*** (-4.42)	-1.57e-04*** (-3.95)	-6.50e-05*** (-3.93)	2.22e-04*** (3.95)	-1.64e-04*** (-3.28)	-1.37e-04*** (-3.57)	-4.12e-05*** (-3.57)	1.78e-04*** (3.58)
<b>Marginal effect 1km</b>	<b>0.43</b>	<b>0.31</b>	<b>0.09</b>	<b>-0.40</b>	<b>0.28</b>	<b>0.20</b>	<b>0.04</b>	<b>-0.24</b>
Access_2km	0.13*** (6.05)	0.09*** (5.91)	0.04*** (5.83)	-0.13*** (-5.90)	0.08*** (5.00)	0.06*** (4.61)	0.02*** (4.61)	-0.08*** (-4.61)
Access_2km <sup>2</sup>	-2.49e-05*** (-3.22)	-1.75e-05*** (-2.72)	-7.25e-06*** (-2.70)	2.48e-05*** (2.72)	-1.21e-05 (-1.52)	-1.09e-05* (-1.81)	-3.29e-06* (-1.80)	1.42e-05* (1.80)
<b>Marginal effect 2km</b>	<b>0.13</b>	<b>0.09</b>	<b>0.03</b>	<b>-0.12</b>	<b>0.08</b>	<b>0.06</b>	<b>0.01</b>	<b>-0.07</b>
Access_3km	0.07*** (6.72)	0.05*** (5.33)	0.02*** (5.45)	-0.07*** (-5.38)	0.04*** (3.89)	0.03*** (3.68)	0.01*** (3.64)	-0.04*** (-3.67)
Access_3km <sup>2</sup>	-9.92e-06*** (-2.92)	-7.10e-06*** (-2.67)	-2.94e-06*** (-2.70)	1.00e-05*** (2.68)	8.34e-07 (0.25)	2.89e-07 (0.10)	8.72e-08 (0.10)	-3.76e-07 (-0.10)
<b>Marginal effect 3km</b>	<b>0.07</b>	<b>0.05</b>	<b>0.01</b>	<b>-0.06</b>	<b>0.04</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.03</b>
Access_4km	0.05*** (5.88)	0.03*** (5.22)	0.01*** (5.18)	-0.05*** (-5.22)	0.02*** (3.48)	0.02*** (3.03)	0.00*** (2.99)	-0.02*** (-3.02)
Access_4km <sup>2</sup>	-3.48e-06* (-1.72)	-2.56e-06* (-1.81)	-1.06e-06* (-1.79)	3.63e-06* (1.80)	1.84e-06 (1.03)	1.46e-06 (1.00)	4.40e-07 (1.00)	-1.90e-06 (-1.00)
<b>Marginal effect 4km</b>	<b>0.05</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.04</b>	<b>0.02</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.02</b>
Access_5km	0.03*** (6.16)	0.02*** (5.46)	0.01*** (5.38)	-0.03*** (-5.45)	0.01*** (2.69)	0.01** (2.07)	0.00** (2.06)	-0.01** (-2.07)
Access_5km <sup>2</sup>	-4.71e-07	-1.61e-07	-6.67e-10	2.28e-07	2.01e-06*	1.73e-06**	5.22e-07**	-2.25e-06**

**Table 1.9: The effect of access on volunteer outcomes by employment status, control function approach**

Access to charitable organizations	Employment status							
	Model (1) Full-time				Model (2) Part-time/not employed			
	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
	(-0.39)	(-0.18)	(-0.18)	(0.18)	(1.87)	(2.13)	(2.26)	(-2.24)
<b>Marginal effect 5km</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>-0.03</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.01</b>
Number of observations	27,020			27,020	41,003		41,003	
Predicted probability	0.38	0.18	0.17	0.66	0.38	0.21	0.15	0.64

1- The marginal effects and coefficient estimates for access and access<sup>2</sup> are scaled by 100 2-The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5% and 1% levels respectively.3-The numbers in the parentheses are Z values 3-As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 4- When displaying the marginal effects, Stata displays separate terms for the linear (access at 1-5km) and quadratic terms (access at 1\_5km<sup>2</sup>) of the access variable. To get the total marginal effects, I first compute the average adjusted prediction (AAP) at the mean value of “access at 1-5km” while all other variables are left at their observed value, then I do this again but fix the “access at 1-5km” at another value ( mean+1) and finally I take the difference between these two numbers. 5- The regression models are weighted by the probability weight. 6-The standard errors in parentheses are bootstrapped (150 replications).7- All the other control variables are suppressed for brevity.

**Table 1.10: The effect of access to charitable organizations on volunteer outcomes by age group, control function approach**

Access to charitable organizations	Age group							
	Model (1) >=15 and <= 75 years old				Model (2) >75 years old			
	pr(v=1) dy/dx	pr(r-v=1) dy/dx	pr(ir-v=1) dy/dx	pr(no-v=1) dy/dx	pr(v=1) dy/dx	pr(r-v=1) dy/dx	pr(ir-v=1) dy/dx	pr(no-v=1) dy/dx
Access_1km	0.36*** (7.13)	0.26*** (7.47)	0.09*** (7.42)	-0.34*** (-7.47)	0.26** (1.97)	0.19** (2.02)	0.06** (2.00)	-0.24** (-2.02)
Access_1km <sup>2</sup>	-1.94e-04*** (-5.31)	-1.57e-04*** (-6.83)	-5.42e-05*** (-6.81)	2.11e-04*** (6.83)	2.969e-05 (0.19)	-7.16e-07 (-0.01)	-2.15e-07 (-0.01)	9.31e-07 (0.01)
<b>Marginal effect 1km</b>	<b>0.35</b>	<b>0.25</b>	<b>0.06</b>	<b>-0.31</b>	<b>0.26</b>	<b>0.18</b>	<b>0.04</b>	<b>-0.22</b>
Access_2km	0.10*** (8.37)	0.07*** (6.94)	0.03*** (6.91)	-0.10*** (-6.95)	0.09* (1.82)	0.07** (1.97)	0.02* (1.96)	-0.10** (-1.97)
Access_2km <sup>2</sup>	-1.89e-05*** (-3.40)	-1.41e-05*** (-3.08)	-4.86e-06*** (-3.08)	1.90e-05*** (3.08)	-1.64e-05 (-1.24)	-2.32e-05 (-1.51)	-7.00e-06 (-1.51)	3.02e-05 (1.51)
<b>Marginal effect 2km</b>	<b>0.10</b>	<b>0.07</b>	<b>0.02</b>	<b>-0.09</b>	<b>0.09</b>	<b>0.08</b>	<b>0.02</b>	<b>-0.09</b>
Access_3km	0.05*** (6.75)	0.04*** (6.24)	0.01*** (6.30)	-0.05*** (-6.27)	0.05* (1.90)	0.05** (2.28)	0.01** (2.29)	-0.06** (-2.29)
Access_3km <sup>2</sup>	-3.78e-06 (-1.58)	-2.73e-06 (-1.46)	-9.39e-07 (-1.45)	3.67e-06 (1.46)	-1.29e-05 (-0.85)	-1.34e-06** (-2.14)	-4.05e-06** (-2.17)	1.75e-05** (2.16)
<b>Marginal effect 3km</b>	<b>0.05</b>	<b>0.04</b>	<b>0.01</b>	<b>-0.05</b>	<b>0.05</b>	<b>0.05</b>	<b>0.01</b>	<b>-0.05</b>
Access_4km	0.03*** (6.45)	0.02*** (6.03)	0.01*** (5.92)	-0.03*** (-6.01)	0.04 (1.30)	0.03** (2.46)	0.01** (2.40)	-0.04** (-2.45)
Access_4km <sup>2</sup>	-1.77e-07	-1.17e-08	-4.03e-09	1.57e-08	-8.68e-06***	-8.26e-06**	-2.49e-06**	1.08e-05**

**Table 1.10: The effect of access to charitable organizations on volunteer outcomes by age group, control function approach**

Access to charitable organizations	Age group							
	Model (1) >=15 and <= 75 years old				Model (2) >75 years old			
	pr(v=1) dy/dx	pr(r-v=1) dy/dx	pr(ir-v=1) dy/dx	pr(no-v=1) dy/dx	pr(v=1) dy/dx	pr(r-v=1) dy/dx	pr(ir-v=1) dy/dx	pr(no-v=1) dy/dx
	(-0.13)	(-0.01)	(-0.01)	(0.01)	(-3.70)	(-2.13)	(-2.10)	(2.13)
<b>Marginal effect 4km</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>-0.03</b>	<b>0.04</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.04</b>
Access_5km	0.02*** (5.37)	0.01*** (4.26)	0.01*** (4.26)	-0.02*** (-4.26)	0.03*** (3.17)	0.00** (2.27)	0.01** (2.22)	-0.03** (-2.26)
Access_5km <sup>2</sup>	1.16e-06 (1.35)	1.11e-06* (1.83)	3.84e-07* (1.83)	-1.50e-06* (-1.83)	-3.62e-06* (-1.88)	-3.44e-06 (-1.62)	-1.04e-06 (-1.60)	4.48e-06 (1.62)
<b>Marginal effect 5km</b>	<b>0.02</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.02</b>	<b>0.03</b>	<b>0.02</b>	<b>0.00</b>	<b>-0.03</b>
Number of observations	62,115			62,115	5,908		5,908	
Predicted probability	0.38	0.20	0.16	0.64	0.28	0.16	0.09	0.75

1- The marginal effects and coefficient estimates for access and access<sup>2</sup> are scaled by 100 2-The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5% and 1% levels respectively.3-The numbers in the parentheses are Z values 3-As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 4- When displaying the marginal effects, Stata displays separate terms for the linear (access at 1-5km) and quadratic terms (access at 1\_5km<sup>2</sup>) of the access variable. To get the total marginal effects, I first compute the average adjusted prediction (AAP) at the mean value of “access at 1-5km” while all other variables are left at their observed value, then I do this again but fix the “access at 1-5km” at another value ( mean+1) and finally I take the difference between these two numbers. 5- The regression models are weighted by the probability weight. 6-The standard errors in parentages are bootstrapped (150 replications).7- All the other control variables are suppressed for brevity.

**Table 1.11: The effect of access to charitable organizations on volunteer outcomes by income level, control function approach**

Access to charitable organizations	Income							
	Model (1)				Model (2)			
	High income				Low income			
	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	
Access_1km	0.57*** (5.28)	0.42*** (5.26)	0.13*** (5.04)	-0.55*** (-5.23)	0.25*** (3.54)	0.20*** (3.51)	0.07*** (3.56)	-0.27*** (-3.53)
Access_1km <sup>2</sup>	-1.77e-04** (-2.20)	-1.69e-04*** (-3.42)	-5.17e-05*** (-3.48)	2.21e-04*** (3.44)	-2.39e-04*** (-2.81)	-1.88e-04*** (-3.21)	-6.10e-05*** (-3.12)	2.49e-04*** (3.19)
<b>Marginal effect 1km</b>	<b>0.55</b>	<b>0.40</b>	<b>0.08</b>	<b>-0.48</b>	<b>0.25</b>	<b>0.20</b>	<b>0.05</b>	<b>-0.25</b>
Access_2km	0.17*** (6.21)	0.12*** (6.31)	0.04*** (5.94)	-0.16*** (-6.25)	0.07*** (3.20)	0.06*** (3.64)	0.02*** (3.81)	-0.08*** (-3.69)
Access_2km <sup>2</sup>	-2.93e-05** (-2.47)	-2.42e-05** (-2.37)	-7.40e-06** (-2.40)	3.16e-05** (2.38)	-1.88e-06* (-1.82)	-1.48e-05* (-1.65)	-4.77e-06* (-1.67)	1.95e-05* (1.65)
<b>Marginal effect 2km</b>	<b>0.17</b>	<b>0.12</b>	<b>0.02</b>	<b>-0.14</b>	<b>0.07</b>	<b>0.06</b>	<b>0.01</b>	<b>-0.07</b>
Access_3km	0.10*** (7.18)	0.07*** (6.27)	0.02*** (5.96)	-0.09*** (-6.23)	0.03*** (2.78)	0.03*** (2.77)	0.01*** (2.76)	-0.04*** (-2.77)
Access_3km <sup>2</sup>	-1.30e-05*** (-2.70)	-9.73e-06*** (-2.84)	-2.97e-06*** (-2.86)	1.27e-05*** (2.85)	1.80e-06 (0.44)	1.48e-06 (0.45)	4.79e-06 (0.45)	-1.96e-06 (-0.45)
<b>Marginal effect 3km</b>	<b>0.09</b>	<b>0.07</b>	<b>0.01</b>	<b>-0.08</b>	<b>0.03</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.04</b>
Access_4km	0.06*** (6.03)	0.04*** (5.69)	0.01*** (5.54)	-0.06*** (-5.68)	0.02** (2.12)	0.02** (2.34)	0.01** (2.36)	-0.02** (-2.34)
Access_4km <sup>2</sup>	-5.20e-06**	-2.94e-06	-8.97e-07	3.83e-06	2.27e-06	1.66e-06	5.38e-07	-2.20e-06

	(-2.20)	(-1.37)	(-1.36)	(1.37)	(0.96)	(0.92)	(0.93)	(-0.93)
<b>Marginal effect 4km</b>	<b>0.06</b>	<b>0.04</b>	<b>0.01</b>	<b>-0.05</b>	<b>0.02</b>	<b>0.02</b>	<b>0.00</b>	<b>-0.02</b>
Access_5km	0.04*** (6.27)	0.03*** (4.69)	0.01*** (4.60)	-0.04*** (-4.68)	0.01 (1.50)	0.01 (1.54)	0.00 (1.52)	-0.01 (-1.54)
Access_5km <sup>2</sup>	-2.18e-06 (-1.56)	-8.14e-07 (-0.72)	-2.49e-07 (-0.72)	1.06e-06 (0.72)	2.73e-06* (1.82)	2.19e-06** (2.14)	7.09e-07** (2.13)	-2.90e-06** (-2.14)
<b>Marginal effect 5km</b>	<b>0.04</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.03</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.01</b>
Number of observations	16,602		16,602		19,139		19,142	
Predicted probability	0.46	0.23	0.21	0.56	0.31	0.17	0.11	0.72

1-The marginal effects, access and access<sup>2</sup> are scaled by 100 2-The asterisks \*, \*\* and \*\*\* indicate that the test statistic is significant at the 10%, 5% and 1% levels respectively.3-The number in the parentheses are Z value 3- As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 4- When displaying the marginal effects, Stata displays separate terms for the linear (access at1-5km) and quadratic terms (access at 1\_5km<sup>2</sup>) of the access variable. That is it treats “access 1-5km”, and “access 1-5km <sup>2</sup>” as separate variables and does not understand that: “access 1-5km<sup>2</sup>”= “access 1-5km”<sup>2</sup>. To get the total marginal effects, I compute the average adjusted prediction (AAP) at the mean value of “access at1-5km” while all other variables were left at their observed value, than do this again but fix the “access at1-5km” at another value (mean+1) and finally I subtract these two numbers from each other. 5-The regression models are weighted by the probability weight. 6-The standard errors in parentages are bootstrapped (150 replications). 7- All the other control variables are suppressed for brevity.



Figure 1.1: The distribution of charitable organizations at 1km

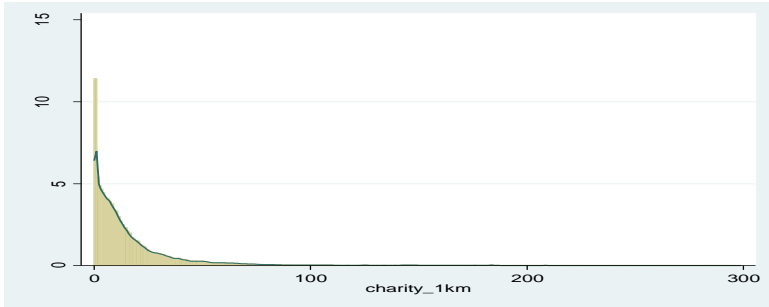


Figure 1.2 The distribution of charitable organizations at 2km

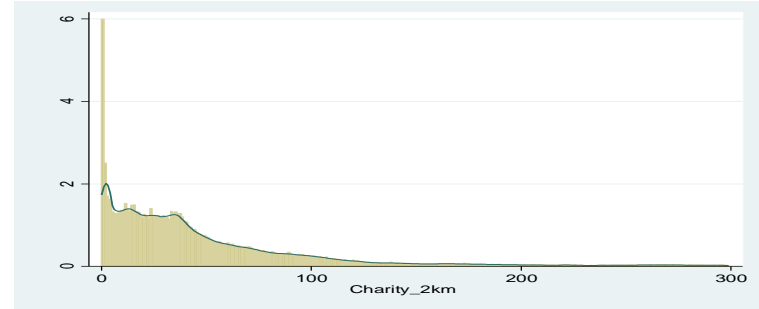


Figure 1.3: The distribution of charitable organizations at 3km

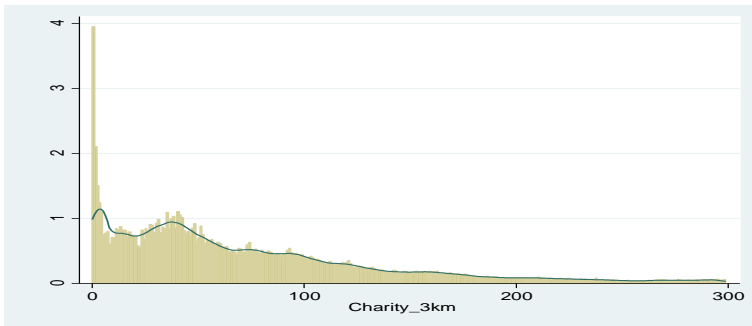


Figure 1.4: The distribution of charitable organizations at 4km

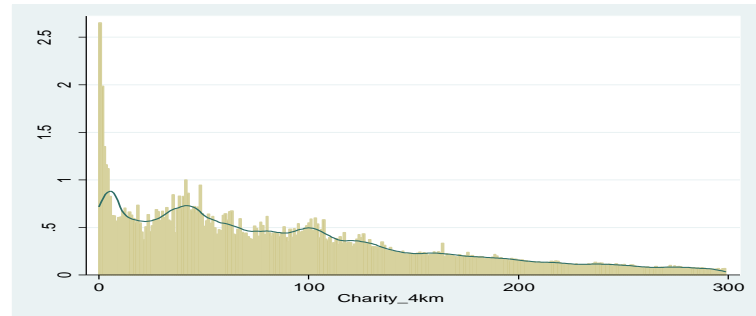


Figure 1.5: The distribution of charitable organizations at 5km

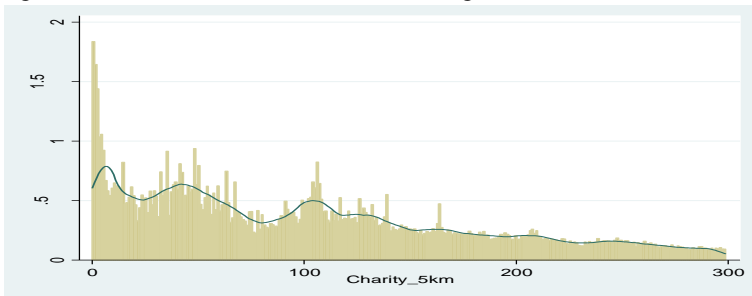


Figure 1.6: The distribution of charitable organizations, Ottawa (2009)

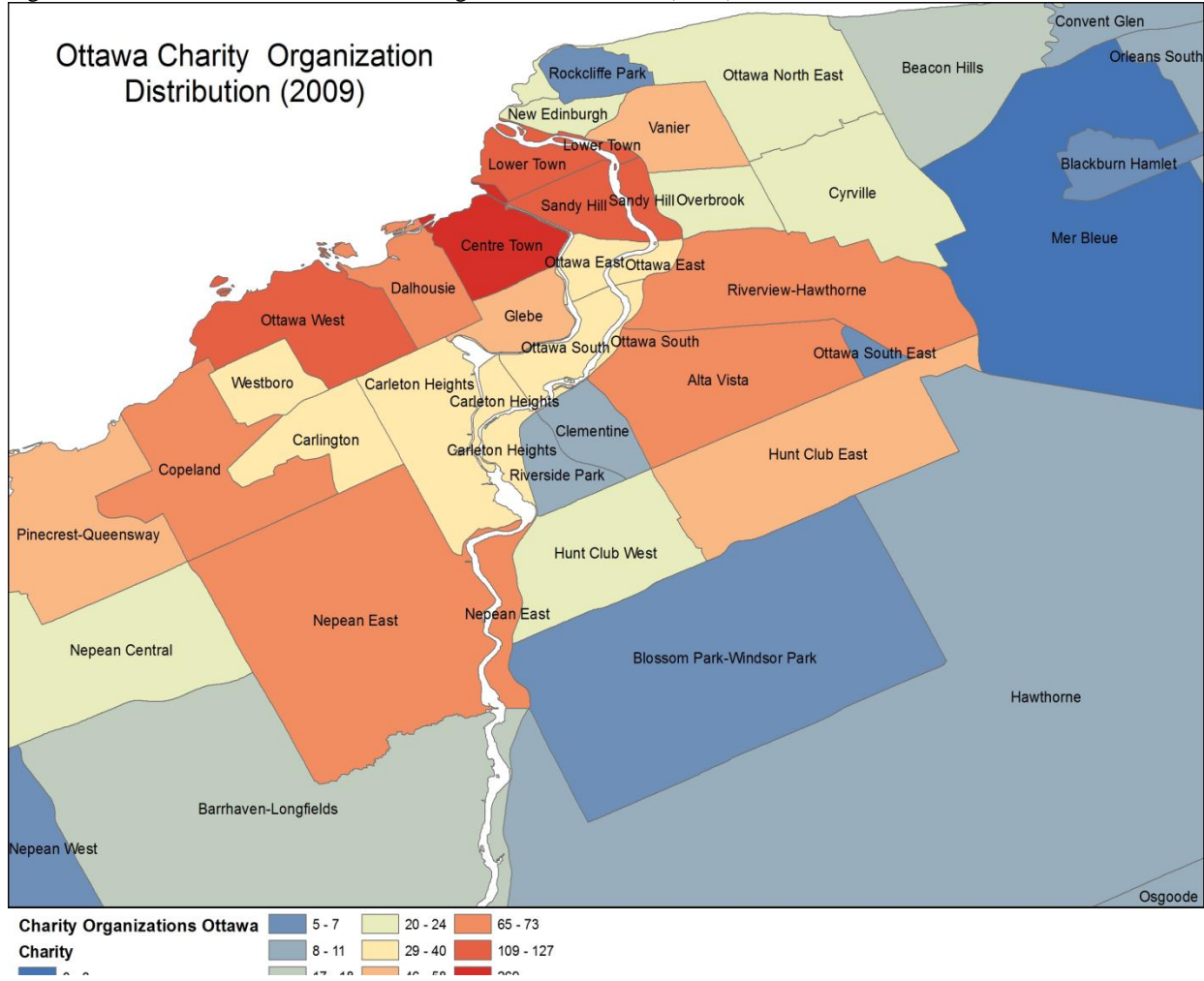


Figure 1.7: The predicted probability of volunteering at 1km

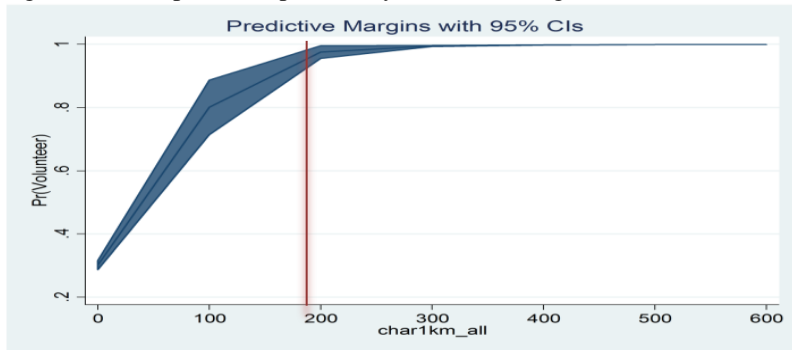


Figure 1.8: The predicted probability of volunteering at 2km

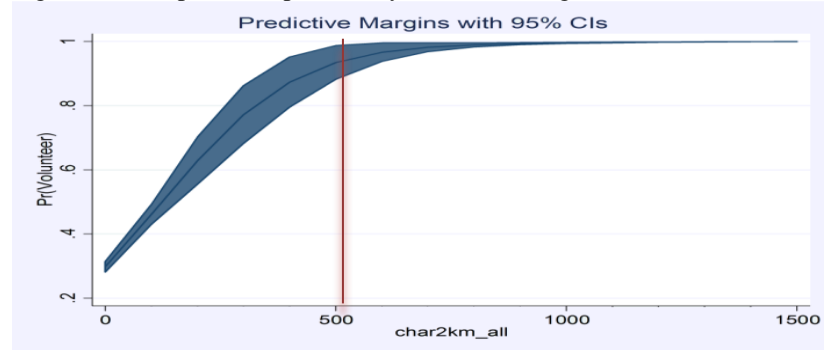


Figure 1.9: The predicted probability of volunteering at 3km

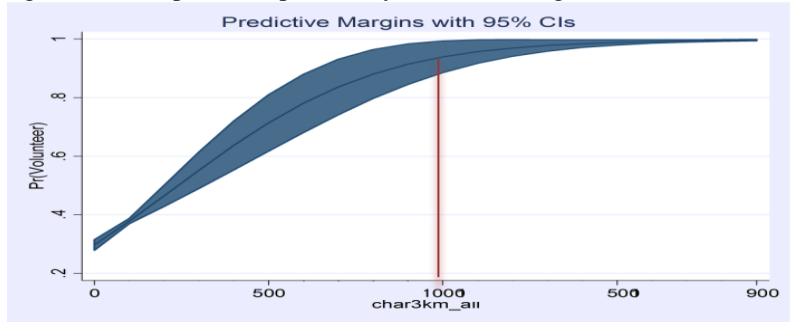


Figure 1.10: The predicted probability of volunteering at 4km

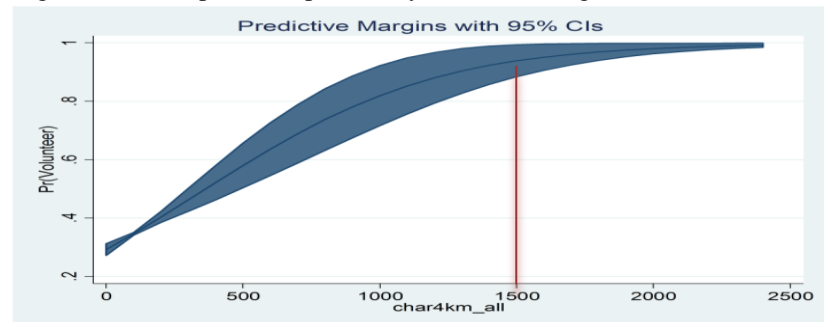


Figure 1.11: The predicted probability of volunteering at 5km

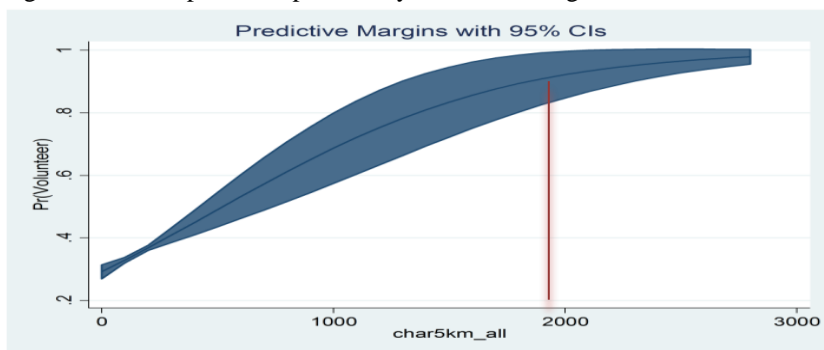


Figure 1.12: The predicted probability of intensity of volunteering at 1km

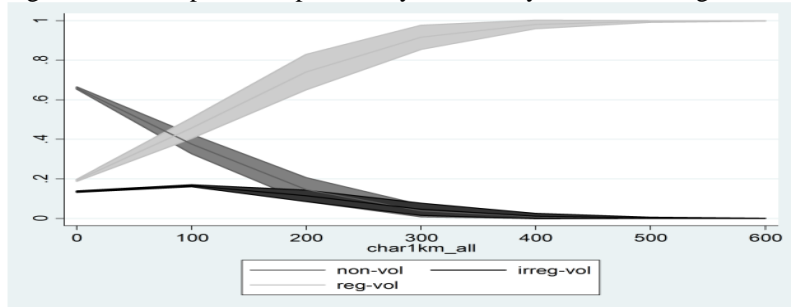


Figure 1.13: The predicted probability of intensity of volunteering at 2km

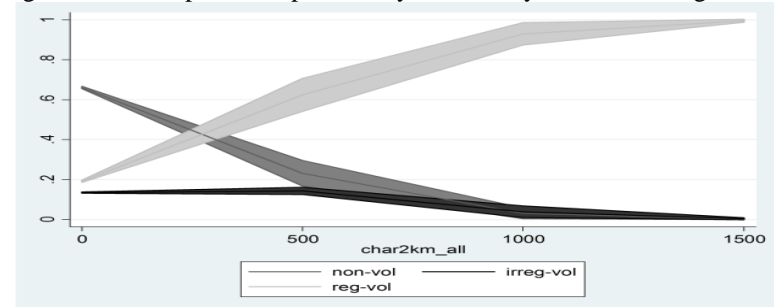


Figure 1.14: The predicted probability of intensity of volunteering at 3km

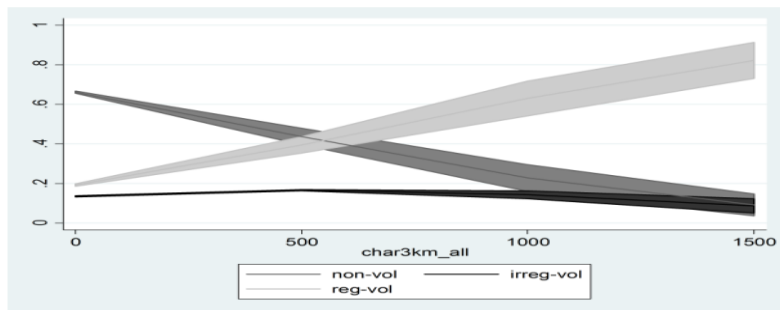


Figure 1.15: The predicted probability of intensity of volunteering at 4km

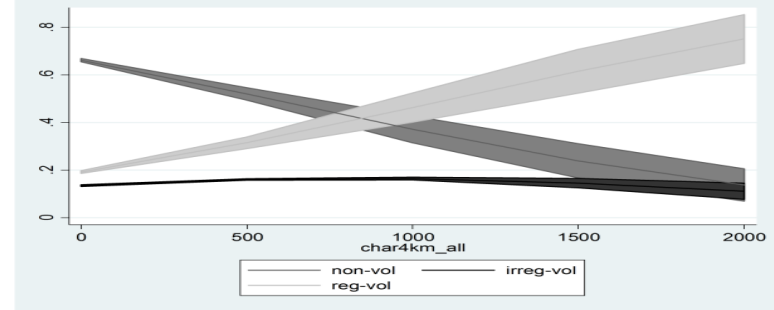
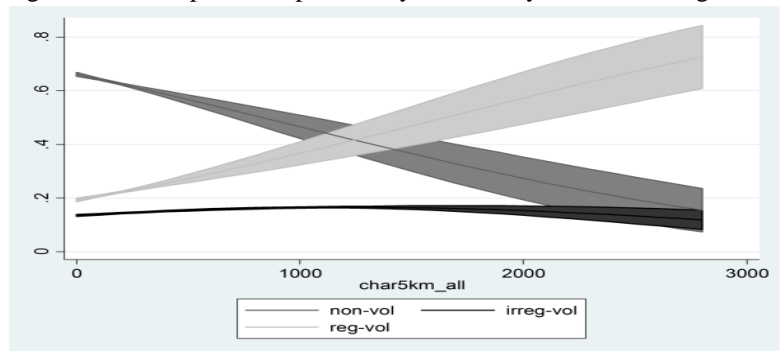


Figure 1.16: The predicted probability of intensity of volunteering at 5km



## Appendix 1.A

**Table 1.A1.: Charitable organizations categories**

Charity CAN Category Name	CRA Category Name
<b>Social services</b>	
Care Providers	Organizations providing care other than treatment (Welfare) charitable corporations
Welfare and outreach	(Welfare) charitable Trusts Welfare organizations (not elsewhere classified)
<b>Health</b>	
Hospitals	Hospitals
Health organizations-specific focus	Services other than hospitals
Supporting health	(Health) charitable corporations
Organizations (Inc. hospital foundations)	(Health) charitable trust
Health organizations-not elsewhere classified	(Health) organization, (not elsewhere classified)
<b>Education and research</b>	
Education institutions	Teaching Institutions or Institutions of learning Support of Schools and Education
Supporting education	(Education) Charitable Corporations (Education) Charitable Trusts
Education organizations not elsewhere classified	Education Organizations, (not elsewhere classified)
<b>Culture, arts</b>	
Cultural activities and promotion of the arts	Cultural activities and promotion of arts Registered National Arts Service Organization
Libraries and museums	Libraries, Museums and Other Repositories
Preservation of natural and historic sites	Preservation of Sites, Beauty and Historical
<b>International aid</b>	
International aid organizations	Disaster Funds
<b>Animal welfare</b>	
Protection of animals	Protection of Animals
<b>Community</b>	
Community corporations and trusts	(Community) Charitable Corporations (Community) Charitable Trusts (Other than Service Clubs and Fraternal Societies Projects)
Community organizations not elsewhere classified	Community Organizations, (not elsewhere classified)

**Table 1.A1.: Charitable organizations categories**

<b>Charity CAN Category Name</b>	<b>CRA Category Name</b>
Service clubs and fraternal societies	Service Clubs and Fraternal Societies' Charitable Corporations Service Clubs and Fraternal Societies' Projects
<b>Religion denomination</b>	
Anglican	Anglican Parishes
Baha'is	Baha's is Religious Groups
Baptist	Baptist Congregations
Buddhist	Buddhist Religious Groups
Hindu	Hindu Religious Groups
Islam	Islamic Religious Groups
Jehovah's witness	Jehovah's Witnesses Congregations
Jewish	Synagogues
Lutheran	Lutheran Congregations
Mennonite	Mennonite Congregations
Pentecostal	Pentecostal Assemblies of Canada only
Presbyterian	Presbyterian Congregations
Roman Catholic	Roman Catholic Parishes and Chapels
Salvation Army	Salvation Army Temples
Seventh Day Adventist	Seventh Day Adventist Congregations
Sikh	Sikh Religious Groups
United	United Church Congregations
Other Denominations	Other Denominations' Congregations or Parishes, (not elsewhere classified)
Religious charitable organizations	(Religion) Charitable Organizations (Religion) Charitable Trusts
Convents and monasteries	Convents and Monasteries
Missionary	Missionary Organizations and Propagation of Gospel
Religious Organizations not elsewhere classified	Religious organizations, (not elsewhere classified)
<b>Miscellaneous</b>	
Military units	Military units
Recreation	Recreation, Playgrounds and Vations Camps
Temperance associations	Temperance associations
Employee's Charity Trusts	Employees' Charity Trusts
Amateur athletics	Corporation Funding Registered Canadian Amateur Athletic Trust Funding Registered Canadian Amateur Athletic Association
Other charitable organizations	Miscellaneous Charitable Organizations, (not elsewhere classified)

## **Appendix 1.B**

### **Interpretation of other Covariates**

Individual characteristics and community factors included in this model have the expected sign and significance where justified by previous studies. Individuals with a higher level of education, greater income, middle age, and longer length of time living in the neighbourhood, frequent attendance at religious services, working part-time and with older children in the household are more likely to volunteer. However unlike previous studies (e.g., Rotolo et al., 2010) I find that being a home owner is not correlated with volunteering. Other studies find a positive relationship between social environment satisfactions and volunteering (e.g., Buffel et al., 2014; Dury et al., 2016; Bowling and Stafford, 2007). In order to capture the social dimension of the neighbourhood they use different questions such as: asking individuals about their neighbourhood satisfaction; neighbourhood involvement and neighbourly support. In terms of social characteristics of the neighbourhood, I find that respondents who report that their neighbourhood is friendly and that people in their neighbourhood help each other, show higher level of formal participation. Indeed individuals who reach out their neighbours more often may have more chance to acquire information about volunteer opportunities (Okun and Michel, 2006).

I find that individuals who live in rural areas are more likely to participate in volunteer activities than people who live in urban areas. This finding is supported in other studies (e.g., Sundeen and Raskoff, 1994; Oliver, 2000) and authors like Fischer (1975) argue that city dwellers are characterized by lower social ties which would make it harder for them to do any form of engagement. The negative sign of the population at 1-5km buffer sizes point to the fact

that there is more competition for volunteer opportunities the more densely the neighbourhoods are.

**Table 1.B1: The effect of socio demographic and community characteristics on the probability of volunteering, full sample**

Variables	Full sample				
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
	Access_1km	Access_2km	Access_3km	Access_4km	Access_5km
	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Male	-0.03*** (-5.19)	-0.03*** (-5.23)	-0.03*** (-5.24)	-0.03*** (-5.21)	-0.03*** (-5.19)
Age	0.01*** (5.18)	0.00*** (5.10)	0.00*** (5.07)	0.00*** (5.03)	0.00*** (4.99)
Age squared	0.00*** (-6.52)	0.00*** (-6.42)	0.00*** (-6.39)	0.00*** (-6.34)	0.00*** (-6.30)
Separated /divorced	-0.02** (-2.43)	-0.02** (-2.40)	-0.02** (-2.35)	-0.02** (-2.34)	-0.02** (-2.33)
Widow /widower	-0.03*** (-2.61)	-0.03*** (-2.58)	-0.03*** (-2.58)	-0.03** (-2.57)	-0.03** (-2.57)
Single/never married	-0.03*** (-3.56)	-0.03*** (-3.52)	-0.03*** (-3.46)	-0.03*** (-3.41)	-0.03*** (-3.37)
Youngest child in household is <5 years old	-0.06*** (-6.64)	-0.06*** (-6.58)	-0.06*** (-6.55)	-0.06*** (-6.56)	-0.06*** (-6.63)
Youngest child in household is between 5-14 years old	0.09*** (12.11)	0.09*** (12.17)	0.09*** (12.17)	0.09*** (12.20)	0.09*** (12.13)
Youngest child in household is >14 years old	0.01 (1.59)	0.01* (1.70)	0.01* (1.73)	0.01* (1.76)	0.01* (1.74)
Less than high school	-0.16*** (-20.33)	-0.16*** (-20.33)	-0.16*** (-20.37)	-0.16*** (-20.40)	-0.16*** (-20.42)
Graduated from high school	-0.08*** (-10.12)	-0.08*** (-10.12)	-0.08*** (-10.10)	-0.08*** (-10.11)	-0.08*** (-10.11)
Some post-secondary	0.03*** (3.89)	0.03*** (3.91)	0.03*** (3.96)	0.03*** (3.97)	0.03*** (3.97)
University degree	0.13*** (19.50)	0.13*** (19.51)	0.13*** (19.49)	0.14*** (19.59)	0.14*** (19.68)
Income, less than \$20,000	-0.05*** (-4.41)	-0.05*** (-4.44)	-0.05*** (-4.42)	-0.05*** (-4.44)	-0.05*** (-4.43)
Income, \$20,000-\$39,999	-0.03*** (-3.65)	-0.03*** (-3.65)	-0.03*** (-3.65)	-0.03*** (-3.69)	-0.03*** (-3.66)
Income, \$40,000-\$59,000	-0.03*** (-3.57)	-0.03*** (-3.62)	-0.03*** (-3.61)	-0.03*** (-3.64)	-0.03*** (-3.64)



**Table 1.B1: The effect of socio demographic and community characteristics on the probability of volunteering, full sample**

Variables	Full sample				
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
	Access_1km	Access_2km	Access_3km	Access_4km	Access_5km
	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Income, \$60,000-\$79,999	-0.01 (-1.03)	-0.01 (-1.04)	-0.01 (-1.08)	-0.01 (-1.10)	-0.01 (-1.07)
Income, \$80,000-\$99,999	-0.01* (-1.64)	-0.02* (-1.67)	-0.02* (-1.69)	-0.02* (-1.71)	-0.02* (-1.70)
Frequent religious attendance	0.22*** (38.08)	0.22*** (38.15)	0.22*** (38.21)	0.22*** (38.23)	0.22*** (38.28)
Live in city or local community <5 years	-0.05*** (-7.10)	-0.05*** (-7.11)	-0.05*** (-7.16)	-0.05*** (-7.16)	-0.05*** (-7.17)
Live in city or local community between 5-10 years	-0.03*** (-3.75)	-0.03*** (-3.74)	-0.03*** (-3.79)	-0.03*** (-3.78)	-0.03*** (-3.81)
Immigrant to Canada (<15 years)	-0.16*** (-13.70)	-0.16*** (-13.65)	-0.16*** (-13.54)	-0.16*** (-13.34)	-0.16*** (-13.25)
Immigrant to Canada (>15 years)	-0.08*** (-10.90)	-0.08*** (-10.81)	-0.08*** (-10.60)	-0.08*** (-10.39)	-0.08*** (-10.23)
Good health	-0.03*** (-5.22)	-0.03*** (-5.19)	-0.03*** (-5.15)	-0.03*** (-5.11)	-0.03*** (-5.10)
Fair/poor health	-0.07*** (-9.84)	-0.07*** (-9.83)	-0.07*** (-9.80)	-0.07*** (-9.78)	-0.07*** (-9.78)
Part-time job	0.04*** (6.05)	0.04*** (6.04)	0.04*** (6.02)	0.04*** (6.06)	0.04*** (6.13)
Not employed	0.05*** (7.32)	0.05*** (7.33)	0.05*** (7.33)	0.05*** (7.36)	0.05*** (7.39)
Newfoundland and Labrador	-0.04*** (-3.79)	-0.04*** (-3.99)	-0.04*** (-3.98)	-0.04*** (-4.18)	-0.05*** (-4.27)
Prince Edward Island	0.02** (2.13)	0.02** (1.97)	0.02** (1.97)	0.02* (1.72)	0.02 (1.63)
Nova Scotia	-0.03* (-1.86)	-0.03* (-1.96)	-0.03* (-1.89)	-0.03* (-1.93)	-0.03* (-1.91)
New Brunswick	-0.04*** (-3.70)	-0.04*** (-3.85)	-0.04*** (-3.86)	-0.04*** (-4.05)	-0.04*** (-4.14)
Quebec	-0.10*** (-14.99)	-0.10*** (-14.97)	-0.10*** (-14.73)	-0.10*** (-14.82)	-0.10*** (-14.91)
Manitoba	0.02* (1.67)	0.01 (0.95)	0.02 (1.55)	0.01 (1.43)	0.02 (1.53)
Saskatchewan	0.07***	0.07***	0.07***	0.07***	0.07***

**Table 1.B1: The effect of socio demographic and community characteristics on the probability of volunteering, full sample**

Variables	Full sample				
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
	Access_1km	Access_2km	Access_3km	Access_4km	Access_5km
	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Alberta	(6.83) 0.05***	(6.82) 0.05***	(6.90) 0.05***	(6.68) 0.04***	(6.63) 0.04***
British Columbia	(5.22) 0.03***	(5.16) 0.03***	(5.27) 0.03***	(5.10) 0.03***	(5.11) 0.03***
People don't help each other in neighbourhood	(3.84) -0.03***	(3.64) -0.03***	(3.75) -0.03***	(3.56) -0.03***	(3.58) -0.03***
Urban	(-4.09) -0.06***	(-4.14) -0.07***	(-4.09) -0.06***	(-4.02) -0.06***	(-3.94) -0.06***
Population size_1km	(-9.48) 0.00***	(-9.68) 0.00***	(-9.49) 0.00***	(-9.06) 0.00***	(-8.63) 0.00***
Year 2003	(-8.31) -0.03***	(-8.29) -0.03***	(-8.42) -0.03***	(-8.43) -0.03***	(-8.06) -0.03***
Year 2005	(-4.88) -0.02**	(-4.82) -0.02**	(-4.74) -0.02**	(-4.67) -0.02**	(-4.62) -0.02**
Year 2008	(-2.34) 0.03***	(-2.35) 0.03***	(-2.31) 0.03***	(-2.30) 0.03***	(-2.30) 0.03***
	(4.64)	(4.63)	(4.64)	(4.57)	(4.52)
Number of observations	68023				
Predicted probability	0.38	0.38	0.38	0.38	0.38

1- The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5% and 1% levels respectively. 2- The numbers in the parentheses are Z values. 3- The regression models are weighted by the probability weight. 4- Dummy variables for the missing values are also included in the regression models, but suppressed for brevity.

## Appendix 1.C

**Table 1.C1: The first stage regression results for the control function approach, full sample**

Variables	Full sample				
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
	Buffer_1km	Buffer_2km	Buffer_3km	Buffer_4km	Buffer_5km
	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Male	0.11 (0.40)	0.98 (1.23)	1.38 (1.06)	0.26 (0.16)	-0.23 (-0.11)
Age	-0.11* (-1.87)	-0.02 (-0.11)	0.06 (0.23)	0.26 (0.82)	0.66* (1.72)
Age squared	0.00*** (2.61)	0.00 (0.60)	0.00 (0.41)	0.00 (-0.35)	0.00 (-1.12)
Separated /divorced	0.23 (0.51)	-0.35 (-0.27)	-2.27 (-1.14)	-2.57 (-1.00)	-2.83 (-0.89)
Widow /widower	-0.01 (-0.01)	-2.17 (-1.58)	-3.79* (-1.66)	-4.65 (-1.53)	-4.95 (-1.31)
Single/never married	0.64 (1.18)	2.59* (1.73)	3.09 (1.29)	2.01 (0.66)	2.22 (0.62)
Youngest child in household is <5 years old	-3.19*** (-6.21)	-9.62*** (-7.05)	-15.15*** (-6.72)	-17.20*** (-5.85)	-16.31*** (-4.65)
Youngest child in household is between 5-14 years old	-2.62*** (-7.49)	-8.38*** (-8.72)	-12.65*** (-7.60)	-14.92*** (-6.70)	-14.37*** (-5.22)
Youngest child in household is >14 years old	-2.13*** (-6.13)	-7.86*** (-8.03)	-13.15*** (-8.01)	-16.19*** (-7.25)	-17.74*** (-6.23)
Less than high school	-1.59*** (-4.57)	-4.45*** (-4.74)	-5.91*** (-3.62)	-6.56*** (-3.00)	-6.12** (-2.21)
Graduated from high school	-0.57 (-1.54)	-1.72* (-1.74)	-3.55** (-2.22)	-4.18** (-2.00)	-4.98* (-1.93)
Some post-secondary	0.04 (0.10)	0.77 (0.74)	0.94 (0.53)	1.73 (0.74)	2.83 (0.99)
University degree	3.51*** (9.01)	10.18*** (9.28)	18.79*** (10.66)	22.39*** (9.96)	26.12*** (9.63)
Income, less than \$20,000	2.25*** (2.80)	5.45*** (2.67)	6.59** (2.14)	6.13 (1.63)	4.32 (0.97)
Income, \$20,000-\$39,999	-0.36 (-0.85)	-1.06 (-0.87)	-1.59 (-0.77)	-2.48 (-0.93)	-5.64 (-1.76)
Income, \$40,000-\$59,000	-1.10*** (-2.81)	-3.06*** (-2.83)	-6.53*** (-3.62)	-8.19*** (-3.45)	-9.51*** (-3.24)

**Table 1.C1: The first stage regression results for the control function approach, full sample**

Variables	Full sample				
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
	Buffer_1km	Buffer_2km	Buffer_3km	Buffer_4km	Buffer_5km
	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Income, \$60,000-\$79,999	-0.69 (-1.54)	-2.21* (-1.75)	-4.00** (-2.02)	-6.32** (-2.49)	-10.42*** (-3.44)
Income, \$80,000-\$99,999	-1.24*** (-2.71)	-3.00** (-2.29)	-5.88*** (-2.80)	-7.97*** (-2.94)	-10.27*** (-3.17)
Frequent religious attendance	-1.50*** (-5.23)	-5.35*** (-6.70)	-10.80*** (-8.22)	-14.55*** (-8.46)	-19.59*** (-9.31)
Live in city or local community <5 years	3.14*** (10.36)	9.01*** (10.36)	14.72*** (10.29)	16.45*** (8.67)	18.73*** (8.03)
Live in city or local community between 5-10 years	1.43*** (4.52)	5.01*** (5.20)	8.97*** (5.65)	9.95*** (4.76)	12.39*** (4.79)
Immigrant to Canada (<15 years)	-3.28*** (-3.48)	-11.35*** (-4.60)	-20.48*** (-4.99)	-38.26*** (-7.34)	-49.23*** (-7.58)
Immigrant to Canada (>15 years)	-2.39*** (-5.34)	-7.11*** (-5.37)	-14.94*** (-6.98)	-25.91*** (-9.42)	-36.68*** (-11.09)
Good health	-1.06*** (-3.63)	-2.62*** (-3.17)	-6.08*** (-4.57)	-8.39*** (-4.84)	-9.86*** (-4.67)
Fair/poor health	-0.95** (-2.41)	-2.42** (-2.23)	-5.40*** (-3.01)	-8.38*** (-3.64)	-11.04*** (-3.98)
Part-time job	0.46 (1.21)	0.83 (0.79)	1.50 (0.89)	0.68 (0.31)	-1.18 (-0.45)
Not employed	0.13 (0.35)	0.17 (0.16)	-0.99 (-0.56)	-2.37 (-1.05)	-3.51 (-1.29)
Newfoundland and Labrador	-2.73*** (-10.69)	-4.83*** (-7.30)	-13.14*** (-12.24)	-9.81*** (-7.38)	-11.35*** (-7.08)
Prince Edward Island	2.03*** (6.45)	7.55*** (9.64)	7.68*** (6.30)	20.88*** (14.41)	28.15*** (16.93)
Nova Scotia	0.00 (0.01)	1.13 (1.50)	-4.33* (-3.91)	0.80 (0.61)	4.94* (3.17)
New Brunswick	1.08*** (3.99)	5.42*** (8.23)	4.55*** (4.28)	13.81*** (10.36)	18.20*** (11.33)
Quebec	-1.56*** (-4.68)	-4.90*** (-5.12)	-12.93*** (-8.01)	-10.08*** (-4.81)	-13.33*** (-5.17)
Manitoba	5.62*** (10.09)	32.06*** (16.79)	23.32*** (10.87)	43.19*** (16.20)	60.95*** (20.95)
Saskatchewan	1.52***	-0.27	-7.81***	0.03	6.82***

**Table 1.C1: The first stage regression results for the control function approach, full sample**

Variables	Full sample				
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
	Buffer_1km	Buffer_2km	Buffer_3km	Buffer_4km	Buffer_5km
	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)	pr(v=1)
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Alberta	(3.45) -2.34*** (-6.71)	(-0.27) -9.00*** (-10.42)	(-5.34) -23.64*** (-16.15)	(0.02) -23.33*** (-12.36)	(4.01) -30.32*** (-13.48)
British Columbia	0.47 (1.28)	0.96 (1.02)	-6.20* (-3.94)	2.89 (1.43)	4.21* (1.73)
People don't help each other in neighbourhood	1.88*** (4.37)	6.11*** (5.05)	6.29*** (3.34)	4.31* (1.80)	3.31 (1.15)
Urban	-6.16*** (-21.10)	-15.14*** (-21.56)	-24.63*** (-23.86)	-33.57*** (-26.12)	-40.15*** (-27.43)
Population size_1km	0.00*** (68.86)	0.00*** (76.98)	0.00*** (103.49)	0.00*** (135.35)	0.00*** (168.21)
Year 2003	-1.31*** (-3.57)	-5.17*** (-4.94)	-10.37*** (-6.11)	-16.66*** (-7.57)	-23.42*** (-8.80)
Year 2005	-0.38 (-0.95)	-0.80 (-0.70)	-1.30 (-0.71)	-1.54 (-0.65)	-1.33 (-0.47)
Year 2008	1.62*** (4.19)	4.53*** (4.21)	8.42*** (4.88)	14.76*** (6.60)	22.06*** (8.14)
Access_35km	-0.01*** (-22.81)	-0.02*** (-24.65)	-0.04*** (-28.69)	-0.05*** (-36.87)	-0.07*** (-41.29)
Access_35km <sup>2</sup>	0.00*** (12.28)	0.00*** (13.68)	0.00*** (14.05)	0.00*** (18.12)	0.00*** (19.15)
Number of observations	68,023				

1- The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 1%, 5% and 1% levels respectively. 2- The numbers in the parentheses are Z values. 3- The regression models are weighted by the probability weight. 4- Dummy variables for the missing values are also included in the regression models, but suppressed for brevity.

## Appendix 1.D

**Table 1.D1: The effect of access to charitable organization (extended databased) on volunteer outcomes for full sample, control function approach**

Access to charitable organizations	Full sample			
	Model (1)			
	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
	dy/dx	dy/dx	dy/dx	dy/dx
Access_1km	0.31*** (5.94)	0.38*** (4.82)	0.13*** (4.75)	-0.50*** (-4.81)
Access_1km <sup>2</sup>	-1.75e-04*** (-4.91)	-7.11e-04*** (-4.48)	-2.44e-04*** (-4.43)	9.55e-04*** (4.47)
<b>Marginal effect 1km</b>	<b>0.27</b>	<b>0.19</b>	<b>0.05</b>	<b>-0.24</b>
Access_2km	0.09*** (6.94)	0.03*** (4.47)	0.01*** (4.50)	-0.04*** (-4.48)
Access_2km <sup>2</sup>	-1.82e-05*** (-2.72)	-1.42e-05*** (-3.11)	-4.88e-06*** (-3.14)	1.91e-05*** (3.12)
<b>Marginal effect 2km</b>	<b>0.08</b>	<b>0.05</b>	<b>0.02</b>	<b>-0.07</b>
Access_3km	0.04*** (5.13)	0.02*** (4.40)	0.01*** (4.44)	-0.02*** (-4.41)
Access_3km <sup>2</sup>	-4.03e-06 (-1.56)	-3.73e-06** (-2.13)	-1.28e-06** (-2.15)	5.01e-06** (2.14)
<b>Marginal effect 3km</b>	<b>0.04</b>	<b>0.02</b>	<b>0.01</b>	<b>-0.03</b>
Access_4km	0.03*** (5.32)	0.01*** (3.72)	0.00*** (3.74)	-0.01*** (-3.73)
Access_4km <sup>2</sup>	-3.64e-07 (-0.25)	-8.08e-07 (-0.89)	-2.77e-07 (-0.89)	1.09e-06 (0.89)
<b>Marginal effect 4km</b>	<b>0.02</b>	<b>0.02</b>	<b>0.00</b>	<b>-0.02</b>
Access_5km	0.02*** (4.12)	0.01*** (2.63)	0.00*** (2.67)	-0.01*** (-2.64)
Access_5km <sup>2</sup>	1.25e-06 (1.60)	6.91e-07 (1.10)	2.37e-07 (1.10)	-9.29e-07 (-1.10)
<b>Marginal effect 5km</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.01</b>
Number of observations	68023		68023	
Predicted probability	0.38	0.20	0.16	0.65

1- The marginal effects, access and access<sup>2</sup> are scaled by 100 2-The asterisks \*, \*\* and \*\*\* indicate that the test statistic is significant at the 10%, 5% and 1% levels respectively.3-The number in the parentheses are Z value 3- As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 4- When displaying the marginal effects, Stata displays separate terms for the linear (access at 1-5km) and quadratic terms (access at 1\_5km<sup>2</sup>) of the access variable. That is it treats “access 1-5km”, and “access 1-5km <sup>2</sup>” as separate variables and does not understand that: “access 1-5km<sup>2</sup>”= “access 1-5km”<sup>2</sup>. To get the total marginal effects, I compute the average adjusted prediction (AAP) at the mean value of “access at 1-5km” while all other variables were left at their observed value, than do this again but fix the “access at 1-5km” at another value ( mean+1) and finally I subtract these two numbers from each other. 5- The regression models are weighted by the probability weight. 6-The standard errors in parentages are bootstrapped (150 replications). 7- All the other control variables are suppressed for brevity.

## Appendix 1.E

**Table 1.E1: The comparisons of marginal effects between the 2SLS and control function approaches**

<b>Access to charitable organizations</b>	<b>Full Sample</b>	
	<b>Model (1) 2SLS</b>	<b>Model (2) Control function</b>
	pr(v=1) dy/dx	pr(v=1) dy/dx
Access_1km	0.71 (1.53)	0.34*** (7.45)
Access_2km	0.13** (2.02)	0.10*** (7.55)
Access_3km	0.05* (1.74)	0.05*** (6.86)
Access_4km	0.04 (1.61)	0.03*** (6.05)
Access_5km	0.02 (1.44)	0.02*** (5.27)
Number of observations	68,023	68,023

1-The marginal effects are scaled by 100 2- The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5% and 1% levels respectively. 3-The number in the parentheses are Z value 4-The regression models are weighted by the probability weight. 5- All the other control variables are suppressed for brevity.

## Appendix 1.F

**Table 1.F1: The effect of access (Doughnuts) to charitable organization on volunteer outcomes, full sample**

Access to charitable organizations	Full Sample			
	pr(v=1)	pr(r-v=1)	pr(ir-v=1)	pr(no-v=1)
	dy/dx	dy/dx	dy/dx	dy/dx
Access_1km	0.13*** (8.19)	0.10*** (8.40)	0.03*** (8.31)	-0.13*** (-8.40)
Access_1km <sup>2</sup>	-2.16e-04*** (-5.71)	-1.58e-04*** (-6.14)	-5.42e-05*** (-6.11)	2.12e-04*** (6.14)
<b>Marginal effect 1km</b>	<b>0.12</b>	<b>0.09</b>	<b>0.03</b>	<b>-0.12</b>
Doughnuts 1-2km	0.05*** (5.92)	0.04*** (6.00)	0.01*** (5.95)	-0.05*** (-5.99)
Doughnuts 1-2km <sup>2</sup>	-3.62e-05*** (-3.18)	-2.46e-05*** (-3.12)	-8.44e-06*** (-3.11)	3.31e-05*** (3.11)
<b>Marginal effect 1-2km</b>	<b>0.05</b>	<b>0.03</b>	<b>0.01</b>	<b>-0.04</b>
Doughnuts 2-3km	0.03*** (4.12)	0.02*** (4.13)	0.01*** (4.11)	-0.03*** (-4.13)
Doughnuts 2-3km <sup>2</sup>	-9.20e-06 (-0.96)	-6.78e-06 (-1.00)	-2.32e-06 (-1.00)	9.10e-06 (1.00)
<b>Marginal effect 2-3km</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>-0.03</b>
Doughnuts 3-4km	0.02** (2.51)	0.01** (2.47)	0.00e+00** (2.46)	-0.02** (-2.47)
Doughnuts 3-4km <sup>2</sup>	6.32e-06 (0.74)	4.92e-06 (0.84)	1.68e-06 (0.84)	-6.60e-06 (-0.84)
<b>Marginal effect 3-4km</b>	<b>0.02</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.02</b>
Doughnuts 5km	0.01* (1.66)	0.01 (1.17)	0.00E+00 (1.17)	-0.01 (-1.17)
Doughnuts 4-5km <sup>2</sup>	7.65e-06 (1.07)	7.71e-06 (1.55)	2.64e-06 (1.55)	-1.03e-05 (-1.55)
<b>Marginal effect 4-5km</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>-0.01</b>
Number of observations	68,023	68,023		
Predicted probability	0.36	0.20	0.16	0.65

1- The marginal effects and coefficient estimates for access and access<sup>2</sup> are scaled by 100 2-The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5 % and 1% levels respectively.3-The numbers in the parentheses are Z values 3-As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 4- When displaying the marginal effects, Stata displays separate terms for the linear (access at1-5km) and quadratic terms (access at 1\_5km<sup>2</sup>) of the access variable. To get the total marginal effects, I first compute the average adjusted prediction (AAP) at the mean value of “access at1-5km” while all other variables are left at their observed value, then I do this again but fix the “access at1-5km” at another value ( mean+1) and finally I take the difference between these two numbers. 5- The regression models are weighted by the probability weight. 6- All the other control variables are suppressed for brevity.



## Appendix 1.G

### Charitable Organizations' Diversity

Charitable organizations are classified by their fields of activity. The CRA classifies charities into nine different fields: social service, health, education and research, culture and arts, international aid, animal welfare, community, religion denomination and miscellaneous (see table 1.A1). At the local level, taking into account how evenly each neighbourhood encompasses charities with different fields of activity would be important because people with different background and preference would attract to different volunteer activities so offering a diverse range of volunteering roles should attract more volunteers.

To try to capture the concentration of fields, I use species richness method which counts the number of different types of charitable organization within a 1-5km radii distances. Using this method we assume that neighbourhoods contain more different types of charitable organizations are considered to be more divers. For example, a neighbourhood containing all nine different types of charitable organizations would be more diverse than a neighbourhood with five types. The Richness method does not take into account the abundances or the relative abundances distributions (evenness) of charitable organizations.<sup>40</sup>

The results reported in Table 1.G1 are the slopes of the volunteer outcomes on access to charitable organizations and the diversity of charitable organizations within 1-5km radii. Allaying with the baseline model, I find that increasing the number of charitable organizations leads to more volunteering, but increasing the diversity of charitable organizations has a negative effect on volunteering. The results suggest that, for example at the 1km buffer size increasing the

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<sup>40</sup> Herfindahl–Hirschman Index (HHI) is another very common method to measure the concentration of charitable organizations by fields of activities at the neighbourhood level. The HHI index takes into account both the richness and evenness distribution of charitable organization within a specified area. This Index was originally used to measure the degree of competitiveness among firms in an industry. The disadvantage to using HHI is that HHI is not computable for neighbourhoods with zero number of charitable organizations.

number of charity organizations by its growth rate increases the probability of participating in volunteer activities and becoming a regular and irregular volunteer by 6%, 7%, and 3% and decreases the probability of becoming a non-volunteer by 3%.

**Table 1.G1: The effect of access to charitable organizations on volunteer outcomes by diversity Index**

Access to charitable Organizations	Diversity Index			
	pr(v=1) dy/dx	pr(r-v=1) dy/dx	pr(ir-v=1) dy/dx	pr(no-v=1) dy/dx
Access_1km	0.34*** (7.40)	0.23*** (5.51)	0.08*** (5.46)	-0.31*** (-5.50)
Diversity_1km	-0.67*** (-3.16)	-0.40** (-2.21)	-0.14** (-2.22)	0.54** (2.21)
Access_2km	0.09*** (5.89)	0.06*** (6.56)	0.02*** (6.59)	-0.09*** (-6.58)
Diversity_2km	-0.03 (-0.22)	0.01 (0.17)	0.00 (0.17)	-0.02 (-0.17)
Access_3km	0.05*** (6.60)	0.03*** (5.64)	0.01*** (5.59)	-0.04*** (-5.63)
Diversity_3km	0.04 (0.37)	0.07 (1.08)	0.03 (1.07)	-0.10 (-1.07)
Access_4km	0.03*** (6.77)	0.02*** (7.11)	0.01*** (6.99)	-0.03*** (-7.09)
Diversity_4km	0.10 (0.81)	0.13 (1.51)	0.05 (1.51)	-0.18 (-1.51)
Access_5km	0.02*** (6.74)	0.02*** (5.43)	0.01*** (5.41)	-0.02*** (-5.43)
Diversity_5km	0.07 (0.58)	0.10 (1.37)	0.03 (1.37)	-0.14 (-1.37)
Number of observations	68,023		68023	
Predicted probability	0.38	0.20	0.16	0.65

1-The marginal effects are scaled by 100 2- The asterisks \*, \*\* and \*\*\* indicate that the coefficient estimate is significant at the 10%, 5% and 1% levels respectively. 3-The number in the parentheses are Z values. 4- As the predicted probabilities are relatively consistent across different buffer sizes I only record the predicted probability corresponding to the 1km buffer in this table. 5-The regression models are weighted by the probability weight. 6- All the other control variables are suppressed for brevity.

## Chapter two: The Returns to Working for Free

### 2.1. Introduction

There are various channels by which individuals can augment their income. In today's economy, volunteering is increasingly viewed as a way to enhance job opportunities and gain work related experience when jobs are scarce. Whereas in 1997 approximately 10% of volunteers in Canada reported that volunteering helped their chances of success in their paid job by 2010 the percentage increased to 36%.<sup>41</sup> While the economic returns to educational attainment and labour market experience have been well documented (e.g., Silles, 2007; Devereux and Fan, 2011; Dickson and Smith, 2011), the returns to volunteering have received much less attention.

There are a variety of reasons to engage in volunteer behaviour – to pursue personal obligations or beliefs, to network or meet people or to make contribution to the community – but for many, volunteering is an investment in human capital. Working for free provides individuals with opportunities to hone their skills on a variety of fronts; to gain important experience and skills (human capital theory), to access networking opportunities which enhance future job offers (social capital theory) and to signal productive characteristics to employers (Day and Devlin, 1998).

The literature on the relationship between volunteering and the paid labour market looks at three different measures of labour market outcomes: the relationship between volunteering and earnings (e.g., Day and Devlin, 1998; Prouteau and Wolff, 2006); between volunteering and moving into the labour market (e.g., Paine et al., 2013; Gay, 1998; Strauss, 2009; Hirst, 2002);

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<sup>41</sup> These numbers are based on the author's calculations from the question "Do you think your volunteer activities have helped your chances of success in your paid job or business" from National Survey of Giving, Volunteering and Participating (NSGVP), 1997 and Canada Survey of Giving, Volunteering and Participating (CSGVP), 2010.

and between volunteering and job retention (e.g., Paine et al., 2013). In this chapter my central research question is whether volunteering brings a positive income premium for individuals once account is taken of the potential endogeneity between being a volunteer and income. Using an Instrumental Variable (IV) technique this paper is the first Canadian study to explore the causal relationship between volunteering and income and contributes to the small number of such studies that use data from outside of Canada (Halla, 2006; Hackl et al., 2007; Sauer 2015; Cozzi et al., 2013; Bruno and Fiorillo, 2016). The empirical literature on the causal effect of volunteering on income provides an incredibly wide range of estimates. For example, Cozzi et al. (2013) find a 94% return to volunteering while Bruno and Fiorillo (2016) find the return to be only 2%. In this chapter by using different instruments I help to better understand these inconsistent findings.<sup>42</sup>

Taking part in volunteer activities is not a random phenomenon; individuals choose whether or not to participate in these activities. Depending on how such choices are made, measured earnings differences in an OLS regression between volunteers and non-volunteers may overestimate or underestimate the true returns to volunteering. For example, if volunteers have unobserved characteristics that make them more effective workers, the underlying relationship in an OLS regression would be overestimated. If however there is a negative selection such that people who have unobserved characteristics that make them ineffective workers choose to volunteer the relationship would be underestimated. Analyzing the causal relationship between unpaid work and earnings requires an exogenous source of variation – which is the role of instruments.

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<sup>42</sup> Cozzi et al. (2013) use rain “shock” and rain variance as instruments for volunteer experience and Bruno and Fiorillo (2016) use participation in religious organizations and other groups (environmental organizations, civil right groups, neighbourhood association, peace groups, etc.) and informal volunteering, as instruments for voluntary work.

A number of instruments are used in the analysis. First, a measure of access to the charitable organizations around an individual's place of residence is used. My results in chapter 1 suggest that this measure of access is causally linked to volunteer opportunities. Proximity to charitable organizations is likely to increase awareness of volunteer opportunities, and a short commute to volunteer jobs might decrease the time costs associated with volunteering. In addition to access, I also use more conventional instruments reflecting membership or participation in various activities.

Using General Social Surveys (GSS) (2003, 2005, 2008, 2010 and 2013) I find the relationship between volunteering and income to be sensitive to the choice of instrument used. When membership or participation in a sport or recreational organization is used as the identifying instrument, unpaid activity is found to have a 53% earnings premium for volunteers as compared to non-volunteers. When participation in religious-affiliated groups is used as the identifying instrument, volunteering is found to *reduce* earnings by 22%. When I use membership in school and civic groups as identifying instruments, I find no statistically significant effect on income. When I use access to charitable organizations I find a large (47%) but imprecisely estimated effect.

The remainder of this chapter is organized as follows. Section 2 reviews the economic literature on volunteering and income, followed by a summary of data in section 3. The fourth section discusses the methodology used in the analysis. The fifth section includes the results and the sixth section concludes the chapter.

## **2.2. Literature Review**

The economics literature groups the motives for volunteering into two broad categories: consumption motives and investment motives (Menchik and Weisbrod, 1987). In the

consumption group, volunteering is a utility-yielding activity which brings internal rewards by helping others, providing personal or family services or offering contacts with others (Prouteau and Wolff, 2006). In the investment model, individuals take part in volunteer activities to enhance their future income potential. Here, working for free provides individuals with opportunities to hone their skills on a variety of fronts, to gain important experience, skills and networking opportunities which enhance future earnings (e.g., Prouteau and Wolff, 2006; Piliavin and Siegl, 2007).

Previous studies that investigate the relationship between volunteering and motivational factors mostly support the investment motive (Prouteau and Wolff, 2006). The empirical papers that investigate the importance of the investment model on volunteering can be categorized into three groups: 1) those that examine the relationship between volunteering and employability (e.g., Spera et al., 2013; Baert and Vujić, 2016; Paine et al., 2013); 2) those that examine the relationship between volunteering and wages/earnings premium (e.g., Day and Devlin, 1998; Prouteau and Wolff, 2006; Halla, 2006; Hackl et al., 2007; Cozzi et al., 2013; Paine et al., 2013 and Bruno and Fiorillo, 2016) and 3) papers that look at the link between volunteering and job retention (e.g., Paine et al., 2013).

The work examining the correlation between unpaid activities and income find conflicting effects of volunteering on earnings. While some studies find positive relationship between volunteering and earnings (e.g., Day and Devlin, 1998), others claim a zero or negative influence (Prouteau and Wolff, 2006; Paine et al., 2013). Day and Devlin (1998) were the first to investigate empirically whether volunteer work affects individual's earnings; they also examined whether this may help to explain the earning gaps between males and females (Day and Devlin, 1997). Without controlling for the potential endogeneity of volunteering they find that on

average volunteers earn about 7% higher incomes than non-volunteers. In addition, they find that the types of organizations for which individuals volunteer are helpful for explaining the earning gaps between male and female. Paine et al. (2013) in a longitudinal study using the British Household Panel Survey (BHPS) (1998-2008) of 13,454 persons, find that while monthly volunteering has a zero effect on wage progression, frequent (weekly) and infrequent (several times or once a year) volunteering have negative effects.

Six studies investigate the causal relationship between volunteering and earnings, five of which find a positive relationship between volunteering and earnings. But the magnitude of these earning premiums varies considerably across studies: from 2% to 94%. Five methodological approaches are employed: Prouteau and Wolff (2006) use a switching regression model, Halla (2006) uses two-stage probit least squares estimation (2SProbitLS) and propensity score matching, Sauer (2015) uses a structural econometrics model, and Hackl et al. (2007), Cozzi et al. (2013) and Bruno and Fiorillo (2016) use instrumental variables.

Using a switching regression model and cross sectional data of 15,441 persons in 1998, Prouteau and Wolff (2006) investigate whether volunteer work has an economic payoff in the labour market in France. Separating the private sector from the public sector they find that taking part in volunteer activities has a statistically significant positive effect on the wage premium for individuals who are employed in the public sector but a negative effect for individuals who are employed in the private sector.

Halla (2006) uses the US Current Population Survey (CPS) of 4,524 persons aged 16 and older, and 2SProbitLS and propensity score matching techniques to investigate the causal relationship between volunteering and income. He finds that male volunteers receive a wage premium (6%) on the paid labour market but female volunteers do not, and that the type of

organization and/or the type of activity in which the volunteer engages plays an important role in explaining the wage premium: for example, volunteering for political organizations and performing more sophisticated volunteer activities leads to increases in the wage premium.

In contrast, Sauer (2015) employs a structural econometrics model, the UK 2001-2005 Panel Study of Income Dynamics (PSID), and focuses on female volunteers. He finds that an extra year of volunteer experience increases wage offers for (female) part-time workers by 8.3% and for (female) full-time workers by 2.4%. His structural model also reveals that the investment motives to volunteering are relatively more important than consumption motives.

Three studies rely on an instrumental variable technique to investigate the causal relationship between volunteering and income. Hackl et al. (2007) in a cross sectional study using the Upper Austrian Census data (2001) of 421 persons, investigate the causal relationship between volunteering and the hourly wage rate in Austria. In order to account for unobserved heterogeneity and reverse causality they employ two variables, participation in clubs as a youth and having a partner who is a volunteer, as instruments for volunteering. They find that current volunteering increases current earnings by 18.5%. Cozzi et al. (2013) use the British Household Panel Survey (BHPS) (1996-2008) of 9,807 persons aged 16 and older, examine the causal relationship of volunteer experience on wage returns across local area districts in England, Scotland and Wales. In order to account for unobserved heterogeneity and reverse causality problem they use the rain “shock” and rain variance as instruments for volunteer experience and find that volunteering increases male income by 94.7% and female income by 87.5%. Finally, Bruno and Fiorillo (2016), use cross-sectional data from the European Union Statistics on Income and Living conditions (EU-SILC) of 14,567 persons in Italy to investigate the causal relationship between voluntary work and earnings. After employing Heckman and IV methods to



control for unobserved heterogeneity, they find a significant and positive wage premium of 2.7%. They use two variables, participation in religious organizations and other groups (environmental organizations, civil right groups, neighbourhood association, peace groups, etc.) and informal volunteering, as instruments for voluntary work. They investigate the channels through which volunteering may affect earnings and find that voluntary work affects earnings through human capital, social capital and screening, corroborating the discussion in Day and Devlin (1998).

There is no Canadian study that explores the causal effect of voluntary activities on income, and it is to this end that I now turn. I employ a number of different instruments in an effort to disentangle the causal role, using data from the Canadian General Social Surveys (2003, 2005, 2008, 2010 and 2013).

### **2.3. Data**

The data for this study come from the General Social Surveys (GSS). Introduced by Statistics Canada in 1985, they are nationally representative cross sectional surveys that cover one topic annually with two purposes: to gather data on social trends in order to monitor changes in the living conditions of Canadians and to provide information on specific social policy issues of current or emerging interest.<sup>43</sup> The GSS on time use (2005 and 2010), social engagement (2003 and 2008) and giving, volunteering and participating (2013), collect data on unpaid volunteer activities, and participation and hence are used in this chapter.<sup>44</sup>

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<sup>43</sup> The GSS cycle topics are: health; time use; victimization; education, work and retirement, family; social support and aging; access to and use of ICT; social engagement; and volunteering, giving and participation. Each topic repeats every five years. Computer assisted telephone interviewing (CATI) is used to gather the data across the 10 provinces in Canada ([www.statcan.gc.ca](http://www.statcan.gc.ca)).

<sup>44</sup> The other two main surveys that gather information about Canadian contributory behaviour, including giving, volunteering and participating are the National Survey of Giving, volunteering and Participation (NSGVP) and Canada Survey of Giving, Volunteering and Participation (CSGVP). However, I do not use these surveys because the only geographical identifiers in these surveys are the province and the census metropolitan area (CMA); they do

Information on volunteering is self-reported by individuals, who are asked about their participation in volunteer activities. I restrict attention to formal volunteering. Formal volunteering is defined as any unpaid help for a formal organization (and thus it ignores helping one's neighbour, for instance). The GSS contains different questions for describing an individual's participation in volunteer work: did they take part in a formal volunteer activity in the past 12 months, coded as dichotomous yes/no response (2003, 2005, 2008, 2010 and 2013), the average number of hours spent in a month on volunteering in categorical (2003, 2005, 2008 and 2010) and continuous formats and questions relating to previous volunteer experience (2003 and 2013). I focus on the participation decision in my main analysis.<sup>45</sup> As previous volunteer experience is found to be a strong predictor of contemporaneous volunteering (e.g., Choi and Chou, 2010) previous volunteering is often included alongside contemporaneous volunteering in models estimating the determinants of income (e.g. Cozzi et al., 2013). However, as only two cycles of GSS (2003, 2013) gather the information about the past volunteer experience (the latter cycle asks these questions only of those currently not volunteering) I only use contemporaneous volunteer participation as a measure of volunteering into my analysis.

Previous studies looking at the return to volunteering on earnings have relied on less than ideal earnings information. For example, Day and Devlin (1998) consider only one-earner families as their data has no information on individual's labour earnings. Bruno and Fiorillo (2016) restrict their sample to only employed individuals without knowing whether the main source of income is employment or not.<sup>46</sup> Cozzi et al. (2013) with no information about labour

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not contain information on the postal codes of the respondents which is necessary to construct the access instrumental variable.

<sup>45</sup> In a robustness specification I use the average number of hours spent volunteering in a month in categorical format (please see section 2.5.2 Robustness Checks).

<sup>46</sup> In my data, 13% of individuals who are employed report that their main source of income is not from employment (wages or salaries) or self-employment.

income restrict their sample to the age group (between 20 and 60 years old) who are most likely in the labour force.

The GSS provides arguably better income data than these previous studies, though income data are not measured uniformly across cycles. By far the most reliable information on income and earnings is contained in the GSS (2013) as it is derived from respondents' income tax files for the 2012 calendar year and separately provides income received from: wages and salaries, self-employment, government transfers and investment income. By contrast, the income in GSS (2003, 2005, 2008 and 2010) is a self-reported measure which does not distinguish between the sources. However, there is a common question across all of the GSS cycles which asks about the main source of personal income during the previous calendar year, categorized into 15 types.<sup>47</sup> I restrict the sample to individuals whose main source of personal income comes from employment including wages, salaries, commission and tips and self-employment (such as unincorporated business, professional practice or farm income).<sup>48</sup> Because the GSS (2003, 2005) does not distinguish between employment and self-employment income when asking individuals about their main sources of income in the past 12 months, I include self-employment income from the other samples too in order to render my income variable comparable across the years. Individuals who are self-employed constitute a small part of my sample (10%).<sup>49</sup> I pool together

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<sup>47</sup> The 15 different sources of income are: no income; employment income; self-employment, investment; registered retirement income funds; employment insurance; worker's compensation; benefits from Canada or Quebec pension plan; retirement pensions; superannuation and annuities; basic old age security; guaranteed income supplement or survivor's; allowance; child tax benefit or family allowances; provincial, territorial or municipal social assistance or welfare; child support/ alimony and other income.

<sup>48</sup> I have exact information on sources of income in the GSS (2013) where individual survey responses are linked to respondents' tax files. I compared the responses of individuals to the question on their main sources of income to the exact data reported in this survey, and found that 92% of individuals who reported that their main source of income was from wages and salaries and self-employment, actually had a main source in one of these categories. In other words, the reported main source was 92% accurate. On this basis, I assume that the information from the other surveys is reasonably accurate.

<sup>49</sup> To check the robustness of my results I exclude 2003 and 2005 and re-estimate the model by restricting the sample to individuals whose main source of income comes from only wages and salaries. My results are essentially

the five data sets and use the Statistics Canada Consumer Price Index at the provincial level to adjust personal income for inflation.

Table 2.1 summarizes the sample size for each survey cycle. The original sample pooled from these five cycles contains 95,053 observations. To investigate the labour market returns to volunteering, I exclude individuals whose main source of income does not come from wages and salaries or self-employment (42%, comprised mostly of retired individuals) and further exclude individuals with zero or missing data on labour income (15%). Because employment income drops sharply after age 65 I exclude individuals aged over 65 years from sample (only 2% as most were excluded in the first restriction).<sup>50</sup> I exclude individuals under 24 years (12%) because these individual may still be in school.<sup>51</sup> I also exclude those who do not provide their residential six digit postal code correctly (6%) and those who did not answer the question about formal volunteering (<0.01%). After these restrictions, I am left with 38,151 observations. To retain as much information as possible I keep observations with missing values for other variables (e.g., labour force status, occupation type), but include controls in the regressions for missing values for each variable.<sup>52</sup>

The volunteer variable is a dummy variable which takes the value 1 if individuals took part in a formal volunteer activity in the past 12 months and zero otherwise. The regressions include the following socio-demographic variables: sex, age, marital status, highest level of educational attainment, indicators for the age of youngest child in the household, household size, language used for the interview, immigration status and the length of time that the respondents lived in

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the same. For example, using membership in sport or recreational organizations as an instrument I find that volunteering increases income by 46%.

<sup>50</sup> For example, in my sample only 8% of individuals aged 65 and over say that their main source of income comes from wages and salaries or self-employment.

<sup>51</sup> The GSS (2005, 2010) do not ask individuals about their school attendance during the past 12 month.

<sup>52</sup> As a robustness check, instead of including controls for missing responses I drop those observation with missing information. My results are essentially the same.

their current city or local community. Regressions also include province dummies and the population density to capture the characteristics of the community. I measure the population size at 3km buffer around individuals' homes. To obtain population size, I merge the geographic attribute files from the census years 2006 and 2011 which contain population data with the Postal Code Conversion File (PCCF) from Statistics Canada which gathers all historical as well as current records for each postal code in Canada.<sup>53</sup> The agglomeration literature (e.g., Morikawa, 2011) suggests that labour productivity is correlated with density insofar as people in densely populated areas on average earn higher incomes. Indicators for part-time versus full-time work as well as industry dummies in ten categories are included.<sup>54</sup> To capture possibly non-linear secular trends in income I include a set of year dummy variables. Table 2.2 presents the definition of all the variables used in this study.

To capture causality between volunteering and income, I consider four different identifying instruments. The first is a measure of access (and its square) to registered charities at the neighbourhood level (as developed in chapter 1). Using the Postal Code Conversion File (PCCF), I obtained the longitude and latitude of respondents' homes based on their reported postal codes; I did the same for the complete set of charitable organizations from the T3010 database (2003, 2005, 2008, 2010 and 2012). I then calculated a three-kilometre circle around each respondent's home and counted the number of charitable organizations falling within the circle.<sup>55, 56</sup>

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<sup>53</sup> Chapter 1 details how I merged these two databases.

<sup>54</sup> To be consistent with the previous studies (e.g., Bruno and Fiorillo, 2016) I control for occupation type and labour status. But these two variables are endogenous in the earnings regressor. To check the robustness of results I drop these two variables from the model and re-estimate the regressions, my results are essentially the same. For example, when using membership in sport or recreational organizations as an instrument I find that volunteering increases income by 51%.

<sup>55</sup> I chose the 3km buffer because this is generally walkable within 30 minutes.

My three other instruments are based on the questions that are asked only in GSS 2003, 2008 and 2013 about the civic engagement of respondents: “in the past 12 month, were you a member or participant in: ... a sport or recreational organization (such as a hockey league, health club, or golf club); ... a religious-affiliated group (such as church youth group or choir); ... a school group, neighbourhood, civic or community association (such as PTA, alumni, block parents or neighbourhood watch)...”.<sup>57</sup>

### **2.3.1. Descriptive Statistics**

Table 2.3 presents some descriptive statistics for the pooled sample, and volunteer and non-volunteer groups. The dependent variable is the natural logarithm of total personal income for individuals who report that their main source of income comes from wages, salaries or self-employment. Transforming the income variable by the natural logarithm decreases the impact of outliers and is closer to a normal distribution than the right-skewed distribution of actual income.

About 40% of respondents were involved in formal volunteer activities within the past 12 months. The mean age of the respondent is 43 years old. Of the full sample, 55% is male but only 52% of the volunteer sample is male; 45% of the full sample is female, however females constitute 48% of the volunteering sample. In other words, females participate proportionately more in volunteering. Most of the respondents (75%) are either married or living common law and proportionately more (78%) participate in volunteer activities. Volunteering is more common among respondents whose youngest child is aged between 5-14 years old when

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<sup>56</sup> Under the *Income Tax Act* all registered charities in Canada in order to be able to retain their charitable status must file a Registration Charity Return (Form T3010) with Canada Revenue Agency (CRA) every year. I obtain the postal codes of charitable organizations from the T3010 at the Public Economics Data Analysis Laboratory (PEDAL) at McMaster University. Further details on the construction of the access variables are provided in chapter 1.

<sup>57</sup> I did not use participation in union or professional associations, or participation in a political party or group because the former will be directly associated with income, and the latter, namely political party membership is less likely to be associated with active participation in the community when compared to other group membership.

compared to respondents with no children. Nearly 78% of the individuals responded to the surveys in English and volunteering is more common among this group.

On average about 65% of the sample has more than high school education and volunteers have a higher level of education than non-volunteers. Nearly, 79% of individuals are born in Canada and among immigrants, volunteering increases with the length of time lived in Canada. About 39% of the respondents live in Ontario and the volunteering rate varies considerably across provinces; Saskatchewan with 53%, has the highest proportion of volunteers and Quebec with 28% has the lowest.<sup>58</sup> Nearly 18% of the sample lives in rural areas and the volunteer rate is higher among this group.

On average about 58% of individuals work full-time and they volunteer less than those who work part-time. The vast majority of workers (57%) are employed in five of ten broad occupation groups: business, finance and administration occupations (15%), sales and services occupations (14%), trades, transport and equipment operators and related occupations (11%), management occupations (9%) and occupation in education, law and social community and government service (8%). Volunteer rate vary considerably by the type of occupations, it is higher among individuals who are in education, law and social community and government service occupations and lower among those who are in occupations unique to processing, manufacturing and utilities. The average numbers of charitable organizations within 3km radius of the individual's place of living is 116. About 28%, 14% and 17% of sample are members or participants in sport, religious and school groups respectively and civic engagement is more common among volunteers than non-volunteers.

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<sup>58</sup> Having information about the total number observations (38,121), the proportion of volunteers (40.01%) and respondents who live in different provinces from the full and volunteer sample, it is possible to calculate the volunteer rate across different provinces (i.e., 53% and 28%).

## 2.4. Methodology

To analyze the relationship between volunteering and income I estimate the following equation:

$$\ln(\text{income})_{it} = \gamma_0 + \gamma_1 V_{it} + X'_{it}\beta + \varphi_p + \lambda_t + \varepsilon_{it} \quad (1)$$

where  $\ln(\text{income})_{it}$  is the natural logarithm of personal income of individual  $i$  at time  $t$ .  $V_{it}$  is the dichotomous indicator for having participated in formal volunteering activities in the past 12 months.  $X_{it}$  is the vector of socioeconomic control, and  $\varphi_p$  and  $\lambda_t$  represent the provincial and year dummies, respectively.<sup>59</sup>

This model does not address the possible endogeneity of volunteering. I use an IV method to take into account both the omitted variable bias and simultaneity between the volunteering and income. The omitted variable bias happens if there are some unobserved factors such as abilities, perseverance and ambition that are associated with both volunteering and income (e.g., Day and Devlin, 1998). In this case it is difficult to determine whether the positive relationship between volunteering and income arises because working for free enhances individual's earnings or because volunteers have some unobserved characteristics that are associated with higher income. The simultaneity arises because volunteering may affect income at the same time being affected by it. Therefore, the income outcome may appear in the regression predicting volunteering outcome and vice versa. It is well established that individuals with higher levels of income are more likely to participate in volunteer than others (e.g., Fischer et al., 1991). For example higher income individuals may have specific skills such as: networking, communication or leadership that are desired by volunteer organizations.

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<sup>59</sup> The socioeconomic factor includes gender, age, marital status, education level, employment status, household size, presence of children in the household, length of time living in Canada, length of time living in city or local community, occupation type, urbanicity and population density. Please see table 2.2 for the full description of the variables.



I use four different instruments: physical access to charitable organizations from an individual's place of residence; membership or participation in sports or recreational organizations; religious-affiliated groups; and finally, membership or participation in school groups, neighbourhood, civic or community associations. The validity of these instruments is conditional on two main assumptions. First, that there exists a strong correlation between the instruments and volunteering, the endogenous variable. This requirement can be directly tested in the first stage regressions. As discussed in the first chapter, physical access to charitable organizations can be thought to encourage volunteering via two channels: first, proximity is likely to increase the awareness of volunteer opportunities and second, decrease the travel costs associated with volunteering. In Chapter 1 I found that there is a non-linear relationship between access to the charitable organizations and working for free, volunteering increases with access but at a decreasing rate. To capture non-linear effects, I use both access and access squared as instruments for volunteering.<sup>60</sup>

Membership or participation in organizations such as sport or recreational organizations, school and civic groups and religious organizations promote social trust and civic culture, and is thought to affect the probability of engaging in volunteer activities. Individuals who are members of such groups may be more sociable than others, enhancing their chances to hear about volunteer opportunities, or to be asked to donate their time for free (Wilson, 2012).

One concern might be that participation in such groups is too correlated with volunteering in the sense that it perfectly predicts volunteering. In table 2.4 I report the volunteer rate for members or participants of different groups or organizations and find that more than half of

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<sup>60</sup> Instruments based on geographic features have been employed by many previous studies including Card (1993) who uses college proximity as an instrument for educational attainment when examining the effect of education on earnings and Currie and Moretti (2003) who use the availability of college in the mother's county in her 17<sup>th</sup> years as an instrument for maternal education when estimating the relationship between maternal education and birth outcomes.

members or participants in these groups stated that they participate in formal volunteer activities. Members or participants of school/civic group were more likely to be volunteers (75%) as compared to members or participants in sports or recreational organizations (60%). Importantly, table 2.4 demonstrates that membership or participation in various groups or organizations is not perfectly correlated with being a volunteer, providing a good deal of variation from which to identify volunteers.

The second condition required of instruments, the exclusion restriction, is that the instruments be uncorrelated with the error term in the main regression (OLS). While it is possible to test whether the first condition is satisfied, the second condition cannot be tested directly and usually relies on economic theory or reasoning. In this chapter, I control for rurality and population density in order to capture geographic characteristics usually associated with earnings. The number of charitable organizations in an area is assumed to affect wages only through volunteering. I also use membership in organizations as instruments for volunteering. It is usually believed that individuals first join a group or organization and then become a volunteer. There is no reason to believe that joining the organization, per se, is linked to earnings. But, my instruments are not perfect and the exclusion restriction may be violated. For instance, charitable organizations may be inclined to locate closer to profitable businesses that offer higher wages in order to access a pool of higher-skilled volunteers. Similarly, membership in organizations may be associated with higher levels of social capital which have shown to be linked to income or salary.

To check the exclusion restriction, I use the access variable along with the rest of the other instruments together (i.e. participation or membership in: sport or recreational organization;

religious-affiliated groups; school groups, neighbourhood, civic or community associations) to check the validity of over identification restrictions using the Hansen-J statistic.

## **2.5. Results**

The results for the OLS estimations without taking account of endogeneity are presented in table 2.5 (model 1). Models 2-5 present the IV model estimates using four different instrumental variables separately: access (and its square); participation or membership in sports or recreational organizations; participation or membership in religious-affiliated groups; and participation or membership in school groups, neighbourhood, civic or community associations. The final two columns of table 2.5 present the IV estimates where the instrument is membership in any of the three groups (model 6), and when all instruments (membership in any of the three groups, and access and access squared) are employed (model 7). For all IV models, the estimated coefficients of the instruments from the first stage are reported at the bottom of the table.

Model (1) presents the baseline OLS estimates. According to these estimates, volunteering is associated with a 2% premium in income for the full sample. This result is comparable but smaller than the 6.6% estimated returns reported in Day and Devlin (1998). The estimated effects for the other individual characteristics, labour market status and community factors included in this model have the expected sign and significance where justified by previous studies. For example I find that individuals with higher educational attainment, who are middle aged, Canadian born, who have lived longer in their local community or city, who work full-time and who have younger children in the household earn more. Further, I find that women, those who live in rural areas and who have larger families make less money.

Table 2.5, model 2, presents the IV results when I employ access and access squared for a 3km buffer around place of residence as instruments. I find that after taking account of the

endogeneity between volunteering and labour market income, volunteering has a much larger but statistically insignificant effect on income. The first stage F statistic which checks the correlation between access and access squared to charitable organization (3km) and volunteering indicates that the instruments are highly correlated with volunteering variable ( $F=14$ ). The Durbin-Wu-Hausman test statistic reported at the bottom of the table 2.5 indicates that the endogenous regression effect on the estimate is meaningful only at an 85% confidence level. However, given that endogeneity biases the estimated coefficients of a model, I am employing an IV procedure in order to fix this serious problem.

The estimated impact of volunteering on income is very large in model 2 (47%), although measured imprecisely. The magnitude of this finding is in keeping with the results in Cozzi et al. (2013) who conclude that volunteer participation increases income by 94.7% for men and 87.5% for women.

The IV estimates with membership in each group are presented in models 3-5 of table 2.5. The estimates reveal that membership in different groups and organizations increases the probability of volunteering. The first stage F statistics are all above ten which shows that the instruments are highly correlated with the endogenous variable (volunteering) in all specifications. Moreover, the test for endogeneity reveals, that volunteering is endogenous with earning for the models 3-4 (but only with 80% confidence for model 5).

Note that the questions about individuals' memberships or participations in different groups or organizations are only asked in GSS (2003, 2008, and 2013), which explains the different sample size when I rely on responses to these questions. This also means that models (3), (4), (5) are not directly comparable to models (1), (2).<sup>61</sup>

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<sup>61</sup> To investigate how sensitive the results would be to the choice of the sample. I re-estimate the models (1), (2) in table 2.5, using GSS (2003, 2008 and 2013). The results are similar to the results obtained from using GSS (2003,

Using membership or participation in sports or recreational organizations as an instrument reveals a positive causal effect of volunteering on income. More specifically, *ceteris paribus*, taking part in volunteer activities for those who are induced motivated to donate their time for free because of membership or participation in sport or recreational organizations increases the income by 53%. However, using membership or participant in religious affiliations the results show a negative causal effect of volunteering on income (22%). Moreover, using membership or participation in school or civic groups as the identifying instrument I find that volunteering has positive but statistically non-significant effect (zero) on income. As previously discussed in the methodology section, the instruments based on membership or participation in various organizations might not satisfy the exclusion restrictions. One particular concern might be that these instruments are correlated with wealth. For example, individuals who are members of a sports or recreational organization such as a hockey league, health club or golf club might be generally richer than average and those who are members of religious-affiliated groups such as a church youth group or choir might be poorer than average. If that is the case, one might worry that the IV estimates reported herein are picking up spurious correlations between volunteering and income. To assess the degree to which this might be an issue, I run a separate series of probit regressions to see whether wealth, as proxied for by the difference between a respondent's personal and household income,<sup>62</sup> predicts membership or participation in the three groups (sports or recreational organizations; religious-affiliated groups; and school groups, neighbourhood, civic or community groups). I restrict the sample to individuals whose household

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2005, 2008, 2010 and 2013). I find 2% premium for the OLS model and zero premium for the IV using access as an instrument.

<sup>62</sup> The household income in GSS (2003 and 2008) is in a categorical type. To make the wealth variable, I construct the household income as a continuous variable. I use the midpoint of each category and for the top income category (income over \$100,000) I assume that the maximum point is \$150,000. To make the wealth variable I subtract the household income from the personal income.

income comes from at least two members of the household.<sup>63, 64</sup> I find a positive and significant correlation between my proxy for wealth and membership in sports organizations, a negative and significant correlation between wealth and membership in religious groups and a negative but insignificant correlation between wealth and membership in civic groups. My findings indicate that using membership or participation in groups or organizations as instruments is problematic and my access variables can be considered as a more reliable instrument.

Being the first time (to my knowledge) to use these instruments separately, I cannot compare my estimates with the existing literature. However, by combining these instruments together the estimate shows that taking part into volunteer activity has a positive and statistically significant effect of 16% on earning (table 2.5, models 6 and 7). This moderate effect – compared to when membership or participation in a sports or recreational organization is used as the identifying instrument – is probably in line with Bruno and Fiorillo (2016) findings of 2.7% which shows that merging different instruments together may cancel out the positive and negative effects of volunteering on income of different groups.

The OLS procedure estimates average effects for the total sample while the IV estimates the Local Average Treatment Effect (LATE) for the samples that are induced to change their behaviour by the instrument (so called compliers). An alternative strategy would be to estimate an Average Treatment Effect (ATE) for the whole population, representing the average effect of volunteering on earnings addressing the issue of endogeneity. Using the Local Instrumental Variable (LIV) method proposed by Basu et al. (2007) I estimate the ATE. Appendix 2.A

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<sup>63</sup> The probit models control for: gender, age, marital status, education level, employment status, household size, presence of children in the household, length of time living in Canada, length of time living in city or local community, occupation type, urbanicity, population density and volunteering.

<sup>64</sup> I re-estimate the IV model for the restricted sample (individuals whose household income comes from the other member of the household, not only from the respondent). The IV results are comparable with the full sample reported in 2.5 for models 3, 4 and 5.

includes a table reporting the estimated ATE (table 2.A1) as well as a description of this methodology. The results suggest that for a randomly-chosen individual volunteering increases income by 5%. Because the main objective of my study is to try to better understand the broad range of estimates found in the literature, I do not focus on these ATE results.

Since I have more than one instrument (access, access squared, and membership in sport, religious and civic organizations) I use over identification test (Hansen-J-test) to verify the exclusion restriction (i.e., the validity of my instruments). Recall that the key identifying assumption of this test is that at least one instrument must be valid. The test results reported in table 2.6 show that I cannot reject the identification assumption that at least one of my instruments is valid.

The IV estimates are clearly different than the OLS estimates.<sup>65</sup> While differences are expected as IV corrects for endogeneity, differences are also expected as OLS and IV provide estimated effects for different groups: the LATE versus ATE. It would not be expected for example that the effect of volunteering to be the same for those urged to volunteer because of their proximity to charities as compared to those induced to volunteer only because they are members of religious groups. The huge variations between the different IV estimates are consistent with the wide range of estimates found in the literature i.e., from 2.7% (Bruno and Fiorillo (2016) to 94.7% (Cozzi et al., 2013). It demonstrates that taking part into volunteer activity affects income differently depending on how the propensity to respond to the instrument varies across different individuals.

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<sup>65</sup> Using membership or participation in sport or recreational organization and religious affiliation groups as instruments the IV estimates are different from OLS estimates at 99% confidence level. Using access and membership or participation in school and civic group as instruments the IV estimates are different from the OLS estimates at 85% and 80% confidence level respectively.

### **2.5.1. Heterogeneous Treatment Effect**

In the LATE framework my sample is partitioned into potentially two groups of people. Some change their volunteer behaviour due to participation or membership in groups or organizations (compliers), some who do not ('always takers' those who always volunteer and 'never takers' those who never volunteer). The earnings of the always and never takers therefore cannot be affected by membership or participation in a group. Disparities in the subgroups of compliers may demonstrate variability in treatment effects from one instrument to another. Therefore, have a better understanding about the compliers for the different instrument can be informative. However since I observe individuals at only one point in time, I cannot distinguish compliers from always takers and never takers. Although I do not know who the compliers are individually, I can still describe them in relation to the general population in terms of their observed characteristics (Angrist, 2004).

It is possible to characterize the population of compliers when both the endogenous variable and the instrument are binary (Angrist, 2004). For this, I consider only my three binary instruments: membership or participation in sports, religious and community groups or organizations. The returns to volunteering might be different for compliers from the three different groups (religious, sports and community) if the tasks they do or are exposed to when they volunteer are different. To learn about the characteristics of the complier groups I take advantage of the GSS (2013) that collects information about various tasks volunteers perform for the volunteer organization to which they devote the greatest number of hours. Using the distribution of each volunteer's time across various tasks I identify the type of task to which the individual devoted the most time and consider it as the main type of volunteer activity. Knowing



the type of tasks in which the volunteers are involved can potentially help me understand better the different IV estimates.<sup>66</sup>

Following Havari and Savegnago (2013), in this exercise I use the sample of 3,315 volunteers aged between 25 and 65 years old from the GSS (2013), whose main source of income comes from wages and salaries or self-employment and who report the type of tasks in which they are involved. Membership or participating in organizations or groups is a binary variable which takes values one if the individual is a member or participant in each of these different groups over the past 12 months.<sup>67</sup> I describe the sub-population of compliers (individuals who are members or participants of a group or organization and take part into volunteer activity) in relation to the general population (volunteers) according to in which of the 14 tasks they were mainly involved: canvassing; fundraising; sit as a member of a committee or board; teaching, educating or mentoring; organize, supervising or coordinating activities or events; office work, bookkeeping, administrative duties, or library work; coach, referee or officiate; counsel or provide advice; provide health care or support including companionship; collect, serve or deliver food or other goods; maintenance, repair or building of facilities or grounds; volunteer driving; first aid, fire-fighting, or search and rescue; conservation or protection of the environment or wildlife. The analysis for a sample of 3,315 volunteers is shown in table 2.7, where I report the distribution of treatment, the distribution of compliers by different

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<sup>66</sup> The GSS-GVP (2013) asks in detail about formal volunteering tasks of individuals “In the past 12 month, as an unpaid volunteer for an organization: ... did you do any canvassing, campaigning, or fundraising (etc.)”. From these questions it is possible to estimate the proportion of volunteers involved in each type of work over the past 12 months. However, since 75% of volunteers reported engaging in two or more tasks, and 30% in five or more, it is impossible from using these questions to determine the main type of task the volunteers are involved in. For this I take advantage of questions that ask about the number of hours individuals spend on each task for the organization they volunteer most hours.

<sup>67</sup> There are overlaps between members or participants of different groups and organization. From the total sample of 4,004 volunteers about 17% are members or participants of at least two different types of organizations. In order to identify correctly the type of task undertaken by each organization I keep individuals who report that they are members or participants of only one type organization.

type of tasks and the relative likelihood of an individual undertaking a particular type of task in the compliers group compared to whole sample.

Looking at table 2.7 (column 4) it is not difficult to see that there are variations between members and participants of different groups with respect to the types of tasks in which they are involved. For example, while members and participants in religious groups are 93% more likely to do teaching, educating and mentoring as compared to the whole sample this is -2% for members or participants of sports or recreational organizations. This reinforces the idea that, the type of organization to which an individual belongs is correlated to the type of task she/he is involved in as a volunteer. However, with 14 types of tasks it is not easy to visualize members or participants of different groups with similar attributes. To help facilitate this I use a hierarchical cluster analysis to group organizations who share common type of tasks between their members (Kardi, 2009). Using Euclidean distance, the hierarchal cluster dendrogram in Figure 2.1 is obtained, where its horizontal axis represents the objects and clusters (members or participants for different groups) and its vertical axis represents the distance or dissimilarity between clusters. The level at which branches merge relative to the root of the tree measures the similarity between groups. It is clear from Figure 2.1 that based on the type of tasks performed, members or participants in school or civic groups and religious affiliations are more similar to each other than those involved in sports groups.

These results are important because they help me to explore the possible mechanisms underlying the returns to volunteering. Three channels have been identified to explain the returns to volunteer work (Day and Devlin, 1998). First, individuals may acquire new skills and knowledge which enhance their human capital. Second, volunteering may provide a powerful screening device for employers that discriminate between people based on their unobserved

characteristics. Third, volunteering may create access to formal or informal networks for superior employment opportunities. This exercise can help me to identify tasks which are associated with human capital acquisition, but all three channels may exist simultaneously. For instance, while coaching (members of sport or recreational organizations who also volunteer devote the most amount of their time to this task) may provide opportunities for individuals to gain new leadership skills which build human capital, it may also be related to socializing and networking. Previous studies investigating the mechanism that drive earnings premium through volunteering have run into the same problem. For example, while Bruno and Fiorillo (2016) find that all the three different channels work together harmoniously in order to realize earnings premiums, although Cozzi et al. (2013) suggest that signaling is the most likely source of the large returns to volunteering. More and better data would help me to disentangle these effects.

### **2.5.2. Additional Robustness Checks**

In the previous section I showed that the estimated returns to volunteering are sensitive to the choice of the instruments. However, apart from the choice of instruments these results might also be sensitive to other choices I made in estimating the models. In order to test the sensitivity of my results to the choice of the dependent variable I use the log of hourly income instead the log of yearly income and find comparable results with models 7-10 (see table 2.8).<sup>68</sup> However, using membership or participation in school or civic group as an instrument, I find that taking part in a volunteer activity increases hourly income by 7%, but this is only significant at the 90% confidence level. Instead of using a hierarchical yes/no response to measure volunteering I also employed the average amount of time spent on volunteer work per month over the past years,

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<sup>68</sup> To build the hourly income variable, I restrict the sample to the individuals who report the average number of hours they usually work per week. The dependent variable is the natural logarithm of hourly income, defined as the log of net personal income divided by the number of hours worked in the past 12 month.

recorded in the following five categories: 15 hours per month; 5 to 15 hours per month; 1 to 4 hours per month; less than 1 hour per month and zero hours. The result reported at table 2.9 show that when I use membership or participation in a sport or recreational organization as an instrument, volunteering is found to have a 26% earnings premium for volunteers. When I use participation in religious-affiliated groups as an instrument, volunteering is found to have a 10% earning penalty. Moreover, when I use access to charitable organizations or membership in school and civic groups as instruments volunteering is found to have an insignificant effect on income.

It is possible that the effects of volunteering vary along other dimensions as well. When it comes to the differences in the returns to volunteering by gender, studies find contradictory results. For example while some find higher returns to volunteering for males as compared to females (e.g. Day and Devlin, 1997; Cozzi et al., 2013) others find no significant difference between them (e.g. Hackl et al., 2007). To explore this relationship I estimate separate regressions for male and female. The results reported in table 2.10 reveal that using membership or participation in sports or recreational organizations and religious affiliated organizations as instruments, taking part into volunteer activities generates higher income for men than women, and that volunteering behaviour does affect female and male differently.

## **2.6. Conclusion**

I investigate the causal effect of volunteering on income and conclude that the relationship is complex – more complex than was, perhaps, previously thought. Using a novel instrument for volunteering, access to charitable organizations, I find that it has a very large, but imprecisely measured, impact on earnings. This means that those who are motivated to take part in volunteer activities as a result of proximity to charitable organizations, may be quite different than other

volunteers (who are not close to such organizations) when it comes to the effect of volunteering on income. Identifying the impact of volunteering on income using a different set of instruments, however, yields wildly different results. In particular, I expand the instrument set by employing membership or participation in: sports or recreational organizations; religious-affiliated groups and school, neighbourhood, civic or community associations separately as instrumental variables. The relationship between volunteering and income is sensitive to the context influencing the decision to volunteer. For instance, those who become volunteers as a result of their membership or participation in sports or recreational organizations earn, by contrast, a statistically significant and substantively large premium on the paid labour market. Those who volunteer because of participation in religious-affiliated organizations, earn lower income relative to non-volunteers, while participation in schools, neighbourhood, civic or community associations, has no effect on income. The heterogeneity in IV estimates arises because the IV procedure estimates the local average treatment effect for individuals for whom the instruments are binding, i.e., those who become volunteers only because of proximity to charities or because of their participation in the various organizations.

To better understand why membership or participation in different organizations leads to different IV estimates, I look at the types of tasks undertaken by the volunteers and find that these differ across organizations in a meaningful way. To the extent that these tasks may or may not be related to human capital, speaks to the potential mechanisms underlying the link between volunteering and earnings. For instance, I am finding that using participation in religious organizations as an instrument leads to a negative relationship between volunteering and earnings – clearly this cannot be because of human capital. In this case, what may be happening is that such participation is capturing unobserved characteristics of workers that are associated

with lower income: maybe these workers have strong preferences for job characteristics that are linked to lower earnings?

Most of the limitations of this study stem from characteristics of the dataset. The GSS is a cross sectional survey that does not let me observe individuals' volunteer behaviour over time. Longitudinal data, would allow me to control for unobservable, time-invariant, characteristics, hence removing one major source of endogeneity. The income variable, while better than that which was used in previous studies, remains imperfect: in some cycles I could not separate out self-employed earnings from earnings from employment; earnings are self-reported in all but the 2013 cycle.

Nevertheless, this study highlights the fact that not all volunteering is created equally. Studies that look at the returns to volunteering without acknowledging this fact, may reach conclusions that are not generalizable. Clearly, much more work is required in order to disentangle these aspects of volunteering that are difficult to capture in available surveys. To the extent that many policies, including mandatory high-school community service, are predicated on the notion that such experience is beneficial for future employment, understanding better the link between the type of volunteer activity and earnings (or economic returns) is a fruitful avenue for future research.

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**Table 2.1: The sample size of GSS surveys**

<b>Cycle</b>	<b>Year</b>	<b>GSS topic</b>	<b>Original sample size</b>	<b>Sample size</b>
27	2013	Giving, volunteering and participating	14,714	5,984
24	2010	Time use/stress and well being	15,390	5,716
22	2008	Social network	20,401	8,729
19	2005	Time use	19,597	7,626
17	2003	Social engagement	24,951	10,096

Source: Statistics Canada, General Social Survey

**Table 2.2: Variable definition**

Description of the variables	
<b>Dependent variables</b>	
Personal Income	Continuous variable, the respondent's reported real personal income (converted to 2005 Canadian dollars) in log form.
Hourly Wage	Continuous variable, calculated as the log of the respondent's reported personal income divided by the number of hours worked in the past 12 months.
<b>Independent variables</b>	
Volunteer	Dummy variable 1, if takes part in the volunteer activity during the past 12 month
Age	Continuous variable takes range between 25 years old and 64
Male	Dummy variable 1, if the respondent sex is male, 0 otherwise
Married/common law	Dummy variable 1, if the respondent is married/ common law, 0 otherwise, <b>base group</b>
Single/never married	Dummy variable 1, if the respondent is single/ never married, 0 otherwise
Separated/ divorced	Dummy variable 1, if the respondent is separated/ divorced, 0 otherwise
Widow / widower	Dummy variable 1, if the respondent is widow/ widower, 0 otherwise
Less than high school	Dummy variable 1, if the respondent did not finish high school, 0 otherwise
Graduated from high school	Dummy variable 1, if the respondent graduated from high school, 0 otherwise
Post-secondary diploma	Dummy variable 1, if the respondent obtained post-secondary diploma or certificate, 0 otherwise
University degree	Dummy variable 1, if the respondent obtained university degree, 0 otherwise, <b>base group</b>
Youngest child in household is <5 years old	Dummy variable 1, if the youngest child in the household is a preschool aged, 0 otherwise
Youngest child in household is 5-14 years old	Dummy variable 1, if the youngest child in the household is between 5-14 years old, 0 otherwise
Youngest child in household is >14 years old	Dummy variable 1, if the youngest child in the household is over 14 years old, 0 otherwise
No children in household	Dummy variable 1, if there are no children in the household, 0 otherwise, <b>base group</b>
Household size	Number of individuals residing in the household
Born in Canada	Dummy variable 1, if respondent born in Canada, 0 otherwise, <b>base group</b>
Immigrant to Canada (<15 years)	Dummy variable 1, if respondent is an immigrant and has lived in Canada less than 15 years , 0 otherwise
Immigrant to Canada (>15 years)	Dummy variable 1, if respondent is an immigrant and has lived in Canada over 15 years , 0 otherwise
Live in city or local community (<5 years)	Dummy variable 1, if respondent lives in city or local community less than five years ,0 otherwise, <b>base group</b>
Live in city or local community (between 5 to 10 years)	Dummy variable 1, if respondent lives in city or local community between five to ten years ,0 otherwise
Live in city or local community (>10 years)	Dummy variable 1, if respondent lives in city or local community over ten years ,0 otherwise
Language of interview: English	Dummy variable 1, if respondent conducts the interview in English language ,0 otherwise, <b>base group</b>
Language of interview: French	Dummy variable 1, if respondent conducts the interview in French language, 0 otherwise.
Newfoundland and Labrador	Dummy variable 1, if respondent lives in Newfoundland and Labrador, 0 otherwise
Prince Edward Island	Dummy variable 1, if respondent lives in Prince Edward Island, 0 otherwise

**Table 2.2: Variable definition**

	<b>Description of the variables</b>
Nova Scotia	Dummy variable 1, if respondent lives in Nova Scotia, 0 otherwise
New Brunswick	Dummy variable 1, if respondent lives in New Brunswick, 0 otherwise
Quebec	Dummy variable 1, if respondent lives in Quebec, 0 otherwise
Ontario	Dummy variable 1, if respondent lives in Ontario, 0 otherwise, <b>base group</b>
Manitoba	Dummy variable 1, if respondent lives in Manitoba, 0 otherwise
Saskatchewan	Dummy variable 1, if respondent lives in Saskatchewan, 0 otherwise
Alberta	Dummy variable 1, if respondent lives in Alberta, 0 otherwise
British Columbia	Dummy variable 1, if respondent lives in British Columbia, 0 otherwise
Urban	Dummy variable 1, if respondent lives in urban area, 0 otherwise, <b>base group</b>
Rural	Dummy variable 1, if respondent lives in rural area, 0 otherwise
Population size	Continuous variable, representing the number of population within 3km radius from an individual's place of residence
Full-time	Dummy variable 1, if the respondent has a full-time job, 0 otherwise, <b>base group</b>
Part-time	Dummy variable 1, if the respondent has a part time job, 0 otherwise
Management occupations	Dummy variable 1, if respondent works in management occupations, 0 otherwise
Business, finance and administrative occupations	Dummy variable 1, if respondent works in business or finance occupations, 0 otherwise
Natural and applied sciences and related occupations	Dummy variable 1, if respondent works in natural and applied sciences and related occupations, 0 otherwise
Health occupations	Dummy variable 1, if respondent works in health occupations, 0 otherwise
Occupations in social science, education, government service and religion	Dummy variable 1, if respondent works in social science, education, government service and religion occupations, 0 otherwise
Occupations in art, culture, recreation and sport	Dummy variable 1, if respondent works in art, culture, recreation and sport occupations, 0 otherwise
Sales and services occupations	Dummy variable 1, if respondent works in sales and services occupations, 0 otherwise, <b>base group</b>
Trades, transport and equipment operators and related occupation	Dummy variable 1, if respondent works in trades, transport and equipment operators and related occupations, 0 otherwise
Occupations unique to primary industry	Dummy variable 1, if respondent works in unique to primary industry occupations, 0 otherwise
Occupations unique to processing, manufacturing and utilities	Dummy variable 1, if respondent works in unique to processing, manufacturing and utilities occupations, 0 otherwise
Access to charitable organizations	Continuous variable, counts the number of charity organizations within 3km radius from an individual's place of residence
Membership or participation in sport /recreational organization	Dummy variable, 1 if the respondent is a member or participant in sport or recreational organization, 0 otherwise
Membership or participation in religious group	Dummy variable, 1 if the respondent is a member or participant in religious group, 0 otherwise
Member or participant of school/civic group	Dummy variable, 1 if the respondent is a member or participant in school/civic group, 0 otherwise

**Table 2.3: Summary statistics for full sample and volunteer and non-volunteer subgroups**

<b>Variable</b>	<b>Full sample</b>	<b>Volunteer</b>	<b>Non-volunteer</b>
	Mean	Mean	Mean
<b>Dependent variable \$ (2005 CAD)</b>			
Income wage and salaries	48,778	53,952	45,328
<b>Independent variables</b>			
<b>Formal volunteer activities (%)</b>			
Volunteer	40.01		
<b>Age (#)</b>			
Age	42.66	43.12	42.35
<b>Sex (%)</b>			
Male	54.84	51.51	57.07
Female	45.16	48.49	42.93
<b>Marital status (%)</b>			
Married/common law	75.15	78.46	72.94
Single/never married	16.16	13.55	17.90
Separated/ divorced	7.70	7.02	8.16
Widowed	0.94	0.93	0.95
<b>Education level (%)</b>			
Less than high school	7.68	4.40	9.86
Graduated from high school	26.39	22.87	28.73
Post-secondary diploma	33.36	32.18	34.15
University degree	31.81	39.64	26.58
<b>Age of youngest child in the household (%)</b>			
Youngest child in household is <5 years old	15.79	14.45	16.68
Youngest child in household is between 5-14 years old	21.55	26.98	17.92
Youngest child in household is >14 years	17.54	18.40	16.96
No children	45.13	40.16	48.44
<b>Number of individuals residing in household (#)</b>			
Household size	3.06	3.20	2.96

**Table 2.3: Summary statistics for full sample and volunteer and non-volunteer subgroups**

<b>Variable</b>	<b>Full sample</b>	<b>Volunteer</b>	<b>Non-volunteer</b>
	<b>Mean</b>	<b>Mean</b>	<b>Mean</b>
<b>Length of time living in Canada (%)</b>			
Born in Canada	79.09	81.48	77.49
Immigrant to Canada (over 15 years)	12.73	11.93	13.26
Immigrant to Canada (less than 15 years)	7.43	5.68	8.60
<b>Length of time living in current city or local community (%)</b>			
Less than 5 years	19.65	16.69	21.63
Between 5 to 10 years	14.70	14.44	14.87
Over 10 years	64.98	68.08	62.91
<b>Language of interview (%)</b>			
English	78.05	84.44	73.97
French	21.95	15.56	26.03
<b>Province of residence of the respondent (%)</b>			
Newfoundland and Labrador	1.48	1.63	1.38
Prince Edward Island	2.91	3.38	2.60
Nova Scotia	0.41	0.51	0.35
New Brunswick	2.28	2.29	2.27
Quebec	23.53	16.29	28.36
Ontario	38.95	40.22	38.10
Manitoba	3.60	4.29	3.14
Saskatchewan	2.98	3.94	2.34
Alberta	10.88	12.81	9.60
British Columbia	12.98	14.64	11.87
<b>Urban/rural (%)</b>			
Urban	82.15	79.48	83.93
Rural	17.85	20.52	16.07
<b>Population Size (#)</b>			

**Table 2.3: Summary statistics for full sample and volunteer and non-volunteer subgroups**

<b>Variable</b>	Full sample	Volunteer	Non-volunteer
	Mean	Mean	Mean
Population size 3km	42,169	38,816	44,405
<b>Labour force status (%)</b>			
Full-time	58.17	54.5	60.61
Part-time	32.28	34.61	30.73
<b>Type of occupation (%)</b>			
Management occupations	8.77	10.49	7.63
Business, finance and administrative occupations	14.51	15.89	13.58
Natural and applied sciences and related occupations	6.96	6.96	6.96
Health occupations	5.06	5.13	5.01
Occupations in social science, education,	8.41	12.17	5.90
Occupations in art, culture, recreation and sport	2.54	3.42	1.95
Sales and services occupations	14.03	12.30	15.18
Trades, transport and equipment	10.98	7.33	13.42
Occupations unique to primary industry	1.89	1.99	1.83
Occupations unique to processing, manufacturing and utilities	3.85	2.38	4.83
<b>Year (%)</b>			
Year 2003	18.73	16.21	20.41
Year 2005	18.60	17.79	19.15
Year 2008	21.71	23.22	20.69
Year 2010	19.21	18.61	19.61
Year 2013	21.75	24.17	20.14
<b>Instrumental variables</b>			
<b>Access (#)</b>			
Access to charitable organizations 3km	116	110	119
<b>Membership or participation in groups or organizations (%)</b>			
Membership or participation in sport or recreational group*	28.26	41.60	19.05

**Table 2.3: Summary statistics for full sample and volunteer and non-volunteer subgroups**

<b>Variable</b>	Full sample	Volunteer	Non-volunteer
	Mean	Mean	Mean
Membership or participation in religious group *	14.41	24.58	7.39
Membership or participation in school/civic group *	16.95	30.94	7.29
<b>Number of observations</b>	38,151	15,264	22,887

1-Source is the GSS cycles 2013, 2010, 2008, 2005 and 2003. 2- Data are weighted by the frequency weights provided in survey.

(\*) Membership or participation in the various groups was only asked in the 2003, 2008 and 2013 surveys. The summary statistics for these variables are constructed from these surveys only, with N=24,644.



**Table 2.4: Membership or participation in groups and organizations**

%	Full sample	Proportion of Members who Volunteer	Proportion of Members who do not Volunteer
Membership or participation in sports/recreational organizations	28.26	60.12	39.88
Membership or participation in religious group	14.41	69.66	30.34
Membership or participation in school/civic group	16.95	74.55	25.45

1- Source is the GSS cycles 2013, 2008, and 2003. 2- The summary statistics of the data are weighted by the frequency weights provided in survey.

**Table 2.5: The effect of volunteering on income**

	<b>Model (1)</b>	<b>Model (2)</b>	<b>Model (3)</b>	<b>Model (4)</b>	<b>Model (5)</b>	<b>Model (6)</b>	<b>Model (7)</b>
		<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>
	<b>OLS</b>	<b>access and access squared</b>	<b>membership in sport organization</b>	<b>membership in religious organization</b>	<b>membership in school or civic group</b>	<b>membership in sport, religious or civic groups</b>	<b>access, access squared, membership in sport, religious or civic groups</b>
Volunteer	0.024*** (0.01)	0.469 (0.37)	0.533*** (0.05)	-0.216*** (0.04)	-0.026 (0.03)	0.163*** (0.03)	0.165*** (0.03)
Age	0.063*** (0.00)	0.059*** (0.00)	0.061*** (0.00)	0.065*** (0.00)	0.064*** (0.00)	0.063*** (0.00)	0.063*** (0.00)
Age squared	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)
Male	0.358*** (0.01)	0.360*** (0.01)	0.343*** (0.01)	0.348*** (0.01)	0.347*** (0.01)	0.345*** (0.01)	0.345*** (0.01)
Single/never married	-0.143*** (0.01)	-0.131*** (0.01)	-0.118*** (0.02)	-0.140*** (0.02)	-0.135*** (0.02)	-0.129*** (0.02)	-0.129*** (0.02)
Separated divorced	-0.021 (0.01)	-0.009 (0.01)	-0.007 (0.02)	-0.020 (0.02)	-0.017 (0.02)	-0.013 (0.02)	-0.013 (0.02)
Widowed / widower	0.011 (0.02)	0.007 (0.02)	-0.011 (0.03)	0.012 (0.03)	0.006 (0.03)	0.000 (0.03)	0.000 (0.03)
Less than high school	-0.590*** (0.01)	-0.485*** (0.09)	-0.467*** (0.02)	-0.630*** (0.02)	-0.589*** (0.02)	-0.548*** (0.02)	-0.548*** (0.02)
Graduated from high school	-0.400*** (0.01)	-0.331*** (0.06)	-0.352*** (0.02)	-0.457*** (0.01)	-0.431*** (0.01)	-0.404*** (0.01)	-0.404*** (0.01)
Postsecondary diploma	-0.278*** (0.01)	-0.229*** (0.04)	-0.240*** (0.02)	-0.314*** (0.01)	-0.295*** (0.01)	-0.276*** (0.01)	-0.276*** (0.01)
French	0.064*** (0.02)	0.098** (0.03)	0.113*** (0.03)	0.056 (0.03)	0.070* (0.03)	0.085** (0.03)	0.085** (0.03)
Youngest child in household is <5 years old	0.125*** (0.01)	0.145*** (0.02)	0.123*** (0.02)	0.093*** (0.02)	0.101*** (0.02)	0.108*** (0.02)	0.108*** (0.02)

**Table 2.5: The effect of volunteering on income**

	<b>Model (1)</b>	<b>Model (2)</b>	<b>Model (3)</b>	<b>Model (4)</b>	<b>Model (5)</b>	<b>Model (6)</b>	<b>Model (7)</b>
		<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>
	<b>OLS</b>	<b>access and access squared</b>	<b>membership in sport organization</b>	<b>membership in religious organization</b>	<b>membership in school or civic group</b>	<b>membership in sport, religious or civic groups</b>	<b>access, access squared, membership in sport, religious or civic groups</b>
Youngest child in household is between 5-14 years old	0.081*** (0.01)	0.044 (0.03)	0.023 (0.02)	0.087*** (0.02)	0.071*** (0.02)	0.055** (0.02)	0.054** (0.02)
Youngest child in household is >14 years old	0.074*** (0.01)	0.065*** (0.01)	0.055** (0.02)	0.066*** (0.02)	0.063*** (0.02)	0.060*** (0.02)	0.060*** (0.02)
Household size	-0.042*** (0.00)	-0.052*** (0.01)	-0.046*** (0.01)	-0.029*** (0.01)	-0.034*** (0.01)	-0.038*** (0.01)	-0.038*** (0.01)
Immigrant to Canada (<15 years)	-0.481*** (0.02)	-0.423*** (0.05)	-0.435*** (0.03)	-0.533*** (0.03)	-0.509*** (0.03)	-0.484*** (0.03)	-0.483*** (0.03)
Immigrant to Canada (>15 years)	-0.105*** (0.01)	-0.078** (0.02)	-0.065*** (0.02)	-0.121*** (0.02)	-0.107*** (0.02)	-0.093*** (0.02)	-0.093*** (0.02)
Live in current city or local community between 5 to 10 years	0.046*** (0.01)	0.032* (0.02)	0.039* (0.02)	0.063*** (0.02)	0.057*** (0.02)	0.051** (0.02)	0.051** (0.02)
Live in current city or local community >10 years	0.026** (0.01)	0.007 (0.02)	0.013 (0.01)	0.044** (0.01)	0.036** (0.01)	0.028* (0.01)	0.028* (0.01)
Part-time	-0.331*** (0.01)	-0.347*** (0.02)	-0.338*** (0.01)	-0.309*** (0.01)	-0.316*** (0.01)	-0.324*** (0.01)	-0.324*** (0.01)
Management	0.381*** (0.02)	0.344*** (0.04)	0.331*** (0.02)	0.406*** (0.02)	0.387*** (0.02)	0.368*** (0.02)	0.368*** (0.02)
Business, finance and administrative	0.301*** (0.01)	0.276*** (0.02)	0.282*** (0.01)	0.328*** (0.01)	0.316*** (0.01)	0.305*** (0.01)	0.304*** (0.01)
Natural and applied sciences	0.390*** (0.01)	0.383*** (0.02)	0.384*** (0.02)	0.402*** (0.02)	0.397*** (0.02)	0.392*** (0.02)	0.392*** (0.02)
Social science, education, government service and religion	0.229*** (0.02)	0.168** (0.05)	0.157*** (0.02)	0.275*** (0.02)	0.245*** (0.02)	0.215*** (0.02)	0.215*** (0.02)

**Table 2.5: The effect of volunteering on income**

	<b>Model (1)</b>	<b>Model (2)</b>	<b>Model (3)</b>	<b>Model (4)</b>	<b>Model (5)</b>	<b>Model (6)</b>	<b>Model (7)</b>
		<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>
	<b>OLS</b>	<b>access and access squared</b>	<b>membership in sport organization</b>	<b>membership in religious organization</b>	<b>membership in school or civic group</b>	<b>membership in sport, religious or civic groups</b>	<b>access, access squared, membership in sport, religious or civic groups</b>
Art, culture, recreation and sport	-0.090*** (0.03)	-0.158* (0.06)	-0.165*** (0.04)	-0.061 (0.03)	-0.087* (0.03)	-0.113** (0.03)	-0.114** (0.03)
Health	0.502*** (0.02)	0.506*** (0.02)	0.507*** (0.02)	0.507*** (0.02)	0.507*** (0.02)	0.507*** (0.02)	0.507*** (0.02)
Trades, transport and equipment operators	0.164*** (0.01)	0.196*** (0.03)	0.214*** (0.02)	0.152*** (0.02)	0.167*** (0.02)	0.183*** (0.02)	0.183*** (0.02)
Unique to primary industry	0.220*** (0.02)	0.207*** (0.03)	0.233*** (0.03)	0.254*** (0.03)	0.249*** (0.03)	0.243*** (0.03)	0.243*** (0.03)
Unique to processing, manufacturing and utilities	0.123*** (0.01)	0.154*** (0.03)	0.176*** (0.02)	0.128*** (0.02)	0.140*** (0.02)	0.152*** (0.02)	0.152*** (0.02)
Newfoundland and Labrador	-0.165*** (0.01)	-0.164*** (0.01)	-0.152*** (0.02)	-0.145*** (0.02)	-0.147*** (0.02)	-0.149*** (0.02)	-0.149*** (0.02)
Prince Edward Island	-0.230*** (0.01)	-0.244*** (0.01)	-0.221*** (0.02)	-0.189*** (0.01)	-0.197*** (0.01)	-0.205*** (0.01)	-0.205*** (0.01)
Nova Scotia	-0.195*** (0.01)	-0.197*** (0.01)	-0.218*** (0.02)	-0.193*** (0.02)	-0.200*** (0.02)	-0.206*** (0.02)	-0.206*** (0.02)
New Brunswick	-0.264*** (0.01)	-0.253*** (0.02)	-0.228*** (0.02)	-0.249*** (0.02)	-0.244*** (0.02)	-0.238*** (0.02)	-0.238*** (0.02)
Quebec	-0.143*** (0.02)	-0.111*** (0.03)	-0.100*** (0.03)	-0.159*** (0.03)	-0.144*** (0.03)	-0.129*** (0.03)	-0.129*** (0.03)
Manitoba	-0.119*** (0.01)	-0.142*** (0.02)	-0.140*** (0.01)	-0.098*** (0.01)	-0.109*** (0.01)	-0.118*** (0.01)	-0.118*** (0.01)
Saskatchewan	-0.048*** (0.01)	-0.091* (0.04)	-0.105*** (0.02)	-0.022 (0.02)	-0.044** (0.02)	-0.064*** (0.02)	-0.064*** (0.02)

**Table 2.5: The effect of volunteering on income**

	<b>Model (1)</b>	<b>Model (2)</b>	<b>Model (3)</b>	<b>Model (4)</b>	<b>Model (5)</b>	<b>Model (6)</b>	<b>Model (7)</b>
		<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>
	<b>OLS</b>	<b>access and access squared</b>	<b>membership in sport organization</b>	<b>membership in religious organization</b>	<b>membership in school or civic group</b>	<b>membership in sport, religious or civic groups</b>	<b>access, access squared, membership in sport, religious or civic groups</b>
Alberta	0.025* (0.01)	-0.003 (0.03)	0.005 (0.02)	0.052** (0.02)	0.040* (0.02)	0.028 (0.02)	0.028 (0.02)
British Columbia	-0.059*** (0.01)	-0.078*** (0.02)	-0.076*** (0.02)	-0.033* (0.01)	-0.044** (0.01)	-0.055*** (0.01)	-0.055*** (0.01)
Urban	0.095*** (0.01)	0.134*** (0.03)	0.138*** (0.01)	0.078*** (0.01)	0.093*** (0.01)	0.108*** (0.01)	0.109*** (0.01)
Population size 3km	1.00e-07 (8.19e-08)	2.10e-07 (1.30e-07)	1.42e-07 (1.28e-07)	-7.52e-08 (1.29e-07)	-2.13e-08 (1.26e-07)	3.53e-08 (1.25e-07)	3.36e-08 (1.25e-07)
Year 2003	-0.052*** (0.01)	-0.017 (0.03)	-0.012 (0.01)	-0.069*** (0.01)	-0.054*** (0.01)	-0.040** (0.01)	-0.040** (0.01)
Year 2005	0.184*** (0.03)	0.182*** (0.03)					
Year 2008	0.044*** (0.01)	0.051*** (0.01)	0.051*** (0.01)	0.041** (0.01)	0.043*** (0.01)	0.046*** (0.01)	0.046*** (0.01)
Year 2010	0.062*** (0.01)	0.093*** (0.03)					
Constant	9.076*** (0.06)	8.933*** (0.14)	8.858*** (0.10)	9.125*** (0.09)	9.056*** (0.09)	8.990*** (0.09)	8.989*** (0.09)
<b>Instrumental variables (first stage)</b>							
Access to charitable organizations 3km		1.46e-04*** (3.12e-05)					9.18e-05* (4.91e-05)
Access to charitable organizations 3km <sup>2</sup>		-4.83e-08*** (1.81e-08)					-1.56e-08 (2.75e-08)

**Table 2.5: The effect of volunteering on income**

	<b>Model (1)</b>	<b>Model (2)</b>	<b>Model (3)</b>	<b>Model (4)</b>	<b>Model (5)</b>	<b>Model (6)</b>	<b>Model (7)</b>
		<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>
	<b>OLS</b>	<b>access and access squared</b>	<b>membership in sport organization</b>	<b>membership in religious organization</b>	<b>membership in school or civic group</b>	<b>membership in sport, religious or civic groups</b>	<b>access, access squared, membership in sport, religious or civic groups</b>
Membership or participation in sport or recreational organizations			0.217*** (0.01)				
Membership or participation in religious group				0.287*** (0.01)			
Membership or participation in school/civic group					0.322*** (0.01)		
Membership or participation in sport, religious or civic group						0.327*** (0.01)	
Access, access squared, membership or participation in sport, religious or civic group							0.326*** (0.01)
<b>The validity of instruments</b>							
First stage F statistic		14	1,089	1,024	2,209	2,500	2,538
Durbin-Wu-Hausman (p value)		2.13 (0.15)	153 (0.00)	32 (0.00)	1.60 (0.20)	28 (0.00)	29 (0.00)
Number of observations	38,151	38,151	24,645	24,646	24,644	24,644	24,644

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the bootstrap weight. 4- Dummy variables for the missing values of marital status, level of education, immigration status, length of time living in city or local community, labour force status and occupation types are also included in the regression models, but suppressed for brevity.

**Table 2.6: The validity of instruments**

	Hansen J statistic
Access and membership or participation in sport or recreational organizations	1.60 (0.45)
Access and membership or participation in religious group	2.61 (0.27)
Access and membership or participation of school/civic group	2.10 (0.35)

**Table 2.7: Complier characterizations**

Types of tasks	$P(X=x)$	$P(X=x   compliers =1)$	$\frac{P(X=x   compliers =1)}{Pr(X=x)}$
<b>Membership in sport or recreational organizations</b>			
Canvassing	4.07	1.89	0.46
Fundraising	21.00	17.57	0.84
Sit as a member of a committee or board	13.76	12.43	0.90
Teaching, educating or mentoring	12.13	11.89	0.98
Organize, supervise or coordinate activities or events	17.01	17.97	1.06
Office work, bookkeeping, administrative duties, or library work	7.36	8.11	1.10
Coach, referee or officiate	7.60	22.70	2.99
Counsel or provide advice	5.07	5.41	1.07
Provide health care or support including companionship	4.01	2.43	0.61
Collect, serve or deliver food or other goods	7.57	4.73	0.62
Maintenance, repair or building of facilities or grounds	5.08	4.32	0.85
Volunteer driving	3.17	3.24	1.02
First aid, fire-fighting, or search and rescue	2.17	1.76	0.81
Conservation or protection of the environment or wildlife	3.95	2.84	0.72
Number of observation	3,315	740	-
<b>Membership or participation in religious group</b>			
Canvassing	4.07	2.47	0.61
Fundraising	21.00	11.42	0.54
Sit as a member of a committee or board	13.76	13.58	0.99
Teaching, educating or mentoring	12.13	23.46	1.93
Organize, supervise or coordinate activities or events	17.01	21.60	1.27
Office work, bookkeeping, administrative duties, or library work	7.36	7.10	0.96



**Table 2.7: Compliers characterizations**

Types of tasks	P(X=x)	P(X=x   compliers =1)	$\frac{P(X=x   compliers =1)}{\Pr(X=x)}$
Coach, referee or officiate	7.60	0.93	0.12
Counsel or provide advice	5.07	6.79	1.34
Provide health care or support including companionship	4.01	4.94	1.23
Collect, serve or deliver food or other goods	7.57	11.11	1.47
Maintenance, repair or building of facilities or grounds	5.08	7.41	1.46
Volunteer driving	3.17	4.32	1.36
First aid, fire-fighting, or search and rescue	2.17	0.31	0.14
Conservation or protection of the environment or wildlife	3.95	2.16	0.55
Number of observations	3,315	324	-
		<b>Membership or participation in school or civic group</b>	
Canvassing	4.07	2.25	0.55
Fundraising	21.00	19.50	0.93
Sit as a member of a committee or board	13.76	19.25	1.40
Teaching, educating or mentoring	12.13	11.25	0.93
Organize, supervise or coordinate activities or events	17.01	18.75	1.10
Office work, bookkeeping, administrative duties, or library work	7.36	11.50	1.56
Coach, referee or officiate	7.60	3.75	0.49
Counsel or provide advice	5.07	4.75	0.94
Provide health care or support including companionship	4.01	4.50	1.12
Collect, serve or deliver food or other goods	7.57	6.00	0.79
Maintenance, repair or building of facilities or grounds	5.08	5.00	0.98
Volunteer driving	3.17	3.25	1.03
First aid, fire-fighting, or search and rescue	2.17	2.50	1.15
Conservation or protection of the environment or wildlife	3.95	4.25	1.08
Number of observations	3,315	400	-

**Table 2.8: The effect of volunteering on hourly income (robustness)**

	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)
		IV	IV	IV	IV
	OLS	access and access squared	membership in sport organization	membership in religious organization	membership in school or civic group
Volunteer	0.042*** (0.01)	-0.672 (0.53)	0.525*** (0.04)	-0.119** (0.04)	0.071* (0.04)
Age	0.042*** (0.00)	0.047*** (0.00)	0.042*** (0.00)	0.044*** (0.00)	0.044*** (0.00)
Age squared	-0.000*** (0.00)	-0.000*** (0.00)	-0.000*** (0.00)	-0.000*** (0.00)	-0.000*** (0.00)
Male	0.243*** (0.01)	0.233*** (0.01)	0.242*** (0.01)	0.237*** (0.01)	0.238*** (0.01)
Single/never married	-0.129*** (0.01)	-0.150*** (0.02)	-0.109*** (0.02)	-0.130*** (0.01)	-0.124*** (0.01)
Separated divorced	-0.053*** (0.01)	-0.069*** (0.02)	-0.030 (0.02)	-0.042* (0.02)	-0.038* (0.02)
Widowed / widower	-0.039* (0.02)	-0.027 (0.02)	-0.048 (0.03)	-0.028 (0.03)	-0.034 (0.03)
Less than high school	-0.562*** (0.01)	-0.724*** (0.12)	-0.433*** (0.03)	-0.572*** (0.03)	-0.531*** (0.03)
Graduated from high school	-0.375*** (0.01)	-0.477*** (0.07)	-0.315*** (0.02)	-0.402*** (0.01)	-0.376*** (0.01)
Postsecondary diploma	-0.267*** (0.01)	-0.343*** (0.06)	-0.217*** (0.02)	-0.279*** (0.01)	-0.260*** (0.01)
French	0.061*** (0.02)	0.009 (0.05)	0.086** (0.03)	0.032 (0.03)	0.048 (0.03)
Youngest child in household is <5 years old	0.128*** (0.01)	0.090** (0.03)	0.133*** (0.02)	0.103*** (0.02)	0.112*** (0.02)
Youngest child in household is between 5-14 years old	0.094*** (0.01)	0.152*** (0.04)	0.046* (0.02)	0.100*** (0.02)	0.084*** (0.02)
Youngest child in household is >14 years old	0.067*** (0.01)	0.078*** (0.01)	0.041* (0.02)	0.051** (0.02)	0.048** (0.02)
Household size	-0.031*** (0.00)	-0.013 (0.01)	-0.038*** (0.01)	-0.023*** (0.01)	-0.027*** (0.01)
Immigrant to Canada (<15 years)	-0.439*** (0.02)	-0.535*** (0.07)	-0.376*** (0.03)	-0.458*** (0.03)	-0.435*** (0.03)
Immigrant to Canada (>15 years)	-0.111*** (0.01)	-0.154*** (0.03)	-0.088*** (0.02)	-0.136*** (0.02)	-0.122*** (0.02)
Live in city or local community between 5 to 10 years	0.047*** (0.01)	0.073** (0.02)	0.036* (0.02)	0.055*** (0.01)	0.049*** (0.01)
Live in city or local community	0.021**	0.052*	0.001	0.026*	0.018

**Table 2.8: The effect of volunteering on hourly income (robustness)**

	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)
		IV	IV	IV	IV
	OLS	access and access squared	membership in sport organization	membership in religious organization	membership in school or civic group
>10 years	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
Management	0.271*** (0.02)	0.330*** (0.05)	0.229*** (0.02)	0.295*** (0.02)	0.276*** (0.02)
Business, finance and administrative	0.267*** (0.01)	0.310*** (0.03)	0.255*** (0.02)	0.297*** (0.01)	0.285*** (0.01)
Natural and applied sciences	0.346*** (0.01)	0.362*** (0.02)	0.339*** (0.02)	0.356*** (0.02)	0.351*** (0.02)
Social science, education, government service and religion	0.214*** (0.02)	0.315*** (0.08)	0.156*** (0.02)	0.262*** (0.02)	0.230*** (0.02)
Art, culture, recreation and sport	-0.013 (0.03)	0.098 (0.09)	-0.099** (0.04)	-0.007 (0.04)	-0.034 (0.04)
Health	0.441*** (0.02)	0.443*** (0.02)	0.445*** (0.02)	0.448*** (0.02)	0.447*** (0.02)
Trades, transport and equipment operators	0.123*** (0.01)	0.068 (0.04)	0.171*** (0.02)	0.115*** (0.02)	0.131*** (0.02)
Unique to primary industry	0.059** (0.02)	0.073** (0.03)	0.076** (0.03)	0.096*** (0.03)	0.090*** (0.03)
Unique to processing, manufacturing and utilities	0.119*** (0.01)	0.061 (0.04)	0.170*** (0.02)	0.125*** (0.02)	0.138*** (0.02)
Newfoundland and Labrador	-0.231*** (0.01)	-0.233*** (0.01)	-0.214*** (0.02)	-0.204*** (0.02)	-0.207*** (0.02)
Prince Edward Island	-0.254*** (0.01)	-0.231*** (0.02)	-0.261*** (0.02)	-0.230*** (0.02)	-0.239*** (0.02)
Nova Scotia	-0.251*** (0.01)	-0.240*** (0.02)	-0.269*** (0.02)	-0.245*** (0.02)	-0.252*** (0.02)
New Brunswick	-0.270*** (0.01)	-0.283*** (0.02)	-0.243*** (0.02)	-0.256*** (0.02)	-0.252*** (0.02)
Quebec	-0.152*** (0.02)	-0.200*** (0.04)	-0.095*** (0.03)	-0.138*** (0.03)	-0.126*** (0.03)
Manitoba	-0.106*** (0.01)	-0.066* (0.03)	-0.141*** (0.02)	-0.100*** (0.02)	-0.113*** (0.02)
Saskatchewan	-0.074*** (0.01)	-0.006 (0.05)	-0.110*** (0.02)	-0.038* (0.02)	-0.059** (0.02)
Alberta	0.019 (0.01)	0.063 (0.04)	0.003 (0.02)	0.044** (0.02)	0.032 (0.02)
British Columbia	-0.035*** (0.01)	-0.003 (0.02)	-0.058*** (0.02)	-0.018 (0.02)	-0.030* (0.01)

**Table 2.8: The effect of volunteering on hourly income (robustness)**

	<b>Model (7)</b>	<b>Model (8)</b>	<b>Model (9)</b>	<b>Model (10)</b>	<b>Model (11)</b>
		<b>IV</b>	<b>IV</b>	<b>IV</b>	<b>IV</b>
	<b>OLS</b>	<b>access and access squared</b>	<b>membership in sport organization</b>	<b>membership in religious organization</b>	<b>membership in school or civic group</b>
Urban	0.107*** (0.01)	0.043 (0.05)	0.154*** (0.01)	0.101*** (0.01)	0.117*** (0.01)
Population size 3km	1.15e-07 (7.97e-08)	-4.80e-08 (1.57e-07)	2.25e-07 (1.29e-07)	5.59e-08 (1.23e-07)	1.05e-07 (1.25e-07)
Year 2003	-0.076*** (0.01)	-0.135** (0.04)	-0.040** (0.01)	-0.093*** (0.01)	-0.077*** (0.01)
Year 2005	0.065* (0.03)	0.051 (0.04)			
Year 2008	-0.000 (0.01)	-0.017 (0.02)	0.011 (0.01)	-0.004 (0.01)	0.001 (0.01)
Year 2010	0.022 (0.01)	-0.033 (0.04)			
Constant	1.906*** (0.06)	2.161*** (0.19)	1.672*** (0.10)	1.929*** (0.09)	1.852*** (0.09)

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the bootstrap weight. 4- Dummy variables for the missing values of marital status, level of education, immigration status, length of time living in city or local community, labour force status and occupation types are also included in the regression models, but suppressed for brevity.

**Table 2.9: The effect of number of hours of volunteering on income (robustness)**

	Model (12)	Model (13)	Model (14)	Model (15)	Model (16)
	OLS	IV access and access squared	IV membership in sport organization	IV membership in religious organization	IV membership in school or civic group
Volunteer hours	-0.006*** (0.00)	0.183 (0.11)	0.263*** (0.02)	-0.095*** (0.02)	-0.013 (0.01)
Age	0.063*** (0.00)	0.061*** (0.00)	0.062*** (0.00)	0.065*** (0.00)	0.064*** (0.00)
Age squared	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)
Male	0.358*** (0.01)	0.358*** (0.01)	0.338*** (0.01)	0.348*** (0.01)	0.346*** (0.01)
Single/never married	-0.145*** (0.01)	-0.133*** (0.01)	-0.116*** (0.02)	-0.140*** (0.02)	-0.135*** (0.02)
Separated divorced	-0.023 (0.01)	-0.011 (0.01)	-0.004 (0.02)	-0.022 (0.02)	-0.018 (0.02)
Widowed / widower	0.011 (0.02)	0.004 (0.02)	-0.040 (0.03)	0.020 (0.03)	0.006 (0.03)
Less than high school	-0.600*** (0.01)	-0.493*** (0.06)	-0.466*** (0.02)	-0.623*** (0.02)	-0.587*** (0.02)
Graduated from high school	-0.406*** (0.01)	-0.348*** (0.04)	-0.374*** (0.01)	-0.447*** (0.01)	-0.430*** (0.01)
Postsecondary diploma	-0.281*** (0.01)	-0.239*** (0.03)	-0.254*** (0.01)	-0.307*** (0.01)	-0.295*** (0.01)
French	0.060** (0.02)	0.093** (0.03)	0.112*** (0.03)	0.058* (0.03)	0.070** (0.03)
Youngest child in household is <5 years old	0.123*** (0.01)	0.156*** (0.03)	0.136*** (0.02)	0.089*** (0.02)	0.100*** (0.02)
Youngest child in household in between 5-14 years old	0.086*** (0.01)	0.059 (0.02)	0.042** (0.02)	0.080*** (0.02)	0.071*** (0.01)
Youngest child in household is >14 years old	0.073*** (0.01)	0.068*** (0.01)	0.055*** (0.02)	0.064*** (0.02)	0.062*** (0.02)
Household size	-0.041*** (0.00)	-0.053*** (0.01)	-0.046*** (0.01)	-0.030*** (0.01)	-0.033*** (0.01)
Immigrant to Canada (<15 years)	-0.486*** (0.02)	-0.446*** (0.03)	-0.467*** (0.03)	-0.518*** (0.03)	-0.507*** (0.03)
Immigrant to Canada (>15 years)	-0.107*** (0.01)	-0.080*** (0.02)	-0.062*** (0.02)	-0.120*** (0.02)	-0.107*** (0.02)
Live in city or local community between 5 to 10 years	0.047*** (0.01)	0.036** (0.01)	0.045** (0.02)	0.061*** (0.02)	0.058*** (0.02)
Live in city or local community >10 years	0.028*** (0.01)	0.008 (0.01)	0.015 (0.01)	0.043** (0.01)	0.036*** (0.01)

**Table 2.9: The effect of number of hours of volunteering on income (robustness)**

	Model (12)	Model (13)	Model (14)	Model (15)	Model (16)
	OLS	IV access and access squared	IV membership in sport organization	IV membership in religious organization	IV membership in school or civic group
Part-time	-0.329*** (0.01)	-0.339*** (0.01)	-0.325*** (0.01)	-0.313*** (0.01)	-0.316*** (0.01)
Management	0.384*** (0.02)	0.369*** (0.02)	0.361*** (0.02)	0.395*** (0.02)	0.387*** (0.02)
Business, finance and administrative	0.303*** (0.01)	0.290*** (0.01)	0.295*** (0.01)	0.322*** (0.01)	0.316*** (0.01)
Natural and applied sciences	0.390*** (0.01)	0.399*** (0.01)	0.407*** (0.02)	0.394*** (0.02)	0.396*** (0.02)
Social science, education, government service and religion	0.233*** (0.02)	0.194*** (0.03)	0.177*** (0.02)	0.264*** (0.02)	0.244*** (0.02)
Art, culture, recreation and sport	-0.086*** (0.03)	-0.141** (0.04)	-0.144*** (0.03)	-0.074** (0.03)	-0.090** (0.03)
Health	0.501*** (0.02)	0.511*** (0.02)	0.507*** (0.02)	0.507*** (0.02)	0.507*** (0.02)
Trades, transport and equipment operators	0.160*** (0.01)	0.186*** (0.02)	0.209*** (0.02)	0.156*** (0.02)	0.168*** (0.02)
Unique to primary industry	0.237*** (0.02)	0.229*** (0.02)	0.258*** (0.03)	0.274*** (0.03)	0.270*** (0.03)
Unique to processing, manufacturing and utilities	0.122*** (0.01)	0.158*** (0.03)	0.194*** (0.02)	0.125*** (0.02)	0.141*** (0.02)
Newfoundland and Labrador	-0.165*** (0.01)	-0.171*** (0.01)	-0.171*** (0.02)	-0.139*** (0.02)	-0.147*** (0.02)
Prince Edward Island	-0.230*** (0.01)	-0.244*** (0.01)	-0.224*** (0.01)	-0.191*** (0.01)	-0.199*** (0.01)
Nova Scotia	-0.195*** (0.01)	-0.203*** (0.01)	-0.235*** (0.02)	-0.191*** (0.02)	-0.201*** (0.02)
New Brunswick	-0.265*** (0.01)	-0.260*** (0.01)	-0.244*** (0.02)	-0.244*** (0.02)	-0.244*** (0.02)
Quebec	-0.146*** (0.02)	-0.121*** (0.02)	-0.110*** (0.03)	-0.154*** (0.03)	-0.144*** (0.03)
Manitoba	-0.116*** (0.01)	-0.134*** (0.01)	-0.126*** (0.01)	-0.100*** (0.01)	-0.106*** (0.01)
Saskatchewan	-0.047*** (0.01)	-0.080*** (0.02)	-0.089*** (0.02)	-0.036** (0.02)	-0.048** (0.02)
Alberta	0.028*** (0.01)	0.008 (0.01)	0.025 (0.02)	0.046*** (0.02)	0.041** (0.02)
British Columbia	-0.058*** (0.01)	-0.078*** (0.01)	-0.073*** (0.01)	-0.036** (0.01)	-0.045*** (0.01)

**Table 2.9: The effect of number of hours of volunteering on income (robustness)**

	<b>Model (12)</b>	<b>Model (13)</b>	<b>Model (14)</b>	<b>Model (15)</b>	<b>Model (16)</b>
	<b>OLS</b>	<b>IV access and access squared</b>	<b>IV membership in sport organization</b>	<b>IV membership in religious organization</b>	<b>IV membership in school or civic group</b>
Urban	0.093*** (0.01)	0.138*** (0.03)	0.144*** (0.01)	0.077*** (0.01)	0.093*** (0.01)
Population size 3km	8.78e-08 (8.21e-08)	1.99e-07* (1.07e-07)	1.45e-07 (1.28e-07)	-6.72e-08 (1.27e-07)	--1.92e-08 (1.26e-07)
Year 2003	-0.058*** (0.01)	0.118 (0.11)	0.194*** (0.03)	-0.139*** (0.02)	-0.063*** (0.02)
Year 2005	0.181*** (0.03)	0.319*** (0.09)			
Year 2008	0.039*** (0.01)	0.190** (0.09)	0.253*** (0.02)	-0.033* (0.02)	0.033* (0.02)
Year 2010	0.054*** (0.01)	0.222** (0.10)			
Constant	9.089*** (0.06)	8.769*** (0.20)	8.581*** (0.10)	9.207*** (0.10)	9.062*** (0.09)

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the bootstrap weight. 4-Dummy variables for the missing values of marital status, level of education, immigration status, length of time living in city or local community, labour force status and occupation types are also included in the regression models, but suppressed for brevity.

**Table 2.10: The effect of volunteering on income by gender**

	Model (17)	Model (18)	Model (19)	Model (20)	Model (21)	Model (22)	Model (23)	Model (24)
	Female	Male	Female	Male	Female	Male	Female	Male
	IV	IV	IV	IV	IV	IV	IV	IV
	access and access squared	access and access squared	membership in sport organization	membership in sport organization	membership in religious organization	membership in religious organization	membership in school or civic group	membership in school or civic group
Volunteer	0.635 (0.39)	0.378 (1.01)	0.410*** (0.06)	0.614*** (0.06)	-0.319*** (0.05)	-0.087 (0.07)	-0.049 (0.04)	0.038 (0.05)
Age	0.060*** (0.01)	0.061*** (0.01)	0.065*** (0.01)	0.065*** (0.01)	0.073*** (0.01)	0.065*** (0.01)	0.070*** (0.01)	0.065*** (0.01)
Age squared	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)	-0.001*** (0.00)
Single/never married	-0.018 (0.01)	-0.225*** (0.05)	-0.009 (0.02)	-0.208*** (0.02)	-0.002 (0.02)	-0.251*** (0.02)	-0.005 (0.02)	-0.244*** (0.02)
Separated divorced	0.103*** (0.01)	-0.132** (0.05)	0.111*** (0.02)	-0.149*** (0.03)	0.108*** (0.02)	-0.168*** (0.03)	0.109*** (0.02)	-0.165*** (0.03)
Widowed / widower	0.087** (0.03)	-0.049 (0.05)	0.046 (0.04)	0.014 (0.05)	0.079 (0.04)	0.021 (0.04)	0.066 (0.04)	0.020 (0.05)
Less than high school	-0.480*** (0.10)	-0.455 (0.24)	-0.554*** (0.03)	-0.399*** (0.04)	-0.709*** (0.03)	-0.556*** (0.03)	-0.651*** (0.03)	-0.529*** (0.03)
Graduated from high school	-0.280*** (0.07)	-0.328* (0.14)	-0.366*** (0.02)	-0.323*** (0.02)	-0.469*** (0.02)	-0.421*** (0.02)	-0.431*** (0.02)	-0.404*** (0.02)
Postsecondary diploma	-0.213*** (0.04)	-0.220 (0.12)	-0.270*** (0.02)	-0.209*** (0.02)	-0.330*** (0.02)	-0.288*** (0.02)	-0.308*** (0.02)	-0.274*** (0.02)
French	0.172*** (0.04)	0.038 (0.09)	0.143** (0.05)	0.072 (0.04)	0.095 (0.05)	0.011 (0.03)	0.113* (0.05)	0.022 (0.03)
Youngest child in household is <5 years old	0.075** (0.02)	0.167** (0.05)	0.072** (0.02)	0.120*** (0.03)	0.037 (0.02)	0.093*** (0.03)	0.050* (0.02)	0.098*** (0.03)
Youngest child in household is between 5-14 years old	-0.061 (0.04)	0.085 (0.07)	-0.020 (0.02)	0.026 (0.03)	0.027 (0.02)	0.094*** (0.03)	0.010 (0.02)	0.082** (0.03)
Youngest child in household is >14 years old	0.001 (0.02)	0.107* (0.04)	0.017 (0.02)	0.063* (0.03)	0.001 (0.02)	0.095*** (0.02)	0.007 (0.02)	0.089*** (0.02)



**Table 2.10: The effect of volunteering on income by gender**

	Model (17)	Model (18)	Model (19)	Model (20)	Model (21)	Model (22)	Model (23)	Model (24)
	Female	Male	Female	Male	Female	Male	Female	Male
	IV	IV	IV	IV	IV	IV	IV	IV
	access and access squared	access and access squared	membership in sport organization	membership in sport organization	membership in religious organization	membership in religious organization	membership in school or civic group	membership in school or civic group
Household size	-0.052*** (0.01)	-0.049 (0.03)	-0.050*** (0.01)	-0.039*** (0.01)	-0.031*** (0.01)	-0.024** (0.01)	-0.038*** (0.01)	-0.026** (0.01)
Immigrant to Canada (<15 years)	-0.323*** (0.07)	-0.470*** (0.13)	-0.396*** (0.04)	-0.461*** (0.04)	-0.496*** (0.04)	-0.550*** (0.04)	-0.460*** (0.04)	-0.535*** (0.04)
Immigrant to Canada (>15 years)	-0.024 (0.03)	-0.115 (0.06)	-0.014 (0.02)	-0.118*** (0.02)	-0.072*** (0.02)	-0.167*** (0.02)	-0.050** (0.02)	-0.158*** (0.02)
Live in city or local community between 5 to 10 years	0.039 (0.02)	0.028 (0.03)	0.069** (0.02)	0.025 (0.02)	0.108*** (0.02)	0.035 (0.02)	0.094*** (0.02)	0.033 (0.02)
Live in city or local community > 10 years	0.014 (0.02)	-0.003 (0.04)	0.041** (0.02)	0.001 (0.02)	0.084*** (0.02)	0.022 (0.02)	0.068*** (0.02)	0.019 (0.02)
Part-time	-0.374*** (0.02)	-0.300*** (0.03)	-0.354*** (0.01)	-0.284*** (0.02)	-0.317*** (0.01)	-0.266*** (0.02)	-0.330*** (0.01)	-0.269*** (0.02)
Management	0.429*** (0.05)	0.229*** (0.06)	0.456*** (0.03)	0.207*** (0.03)	0.561*** (0.03)	0.249*** (0.03)	0.522*** (0.03)	0.242*** (0.03)
Business, finance and administrative	0.348*** (0.04)	0.140*** (0.04)	0.396*** (0.02)	0.116*** (0.02)	0.456*** (0.02)	0.137*** (0.02)	0.434*** (0.02)	0.134*** (0.02)
Natural and applied sciences	0.529*** (0.03)	0.277*** (0.02)	0.500*** (0.04)	0.278*** (0.02)	0.525*** (0.04)	0.281*** (0.02)	0.516*** (0.04)	0.280*** (0.02)
Health	0.220*** (0.06)	0.021 (0.15)	0.264*** (0.03)	-0.015 (0.04)	0.385*** (0.03)	0.097** (0.04)	0.340*** (0.03)	0.077* (0.03)
Social science, education, government service and religion	-0.196* (0.08)	-0.182 (0.12)	-0.098* (0.04)	-0.228*** (0.06)	0.043 (0.04)	-0.171** (0.06)	-0.009 (0.04)	-0.181** (0.06)
Art, culture, recreation and sport	0.584*** (0.02)	0.371*** (0.05)	0.579*** (0.03)	0.389*** (0.06)	0.585*** (0.02)	0.390*** (0.06)	0.583*** (0.02)	0.390*** (0.06)
Trades, transport and equipment operators	0.146*** (0.03)	0.097 (0.10)	0.095* (0.04)	0.126*** (0.02)	0.110** (0.04)	0.049* (0.02)	0.104** (0.04)	0.062** (0.02)

**Table 2.10: The effect of volunteering on income by gender**

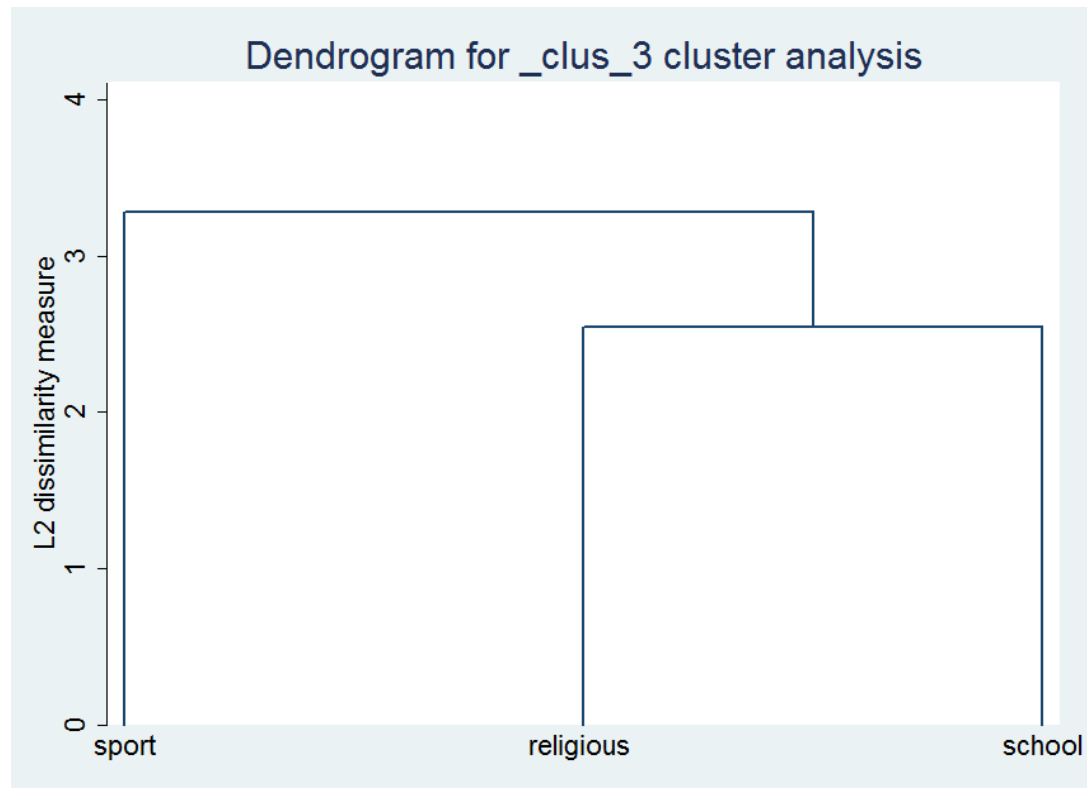
	Model (17)	Model (18)	Model (19)	Model (20)	Model (21)	Model (22)	Model (23)	Model (24)
	Female	Male	Female	Male	Female	Male	Female	Male
	IV	IV	IV	IV	IV	IV	IV	IV
	access and access squared	access and access squared	membership in sport organization	membership in sport organization	membership in religious organization	membership in religious organization	membership in school or civic group	membership in school or civic group
Unique to primary industry	-0.036 (0.09)	0.119*** (0.03)	0.006 (0.07)	0.145*** (0.03)	0.104 (0.07)	0.140*** (0.03)	0.068 (0.07)	0.141*** (0.03)
Unique to processing, manufacturing and utilities	0.209*** (0.03)	0.069 (0.08)	0.215*** (0.02)	0.094*** (0.03)	0.162*** (0.02)	0.040 (0.03)	0.182*** (0.02)	0.049 (0.03)
Newfoundland and Labrador	-0.190*** (0.02)	-0.149*** (0.02)	-0.185*** (0.02)	-0.130*** (0.03)	-0.168*** (0.02)	-0.130*** (0.03)	-0.174*** (0.02)	-0.131*** (0.03)
Prince Edward Island	-0.283*** (0.02)	-0.235*** (0.03)	-0.253*** (0.02)	-0.208*** (0.02)	-0.216*** (0.02)	-0.185*** (0.02)	-0.230*** (0.02)	-0.189*** (0.02)
Nova Scotia	-0.129*** (0.02)	-0.264*** (0.02)	-0.171*** (0.02)	-0.261*** (0.03)	-0.144*** (0.02)	-0.245*** (0.02)	-0.154*** (0.02)	-0.248*** (0.02)
New Brunswick	-0.265*** (0.03)	-0.239*** (0.02)	-0.283*** (0.03)	-0.185*** (0.02)	-0.309*** (0.03)	-0.204*** (0.02)	-0.299*** (0.03)	-0.201*** (0.02)
Quebec	-0.059 (0.06)	-0.126** (0.04)	-0.080 (0.05)	-0.124** (0.04)	-0.174** (0.06)	-0.150*** (0.03)	-0.139** (0.05)	-0.145*** (0.03)
Manitoba	-0.191*** (0.03)	-0.112* (0.05)	-0.158*** (0.02)	-0.133*** (0.02)	-0.115*** (0.02)	-0.097*** (0.02)	-0.131*** (0.02)	-0.104*** (0.02)
Saskatchewan	-0.178*** (0.05)	-0.041 (0.08)	-0.175*** (0.02)	-0.046 (0.03)	-0.099*** (0.02)	0.035 (0.03)	-0.127*** (0.02)	0.020 (0.03)
Alberta	-0.089** (0.03)	0.060 (0.07)	-0.081*** (0.02)	0.077** (0.02)	-0.034 (0.02)	0.119*** (0.02)	-0.051* (0.02)	0.111*** (0.02)
British Columbia	-0.095*** (0.03)	-0.073* (0.04)	-0.067** (0.02)	-0.083*** (0.02)	-0.022 (0.02)	-0.045 (0.02)	-0.039 (0.02)	-0.053* (0.02)
Urban	0.183*** (0.03)	0.103 (0.09)	0.144*** (0.02)	0.123*** (0.02)	0.079*** (0.02)	0.070*** (0.02)	0.103*** (0.02)	0.080*** (0.02)

**Table 2.10: The effect of volunteering on income by gender**

	Model (17)	Model (18)	Model (19)	Model (20)	Model (21)	Model (22)	Model (23)	Model (24)
	Female	Male	Female	Male	Female	Male	Female	Male
	IV	IV	IV	IV	IV	IV	IV	IV
	access and access squared	access and access squared	membership in sport organization	membership in sport organization	membership in religious organization	membership in religious organization	membership in school or civic group	membership in school or civic group
Population size 3km	7.09e-07 (1.22e-07)	-1.71e-07 (3.32e-07)	3.87e-07 (1.46e-07)	-5.29e-08 (2.05e-07)	2.60e-07 (1.49e-07)	-3.20e-07 (2.00e-07)	3.06e-07 (1.44e-07)	-2.75E-07 (1.98E-07)
Year 2003	-0.096*** (0.03)	0.054 (0.10)	-0.121*** (0.02)	0.078*** (0.02)	-0.164*** (0.02)	0.013 (0.02)	-0.148*** (0.02)	0.025 (0.02)
Year 2005	0.057 (0.03)	0.270*** (0.05)						
Year 2008	-0.041* (0.02)	0.119*** (0.04)	-0.048** (0.02)	0.125*** (0.02)	-0.054*** (0.02)	0.110*** (0.02)	-0.052** (0.02)	0.113*** (0.02)
Year 2010	-0.066*** (0.01)	0.035 (0.03)						
Constant	8.804*** (0.13)	9.333*** (0.42)	8.879*** (0.13)	9.121*** (0.14)	9.023*** (0.11)	9.478*** (0.14)	8.971*** (0.11)	9.411*** (0.14)
Number of observations	19,437	18,714	12,492	12,153	12,493	12,153	12,491	12,153

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the bootstrap weight. 4- Dummy variables for the missing values of marital status, level of education, immigration status, length of time living in city or local community, labour force status and occupation types are also included in the regression models, but suppressed for brevity.

Figure 2.1: Dendrogram for cluster analysis



## Appendix 2.A

Economists are usually interested in estimating the Average Treatment Effect (ATE). However, in the presence of essential heterogeneity the standard IV estimates are not informative about the ATE. Essential heterogeneity happens if individuals self-select themselves into treatment based on factors which are observable to them but unobservable to the analyst. Using Local Instrumental Variable (LIV) method, Basu et al. (2007) demonstrate that the ATE estimate can be recovered by computing the Marginal Treatment Effect (MTE). To estimate the MTE, first using the Probit model I estimate the propensity score of choosing treatment (volunteering) as a function of all covariates and also instruments (access, access squared, membership or participation in sport or recreational organizations, membership or participation in religious affiliations and membership or participation in civic, school or community groups) as follows:

$$I_i = Z_i\beta_d - V_i$$

$$I_i = 1 \text{ if } I_i^* \geq 0, \quad I_i = 0 \text{ otherwise}$$

Where  $I_i$  a binary decision for participating into volunteer activities,  $Z$  includes observable factors (instruments and all the covariates) that effects participation and  $V$  contains unobservable ones. Then in the second stage employing propensity scores as a valid instrument I estimate:

$$E[Y|X = x, P(z) = p] = X\beta_0 + X(\beta_1 - \beta_0)p + K(p)$$

Where,  $K(p)$  is a nonlinear function of propensity score. Taking the first derivative of this outcome with respect to  $p$  delivers the MTE.<sup>69</sup> The MTE is conditional on a given realization of the propensity score, for this STATA report it on a graph. Figure A2.1 shows the MTE estimates over the range of  $U_{Non-vol}$  (propensity not to be treated). The shaded area corresponds with 95%

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<sup>69</sup> To estimate the model I use the *margte* command in STATA 13 (Brave and Walstrum, 2014).

confidence interval, the straight and dashed lines represent MTE and ATE respectively. It is clear from the graph that the MTE is downward sloping. This means that people with higher values of  $U_{Non-vol}$  (that is, values of unobservable that make them less likely to participate in volunteer activities) tend to gain less out of volunteering.

The ATE can be derived by integrating MTE over  $p$ . The ATE of 0.05, reported at table 2.A1, implies that for an individual picked up randomly from the population, participating into volunteer activities increases his/her income by 5%. This suggests a modest causal effect of volunteering on income after those positive or negative effects for different subsamples cancel each other out.

Figure 2.A1: Marginal treatment effect

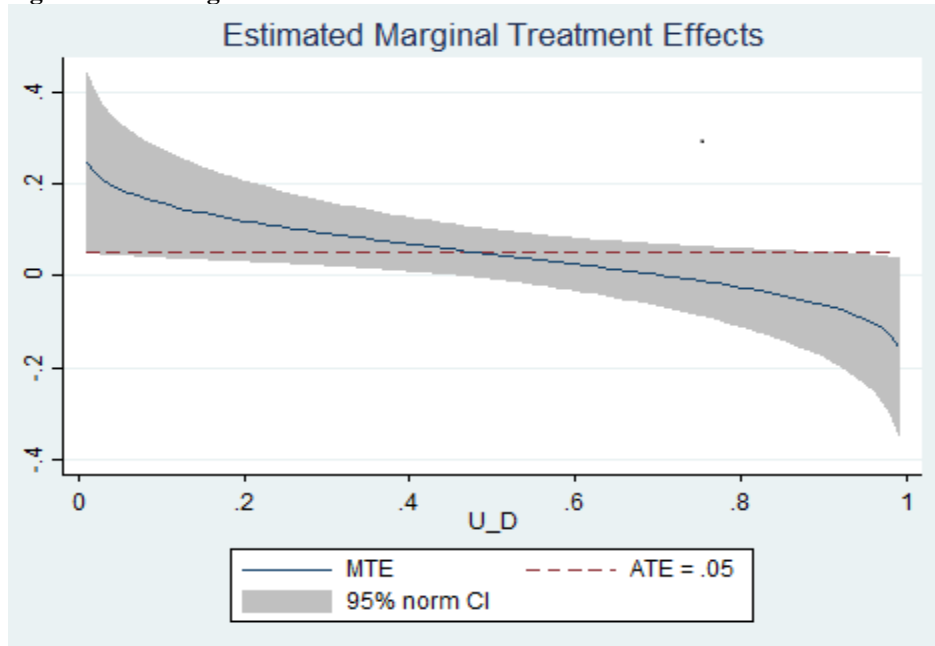


Table 2.A1: Average treatment effect of volunteering on income

ATE	0.047*
	(0.03)

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses is standard errors.

## Chapter three: Doing Good, Feeling Good: Causal Evidence from Canadian Volunteers

### 3.1. Introduction

It has often been said that the greatest wealth is health.<sup>70</sup> Scientists from different fields, policymakers and community leaders aim to better understand what factors affect an individual's health, to foster a healthier society. One intriguing possibility discussed in the literature, is that volunteering itself may 'lead to' better health. Volunteering is thought to influence health through three different mechanisms: strengthening an individual's social networks which decreases stress and the risk of certain diseases; leading to higher incomes through, for instance, the acquisition of human capital (e.g., Cozzi et al., 2013); and leading to increased 'warm glow' and feeling good about oneself (Fiorillo and Nappo, 2016). Several studies document a correlation between volunteering and objective (e.g., mortality) or subjective (e.g., self-rated health) measures of health outcomes. For example, Musick et al. (1999) use data from the Americans' Changing Lives survey to examine the association between volunteering and mortality among older adults. They find that donating time for free is associated with a lower risk of mortality. In another study Morrow-Howell et al. (2003) use the same data set to examine the effect of volunteering on self-reported health. They find that both participation and the amount of time devoted to volunteering are positively related to individuals' health.

Not only has volunteering been linked to greater health, but volunteering has also been linked to better well-being. Thoits and Hewitt (2001) use two sets of data from the Americans' Changing Lives study (1986 and 1989) to examine the effect of volunteering on different measures of well-being, namely: happiness, life satisfaction, self-esteem, sense of control over

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<sup>70</sup> First attributed to the Roman poet, Virgil (70-19 BC).

life, physical health and depression. They conclude that volunteering is positively related to well-being and that individuals with better well-being are more likely to volunteer.

Identifying a causal link from volunteering to health or well-being is complicated because of unobserved heterogeneity and reverse causality. Unobservable factors can jointly affect volunteering and health outcomes. For example, a daily walker may be both more likely to report good health and more likely to be aware of her local community's activities and needs. Moreover, reverse causality may arise if, for example, individuals in poor health do not have the capacity to participate in volunteer activities, whereas healthy individuals do. Only a handful of studies try to determine the causal relationship between volunteering, health and well-being.

Five studies take into account endogeneity using data from the United States and United Kingdom, of which three employ an IV approach and rely on measures of 'religiosity' as instruments. For example, Borgonovi, (2008) in a cross sectional study use the US Social Capital Community Benchmark Survey (2000) of 23,143 persons to investigate the causal relationship between religious volunteering and health and happiness. She employs a measure of religious fragmentation as an instrument for religious volunteering, and finds that monthly volunteers are 4% more likely to report being in excellent health and 5% more likely to report being very happy when compared to their non-volunteering counterparts.<sup>71</sup> Those who volunteer weekly experience an even larger return to happiness: 7%. Schultz et al. (2008) use the US Social Capital Community Survey in Duluth, Minnesota, and Superior, Wisconsin, to investigate the causal relationship between social capital (attitudes on trust, formal group involvement, informal socializing, organized group interaction, social support and volunteer activity) and health. Using

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<sup>71</sup> To measure religious fragmentation, Borgonovi (2008) uses the Hirschman Index by squaring the proportion of individuals in the respondent's county of the same denomination – a subgroup within a religion that operate under a common name e.g., Orthodox, Roman Catholic – to the share of religious people in the county.



religious attendance and the length of time an individual has lived in his community as instruments, they find that volunteering an additional time each year increases the probability of being healthy by 11%. Fiorillo and Nappo (2016) use the British Income and Living Conditions Survey (2006) to investigate the causal relationship between volunteering and self-perceived health. Using religious participation as instrument they find that taking part in formal volunteer activities increases the probability of reporting very good or good health status by 45%.<sup>72</sup>

Using the Well-Being Module of the American Time Use Survey 2010, Gimenez-Nadal and Molina (2015) exploit variation in the cross-state treatment of deductions for charitable contributions and the number of non-profit organizations per 10,000 inhabitants at the state level as instruments for volunteering to investigate the causal relationship between volunteering and happiness obtained by individuals during their daily activities in the United States. They find that volunteering has no significant effect on daily happiness.<sup>73</sup>

One Canadian study explores the correlational effect of voluntary activities on health outcomes, but no study looks at the causal link. Theurer and Wister (2010) use the 2003 General Social Survey to investigate the associations between volunteering and self-perceived happiness and life satisfaction among elderly Canadians. Controlling for demographic, health status and social support variables they find a positive relationship between volunteering and self-perceived happiness and life satisfaction. However, once they control for measures of social capital (sense of belonging to community, community and neighbour trust, and group activities) the estimated effect of volunteering becomes statistically insignificant.

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<sup>72</sup> Fiorillo and Nappo (2016) define two health variables: first, an ordinal variable taking on values 1-5 (very poor-very good) and second, a dummy variable indicating very good or good health. The estimate mentioned above (45%) corresponds to the latter. They do not provide the marginal effects for the ordinal health variable except for the good health status (1%).

<sup>73</sup> Binder and Freytag (2013) use a matching estimating technique to investigate the causal relationship between volunteering and subjective well-being (life satisfaction) in the United Kingdom. They find that regular volunteering has a positive effect on well-being (life satisfaction).

This chapter is the first to investigate the causal link between volunteering and health and volunteering and life satisfaction in Canada.<sup>74</sup> It also contributes to the small number of papers in general, on this topic. I deal with the problem of endogeneity by using a novel instrument for volunteering, namely: physical access to charitable organizations. Access is measured as the number of registered charities within a three-kilometer radius of an individual's residence (as indicated by their six-digit postal code). I am inspired by Gimenez-Nadal and Molina's (2015) instrument – number of non-profit organizations per 10,000 inhabitants at the state level– but am able to improve upon it by measuring access at the smallest possible local level, the postal code of the household. My access variable is correlated with volunteering but is arguably not correlated with unobserved factors such as social interactions or lifestyle habits, as discussed further below. I also examine the sensitivity of my results by employing two other instruments: a measure of religiosity and length of time living in a city or community.

Using data from the General Social Surveys (2003, 2005, 2008, 2010 and 2013), I find that volunteering has a positive causal effect on health. Volunteering increases the probability of a respondent reporting excellent/very good health status by about 24% points and decreases the probability of a respondent reporting good or fair/poor health status by 10% and 14% points respectively. But, these volunteer effects are heterogeneous across age groups: its impact on health is important only for younger and middle aged individuals. Being a volunteer is found to have a positive impact on self-reported life satisfaction for women and middle-aged individuals.

The remainder of this chapter is organized as follows. Section 2 provides a summary of the survey data, followed by a discussion of methodology in section 3. The results follow and then I conclude.

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<sup>74</sup> Subjective well-being is typically assessed by overall life satisfaction. In this paper I use the terms life satisfaction and well-being interchangeably.

### 3.2. Data

The data for this study come from the General Social Surveys (GSS), national cross-sectional social surveys enacted by Statistics Canada in 1985 that cover one topic annually. The surveys capture a host of socio-economic and family characteristics of individuals. The GSS on social engagement (2003 and 2008), on time use (2005 and 2010) on social identity and volunteering, giving and participation (2013) also collect data on the volunteering, self-perceived health and life satisfaction of individuals, and hence are ideal for my study. Self-perceived health is based on the question “in general, would you say your health is: excellent; very good; good; fair and poor.” I recode self-rated health into three groups: one indicating fair or poor (1-2) health, two indicating good (3) health and three indicating very good or excellent (4-5) health. Life satisfaction is based on the question “how do you feel about your life as whole right now?”, and takes values from 1-10 where 1 indicates being very dissatisfied and 10 indicates being very satisfied. I recode the life-satisfaction variable into three categories (8-10); (4-7) and (1-3) and named them very satisfied, somewhat satisfied and very dissatisfied respectively.<sup>75, 76, 77</sup>

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<sup>75</sup> In 2013 the question on life satisfaction is on a zero to 10 point scale, where zero means very satisfied and 10 means very dissatisfied. To be consistent with the rest of other cycles I recode the life satisfaction variable into three categories: (8-10); (4-7) and (3-0).

<sup>76</sup> The GSS (2003, 2005 and 2008) asks question about the happiness of Canadians, but unfortunately the questions are not consistent over the years. While GSS (2003 and 2005) ask about the feeling of happiness in the current moment “presently would you describe yourself as: very happy? somewhat happy? somewhat unhappy? very unhappy?”, the GSS (2008) asks about feelings of happiness in general “would you describe yourself as being usually: happy and interested in life? somewhat happy? somewhat unhappy? unhappy with little interest in life? so unhappy that life is not worthwhile?”. Given that the questions are asked in three out of five cycles and inconsistently I decided to focus on the self-reported health and life satisfaction questions which are asked consistently over the cycles.

<sup>77</sup> The measures of life satisfaction used in this chapter are not without concerns. First, the framing of the question has varied across GSS cycles. As suggested by Bonikowska et al. (2014), the responses to the life satisfaction question in the 2003, 2005 and 2013 GSS cycles might be biased downwards because of the questions asked of respondents immediately before the life satisfaction question. In particular, in these years respondents were first asked a series of questions (on a 10 point scale) regarding their health, main activities, how they spend their time, and, importantly, about their financial situation. After these questions, individuals may feel less satisfied with their life as a whole. The inclusion of years fixed effect in my models addresses to some extent these differences in framing over time. The second concern relates to the subjective inherent in the chosen variables. Bertrand and Mullainathan (2001) show that relying on subjective measures of socioeconomic variables (e.g., health and life

The original sample pooled from these five cycles (2003, 2005, 2008, 2010 and 2013) contains 122,748 observations. After excluding those who do not report their health (1%) and life satisfaction (1%), those who do not answer the question about formal volunteering (0.25%) and those who do not provide their residential six-digit postal code correctly (11%), I am left with 110,624 observations. To keep as many observations as possible for my analysis I do not exclude observations with missing values for other variables, but include controls in the regression for missing values for each variable.<sup>78</sup> Table 3.1 summarizes the sample size for each survey cycle.

To measure an individual's participation in formal volunteer work the GSS (2003, 2005, 2008, 2010 and 2013) ask two different types of questions: "In the past 12 months, did you do unpaid volunteer work for any organization?" coded as a binary yes/no response and "On average, about how many hours per month did you volunteer?" coded into four categories: over 15 hours per month, between 5 to 15 hours per month, between 1 to 5 hours per month and less than 1 hour per month. This study focuses on the participation decision from the first question. I include the following socio-demographic variables in the regression model: sex, age, marital status, education, employment status household income, age of the youngest child in the household and immigration status. I also include variables reflecting the characteristics of the community in which the individual resides: an urban-rural indicator, provincial dummies and the population density which is measured at three kilometer buffers around individuals' homes.<sup>79</sup> To capture a possibly non-linear secular trend in self-rated health and life satisfaction I include a set of year dummy variables. Table 3.2 presents the definition of all the variables used in this study.

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satisfaction) might create measurement error (e.g., ordering of questions, question wording, scales presented to respondent and careless responding).

<sup>78</sup> As a robustness check, instead of including controls for missing responses I drop those observation with missing information. My results are essentially the same.

<sup>79</sup> Chapter 1 contains the details about how I compute the population size at the three kilometre buffer. Population density around an individual's place of residence may help to pick up the availability of services (doctors, hospitals), or the walkability of the neighbourhood (points of interest) which could affect health and life satisfaction.

To investigate the causal relationship between volunteering and self-rated health and life satisfaction I use a general seemingly unrelated regression (SUR) framework, known as the Conditional Mixed Process (CMP) method, which is an appropriate way to incorporate instrumental variables when both the dependent and endogenous variables are categorical (as described further in the methodology section). I use access (and its square) to registered charities within a three kilometer buffer as my main instrument. To measure the access variable, the number of charitable organizations that fall within a three kilometer radius around each respondent's home (postal code level) is calculated. The data for the location of charitable organizations at the postal code level comes from Canada Revenue Agency (CRA), Registration Charity Return (Form T3010) that is available at the Public Economics Data Analysis Laboratory (PEDAL) at McMaster University.

The average number of charitable organizations within three kilometers of a respondent's place of residence is 114. But averages mask heterogeneity. Once account is taken of the population density in these three-kilometre buffers, as shown in table 3.3, volunteers are surrounded by more charitable organizations than are non-volunteers except in very low density areas, in which case volunteers and non-volunteers have close to the same number of organizations. For example, grouping population size into quartiles, one finds that volunteers who live in three-kilometer buffers with a population between 24,730 and 53,301 (third quartile) are surrounded, on average, by 79 charitable organizations, while this is 74 for non-volunteers.

Table 3.4 presents some descriptive statistics for the full sample and for the three categories of self-reported health. Over one half (58%) of the sample report that their overall health is excellent/very good; 29% report that their health is good and 13% report that they have fair/poor health status. More individuals with excellent health volunteer (42%) when compared to those

with fair health (29%). Proportionately more individuals in excellent health are younger, more educated, work full-time, have young children at home, live in households with higher earnings, are Canadian born and live in more populated areas relative to other health groups. The self-reported health status varies considerably across provinces: Alberta (66%) and Ontario (65%) residents are the most likely to self-report excellent/very good health, while New Brunswick residents are the least likely (53%).<sup>80</sup>

Table 3.5 presents some descriptive statistics for the full sample and for the three categories of self-rated life satisfaction. Two-thirds (66%) of the sample report that they are very satisfied with their life; 31% report that they are somewhat satisfied with life and 2.5% report that they are very dissatisfied with life. More individuals who are very satisfied with life volunteer (42%) when compared to those who are very dissatisfied with life (29%). Proportionately more individuals who are very satisfied with life are younger, more educated, work full-time, have young children at home, live in households with higher earnings and are Canadian born, relative to other life satisfaction groups. However, when I look at the population size at a three kilometer buffer around an individual's place of residence I find that individuals living in less populated areas are proportionately more likely to report being very satisfied with life compared to those in more populated areas. Life satisfaction also varies regionally: residents of Newfoundland Labrador (72%) and Quebec (69%) being most likely to have strong life satisfaction, residence of Ontario (64%) and British Columbia (65%) ranked the lowest.

Examining tables 3.4 or 3.5 reveals that about 39% of the respondents were involved in formal volunteer activities within the past 12 months. The mean age of the respondent is 45

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<sup>80</sup> Having information about the total number observations (97,156), the proportion of individuals with excellent/very good (very satisfied), good (somewhat satisfied) and fair/poor (very dissatisfied) health status (well-being) and proportion of individuals in each provinces from the full and health status (life satisfaction) subsamples, it is possible to calculate the proportion of the three categories of health status (life satisfaction) across provinces.

years. Nearly, 51% of the respondents are women. Most of the respondents are either married or living common law (62%), have more than high school education (53%), have no children at home (58%), are born in Canada (79%) and live in urban areas (82%). On average about 37% of individuals work full-time. Approximately 50% of individuals live in households that earn an annual income of greater than \$60,000. The average population within 3km radii of the individual's place of residence is 41,756.

### **3.3. Methodology**

I use physical access to charitable organizations (plus its square) as an instrument for volunteering.<sup>81</sup> To measure access I count the number of charitable organizations in the three kilometer buffer around a respondent's home (postal code).<sup>82</sup> To be valid an instrument must satisfy two conditions: first, be correlated with the endogenous variable (volunteering) and second, be uncorrelated with the error term in the main regression (ordered probit).

In Chapter 1 I demonstrate that this measure of access is correlated with the volunteering decision. In that chapter I show that increasing the number of charitable organizations within a 3km radius around an individual's place of residence by 6% (the growth rate of the number charities in Canada between 2003 to 2009), increases the predicted probability of volunteering by

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<sup>81</sup> Instruments based on geographic features have been used by previous studies for example, Gimenez-Nadal and Molina (2015) use the number of non-profit organizations per 10,000 inhabitants at the state level for volunteering when estimating the relationship between volunteering and daily happiness in the US and Keller and Shiue (2014) use minimum distance to coast as an instrument for custom liberalization when investigating the impact of the Zollverein custom union on trade.

<sup>82</sup> A common method of measuring access to point of interest is counting the number of points of interest within a buffer – known as the 'coverage approach'. Addressing the boundary (for people who live in the border region) and travel behaviour (for people who do not choose the nearest point of interest) problems, this is preferred to the other two methods known as 'container approach' and 'minimum distance approach' (e.g. Talen and Anselin, 1998). However, the coverage approach is not without its problems. Geocoding based on postal codes rather than the precise street address of respondents and charitable organizations creates measurement error, especially in rural areas where postal codes cover large geographic areas. The other two limitations of measuring access to charitable organizations in this study are: first; if a charity fills out only one T3010 tax form covering multiple branches prevents me from capturing the physical locations of all volunteer opportunities and second; the 3km buffer around each postal code are created separately for each of the ten provinces which is problematic for individuals who live close to the border of neighbour provinces.

0.78%. I argue that proximity to charities is associated with volunteering because of two probable channels: 1) easier access to information about volunteer opportunities and 2) travel time savings for volunteer work. To satisfy the exclusion restriction (second condition) the best candidate for an instrument normally should be derived from a natural or random experiment (Angrist and Krueger, 2001). However, charitable organizations do not choose their locations randomly and their level of activity is a function of both local needs for their services and charities' abilities to access the necessary resources to provide such services to community. Non randomness in the location decision of charitable organizations may violate the exclusion restriction condition. For example, charitable organizations may locate in disadvantaged areas in order to facilitate providing services to targeted clients – like a women's centre being located close to low-income housing with a preponderance of female-headed households. Controlling for other geographic characteristics such as population density (which may reflect, for instance, the location of clients), should help to mitigate this effect so that my measure of access to charitable organizations only affects an individual's health and life-satisfaction indirectly through its effect on volunteering.

My dependent variables (health and life satisfaction) are ordinal (taking on values 1-3), and the endogenous independent variable, volunteering, is binary. Dealing with endogeneity in nonlinear models (e.g., probit or ordered probit) with a binary endogenous regressor requires careful consideration as the standard two stage least squares (2SLS) or Control Function (CF) approaches may produce inconsistent estimates (Wooldridge, 2010). If both my dependent and independent variables were binary, a bivariate probit model could be employed. But I cannot use this model unless I redefine the dependent variables (health and life-satisfaction) in binary formats, potentially losing valuable information. To avoid this problem, I use the fully observed



recursive CMP model which assumes that the underlying model is based on a general seemingly unrelated regression (SUR) framework.<sup>83</sup> Rather than relying on the classical regression model with continuous output variables, this approach allows the system to consist of binary, ordered, categorical or censored equations (Roodman, 2011). The SUR treats the dependent variables as independent from each other but allows for correlations between their error terms. The multi equation SUR, the CMP, permits the endogenous variable in one equation to appear on the left hand side of another equation, but requires that the system be recursive, “with clearly defined stages; and that are fully observed, meaning that endogenous variables appear on the right hand side only as observed” (Roodman, 2011, p.174).

The CMP can be written as:

$$Y_{it}^* = Z_{it}\gamma + X'_{it}\beta + \varepsilon_{it} \quad (1)$$

$$Z_{it}^* = IV_{it}\alpha_1 + IV_{it}^2\alpha_2 + X'_{it}\beta + u_{it} \quad (2)$$

$$Y_{it} = \begin{cases} 3 & Y_{it}^* > \tau_2 \\ 2 & \tau_1 < Y_{it}^* \leq \tau_2 \\ 1 & \text{otherwise} \end{cases}$$

$$Z_{it} = \begin{cases} 1 & Z_{it}^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

where  $Y_{it}^*$  is the unobserved latent variable for the outcome variables. The two outcome variables used are: (i) self-reported health with three ordered categories: excellent/very good (3), good (2) and fair or poor (1) and (ii) self-rated life satisfaction with three ordered categories: very satisfied (3), somewhat satisfied (2), very dissatisfied (1).  $Z_{it}^*$  is unobserved latent variable for volunteerig.  $Z_{it}$  is an endogenous volunteer variable which takes the value one if the respondent did any unpaid volunteer activities during the past 12 months and zero otherwise.  $IV_{it}$  is a vector

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<sup>83</sup> Several papers in the other contexts have used CMP models to study the causal relationship between binary endogenous variable and discrete outcome variable (e.g., Hutchinson and Meekers, 2012; Irizarry, 2015; Vargas, 2015).

of exogenous instruments (access and its square) and  $X_{it}$  is the vector of socioeconomic controls.<sup>84, 85</sup> In the model of life satisfaction I control for health status as previous research has shown a strong relationship between self-rated health and life satisfaction (e.g., Binder and Freytag 2013; Borgonovi, 2008). The regression models are weighted by the probability weights, and the standard errors are corrected for heteroskedasticity.

### 3.4. Results

To begin, I employ an ordered probit model to estimate the effect of volunteering on the probability of self-reported health and life satisfaction without addressing endogeneity. Table 3.6 reports the resulting marginal effects which give the correlations between the probability of having excellent/very good, good and fair/ poor health status and the probability of feeling very satisfied, somewhat satisfied and very dissatisfied about life, and volunteering (full set of results reported in the appendix table 3.A1). According to these estimates, taking part in volunteer activities increases the probability of reporting excellent/very good health status by 6.1% points and decreases the probability of reporting good and fair/poor health status by 2.9% and 3.3% points. Looking at life satisfaction, table 3.6 shows that taking part into volunteer activities increases the probability of reporting high life satisfaction by 4.8% points and decreases the probability of reporting medium and low life satisfaction by 4% and 0.8% points respectively.

It is not easy to compare my results to those of other studies because of differences in the measures of volunteering, health and life-satisfaction. Nevertheless, my finding of the impact of volunteering on health is very close to the 6.2% point effect reported by Borgonovi (2008) but its

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<sup>84</sup> The CMP is preferable to the ordered probit model if the covariance between the error terms in equations 1 and 2 is not zero. However, if this is not satisfied then the single equation ordered probit model is valid.

<sup>85</sup> The socioeconomic factor includes gender, age, marital status, education level, household income, employment status, presence of children in the household, length of time living in Canada and set of geographic identifies such as urbanicity, population density and province and yeas dummies (please see table 3.2).

impact on life satisfaction is smaller than the 7.2% points reported in Binder and Freytag (2013). Borgonovi (2008) reports the marginal effects (from the ordered probit model) of volunteering (less than monthly, monthly but less than weekly and weekly or more) on the probability of reporting being in excellent health. Binder and Freytag (2013) report the marginal effects (from the OLS model) of volunteering (at least once a week, at least once a month, several times a year and once a year or less) on life satisfaction (cardinal number).

Table 3.7 presents the IV estimates for the effects of volunteering on health and life satisfaction status that take account of endogeneity using the CMP approach. The Cragg-Donald Wald F statistic (35 and 33) which tests the joint correlation between the instruments (access and access squared) and volunteering indicates that they are highly correlated with the volunteering variable. The rho statistic reported by the CMP that measures the covariance of the error terms in equations (1) and (2) indicates that volunteering is endogenous for both the health and life satisfaction variables and the CMP approach is preferable to the ordered probit model.

After controlling for the endogeneity between volunteering and the outcome variables, taking part in volunteer activities has a larger positive impact on health status as compared to the results when endogeneity was not addressed. However, it now has no statistically significant effect on life satisfaction. The marginal effects on health outcomes indicate that volunteering increases the probability of reporting excellent/very good health status by 23.9% points and decreases the probability of reporting good and fair/poor health status by 10% and 13.8% points respectively. The magnitudes of these estimates for the health and life satisfaction outcome lie outside of those reported in the established literature. For instance, Fiorillo and Nappo (2016), find that after controlling for endogeneity, volunteering increases the probability of self-perceived good health by 1% point. Binder and Freytag (2013) using propensity score matching find that taking part in

volunteer activities increases life satisfaction by 11.3% point. One potential explanation for the different effects arising from the endogeneity-corrected model is that the ordered probit approach estimates average effects for the total sample while the CMP estimates the local average effects (LATE) for those induced to change their behaviour by the instruments. More specifically volunteering might have a larger effect on health for those induced to volunteer only because of greater access to charitable organizations. It is thus sensible that they yield different magnitudes. Basically, the probit model averages the effect of volunteering over the entire sample, while the IV (CMP) averages it over those who were treated (as defined by the instruments).

As expected, better health status is associated with higher income, higher levels of education, younger individuals who employed and with a child in the household less than 5 years old. Comparing the marginal effects of volunteering with other variables in regression it is clear that volunteering has a considerable impact on health (table 3.7). For example, *ceteris paribus*, going from a household with an income of over \$100,000 to a household with less than \$20,000 income decreases the probability of reporting excellent health by 16.6% point and increases the probability of reporting good and fair/ poor health by 7% and 9.6% points respectively. Also, I find that health is the strongest predictor of life satisfaction, *ceteris paribus*; going from excellent health to fair/poor health decreases the probability of reporting very satisfied with life by 40.2% point and increases the probability of reporting somewhat satisfied and very dissatisfied with life by 33.8% and 6.4% points respectively.<sup>86, 87</sup>

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<sup>86</sup> To compare my main estimates with previous studies I re-estimate the CMP model with two separate alternative conventional instruments: 1) religious participation and 2) length of time living in city or local community. Appendix 3.B includes tables 3.B3 and 3.B4 reporting the results for the alternative estimates. When religious participation is used as the identifying instrument, volunteering is found to increase the probability of reporting excellent/very good (very satisfied) health status (life satisfaction) by 12.3% (18%) point and decreases the probability of reporting good and (somewhat satisfied) fair/poor (very dissatisfied) health status (life satisfaction) by 5.7% (14.8%) and 6.6% (3.3%) points respectively. When I use length of time living in city or community as an identifying instrument I find that taking part into volunteer activities increases the probability of reporting excellent/very good (very satisfied) health status (life satisfaction) by 16.8% (16.9%) point and decreases the

The remaining tables summarize the results from a series of robustness exercises. First, I examine the sensitivity of my estimates to the way income, an important and possibly endogenous determinant of both health and life satisfaction, is controlled for (models 5 and 6). Second, I investigate the robustness of volunteering effects accounting for set of social network variables (models 7 and 8). Further, I restrict the sample of individuals by sex and age groups (models 9-18).

Income has been shown to be an important determinant of health (e.g., Ettner, 1996; Lynch & Kaplan, 2000) and is thus important to include as a control in the model. However there is reason to believe such a variable is also endogenous to the outcomes. For example, individuals in poor health are less likely to be in the labour force and hence would earn less money. To check the sensitivity of my results to the possible endogeneity of income, I re-estimate the model using ‘permanent’ income rather than current income which is considered to be less endogenous to the labour leisure trade-off.

To measure permanent income I follow McDonald and Kennedy (2004) and rely on a set of dummy variables reflecting the type of dwelling in which the individual resides, whether the dwelling is owned by a member of household and whether the individual receives investment income. The results reported in table 3.8 show that the effects of volunteering on health and life satisfaction are robust to this different specification of income (full set of results reported in the appendix table 3.A2). In this case, volunteering increases the probability of reporting

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probability of reporting good and (somewhat satisfied) fair/poor (very dissatisfied) health status (life satisfaction) by 7.6% (13%) and 9.3% (3%) points respectively. As mentioned before, it is not easy to compare these results with previous studies however the estimates for both health and life satisfaction are in upper range found in literature that used the same type of instruments (Borgonovi, 2008; Schultz et al., 2008 and Fiorillo and Nappo, 2016).

<sup>87</sup> In Grossman’s (Grossman, 1972) model of health, age is posited to have a non-linear relationship with health. To check the robustness of results I create an age squared variable and estimate the models with both versions of age. The results show that the role of volunteering on health and life satisfaction outcomes is robust to including the age squared.

excellent/very good health status by 31.4% point and decreases the probability of reporting good health status by 11.7% and 19.8% points respectively. And, like before, table 3.8 reveals that volunteering does not have a statistically significant effect on life satisfaction.

In the next exercise, I follow Fiorillo and Nappo (2016) and include measures of individuals' formal and informal social networks as additional controls to examine the relationship of social networks with both volunteering and the outcomes of interest. As they argue, social connections can directly affect volunteering and health; for instance, individuals with more social contacts may be more likely to hear about (be asked to engage in) volunteer opportunities. According to the Canada Survey of Giving, Volunteering and Participation (CSGVP) in 2010 while 51% of volunteers had been asked by someone to become involved as a volunteer only 43% said that they approached an organization on their own initiative. Moreover, a large number of studies show how social networking (e.g., ties with friends and family members and civic engagement) is directly linked to individual health and well-being (e.g., Helliwell and Putnam, 2004). I therefore include measures of individuals' formal and informal social networks into CMP model. It is possible that not including them would lead to the problem of omitted variables – a problem that can be overcome by good instruments; the main reason that I do not include measures of social networking in my main analysis (models 3 and 4) is that the questions capturing social networking are not asked across all of the GSS's cycles hence would lead to a large number of missing values.

To measure an individual's informal social network, the GSS (2003, 2008 and 2013) has questions about a respondent's social contacts with friends and relatives who do not reside in the household. They ask about the frequency of face to face contacts with friends and relatives in a

categorical format during the last month.<sup>88</sup> I construct a set of dummy variables representing respondents' informal social interactions at three levels: high, medium and low. To measure formal social networks the GSS (2003, 2008 and 2013) asks about the civic engagement of respondents.<sup>89</sup> I construct a dummy variable which takes the value one if the respondent was a member or participant in at least one of these eight different organizations and zero otherwise.

The estimated impact of being a volunteer on health and life satisfaction once account is taken of social networks, is reported in table 3.9. Volunteering continues to have a positive and significant effect on health, but it is now smaller than previously found. I continue to find an insignificant effect from volunteering to life satisfaction. Being a volunteer increases the probability of a respondent reporting excellent/very good health status by 16.7% point and decreases the probability of reporting good and fair/poor health status by 7.5% and 9.2% points respectively. As a point of comparison if the same individual goes from frequent social networking to very frequent (infrequent) social networking, the probability of reporting excellent/very good health status increases (decreases) by 2.2% (4.1%) point and decreases (increases) the probability of reporting good and fair/ poor health statuses by 1% (1.9%) and 1.2% (2.3%) points respectively. These results corroborate the finding that "...formal

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<sup>88</sup> The GSS (2003, 2008 and 2013) has two different questions for social contacts: "in the last month, how often did you see your friends (relatives)? Was it: 1) ... every day? 2) ... a few times a week? 3) ... a few times a month? 4) ... once a month and 5) ...not in the last month? I scored the answers to each question as follows: 4 if every day, 3 if a few times a week, 2 if a few times a month, 1 if once a month and 0 if not in the last month and sum them together. Very frequent social interaction is a dummy which takes value one if the respondent has a score greater than five and zero otherwise; frequent social interaction is a dummy variable which takes the value one if the respondent has the score between three to five and zero otherwise and infrequent social interaction is a dummy variable which takes the value one if the respondent has a score of less than three.

<sup>89</sup> In the civic engagement module the GSS (2003, 2008 and 2013) asks: "in the past 12 month, were you a member or participant in: a union or professional association; ...a political party or group; ... a sports or recreational organization (such as a hockey league, health club, or golf club); ... cultural/ educational group (such as a theatre group, book club or bridge club); ... a religious-affiliated group (such as church youth group or choir); ... a school group, neighbourhood, civic or community association (such as PTA, alumni, block parents or neighbourhood watch); ...service club (such as Kiwanis, Knights of Columbus or the legion); ... other".

volunteering might affect individual health not only through social relations but also through the internal rewards originating from the intrinsic motivation ...” (Fiorillo and Nappo, 2016, p .20).

Some groups may respond differently to volunteering than others. To examine this possibility, I estimate the causal effect of volunteering on health and life satisfaction by sex and by age groups. The results reported in table 3.10 reveal that volunteering affects female and male differently. While working for free positively affects the health status for both female and male, it enhances life satisfaction only for female. Why volunteering has an impact on life satisfaction for female but not male cannot be adequately addressed with the data at hand; it may reflect the types of volunteering activities undertaken by each group. Further study on this question is warranted and left for future research.

People take part in volunteer activities for various reasons at different stages of their life course. For example, according to the General Social Survey of Giving, Volunteering and Participating (CSS GVP, 2013), 42% of respondents aged between 15 to 24 years old say they volunteer to improve their health, and more than 60% of respondents aged 65 years and over report the same reason. To see if older volunteers experience greater health (life satisfaction) benefits than younger volunteers, I subgroup the sample by different age groups (individuals aged<35; aged>65;  $35 \leq \text{aged} \leq 65$ ). The results reported in table 3.11 suggest that while volunteering is positively related to higher life satisfaction among middle aged population ( $35 \leq \text{aged} \leq 65$ ) it is not significantly related to life satisfaction for the young and elderly groups. Moreover, I find that volunteering is positively related to higher level of health status among young (15-35 years) and middle aged individuals ( $35 \leq \text{aged} \leq 65$ ). The findings suggest that middle aged volunteers may not experience the same benefits from volunteering as those older and younger.



### **3.5. Conclusion**

This is the first Canadian study to investigate the causal relationship of volunteering on health and life satisfaction. I employ a novel instrument, access to charitable organizations at a 3km buffer around an individual's place of living to identify volunteers. The one finding that stands out is the persistent positive causal effect of volunteering on health: being a volunteer leads to better health, *ceteris paribus*. This result is robust to a host of sensitivity tests, but the size of the impact of being a volunteer on health is sometimes sensitive to the sample under investigation.

The effect of volunteering on life satisfaction is not as robust as was the case for health. In my main analysis, volunteering has no statistical effect on life satisfaction. However, it does have a positive and significant effect in some of my robustness analyses: it positively affects life satisfaction for female but not male. Middle aged individuals also experience higher life satisfaction as a result of volunteering when compared to others. One explanation may be tied to the types of activities undertaken by the volunteer: an in-depth analysis of such activities by gender and by age groups may help us to understand better the links between volunteering and life satisfaction.

Like all empirical analyses, this one is limited by the availability of data. Longitudinal data that follows individuals over time would be ideal for discerning the causal impact of volunteering on health and life satisfaction. In addition, I have to rely on self-reported health and life satisfaction; it would have been useful to be able to compare these results to those arising from more objective outcome measures. Finally, more and better information on the types of volunteer activities undertaken by individuals may shed light on why some groups respond differently to volunteering than others. For instance, if we could distinguish volunteer activities

that require interacting with others from those that do not, this may provide some explanation for these differing impacts.

Overall, my results point to yet another potential benefit associated with volunteering, namely improved health. Life satisfaction may also increase for some volunteers. This provides further support for policies designed to encourage and promote volunteering.

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**Table 3.1: Construction of the pooled sample**

<b>Cycle</b>	<b>Year</b>	<b>GSS topic</b>	<b>Original sample size</b>	<b>Sample size after restrictions</b>
17	2003	Social engagement	24,951	21,156
19	2005	Time use	19,597	16,844
22	2008	Social engagement	20,401	18,456
24	2010	Time use	15,390	13,792
27	2013	Social identity and giving, volunteering, and participation	42,409	40,376

Source: Statistics Canada, General Social Survey

**Table 3.2: Variable definition**

<b>Dependent variables</b>	
Self-reported health	Ordered variable; 3 if excellent/very good; 2 if good and 1 if fair/ poor
Self-rated life satisfaction	Ordered variable; 3 if very satisfied ; 2 if somewhat satisfied and 1 if very dissatisfied
<b>Independent variables</b>	
Volunteer	Dummy variable 1, if the respondent took part in a volunteer activity during the past 12 months
Male	Dummy variable 1, if the respondent is male, 0 otherwise
Age	Continuous variable representing the age of the respondent (over 15 years old)
Married/common law	Dummy variable 1, if the respondent is married/ common law, 0 otherwise, <b>base group</b>
Widowed	Dummy variable 1, if the respondent is widow/ widower, 0 otherwise
Separated /divorced	Dummy variable 1, if the respondent is separated/ divorced, 0 otherwise
Single/never married	Dummy variable 1, if the respondent is single/ never married, 0 otherwise
Less than high school	Dummy variable 1, if the respondent did not finish high school, 0 otherwise
Graduated from high school	Dummy variable 1, if the respondent graduated from high school, 0 otherwise
Post-secondary diploma or certificate	Dummy variable 1, if the respondent obtained post-secondary diploma or certificate, 0 otherwise, <b>base group</b>
University degree	Dummy variable 1, if the respondent obtained university degree, 0 otherwise
Full-time	Dummy variable 1, if the respondent has a full-time job, 0 otherwise, <b>base group</b>
Part-time	Dummy variable 1, if the respondent has a part-time job, 0 otherwise
Not-employed	Dummy variable 1, if the respondent is not employed, 0 otherwise
Excellent /very good	Dummy variable 1, if the health status of the respondent is excellent/very good, 0 otherwise, <b>base group</b>
Good	Dummy variable 1, if the health status of the respondent is good, 0 otherwise
Fair/poor	Dummy variable 1, if the health status of the respondent is fair/poor, 0 otherwise
Less than \$20,000	Dummy variable 1, if the income of the household is less than 20,000 dollars per year, 0 otherwise
\$20,000-\$39,999	Dummy variable 1, if the income of the household is between 20,000-39,999 dollars per year, 0 otherwise
\$40,000-\$59,000	Dummy variable 1, if the income of the household is between 40,000-59,999 dollars per year, 0 otherwise
\$60,000-\$79,999	Dummy variable 1, if the income of the household is between 60,000-79,999 dollars per year, 0 otherwise
\$80,000-\$99,999	Dummy variable 1, if the income of the household is between 80,000-99,999 dollars per year, 0 otherwise
Over \$100,000	Dummy variable 1, if the income of the household is over 100,000 dollars per year, 0 otherwise, <b>base group</b>
No children in household	Dummy variable 1, if there are no children in the household, 0 otherwise, <b>base group</b>
Youngest child in household is <5 years old	Dummy variable 1, if the youngest child in the household is less than 5 years old, 0 otherwise

**Table 3.2: Variable definition**

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Youngest child in household is 5-14 years old	Dummy variable 1 if the youngest child in the household is between 5 and 14 years old, 0 otherwise
Youngest child in household is >15 years old	Dummy variable 1, if the youngest child in the household is over 15 years old, 0 otherwise
Born in Canada	Dummy variable 1, if respondent born in Canada, 0 otherwise, <b>base group</b>
Immigrant, over 15 years	Dummy variable 1, if respondent is an immigrant and has lived in Canada over 15 years, 0 otherwise
Immigrant, less than 15 years	Dummy variable 1, if respondent is an immigrant and has lived in Canada less than 15 years, 0 otherwise
Social contact with friends and relatives very frequently	Dummy variable 1, if respondent had more than six times face to face social contacts with friends or relatives in a month, 0 otherwise, <b>base group</b>
Social contact with friends and relatives frequently	Dummy variable 1, if respondent had between three to five times face to face social contacts with friends or relatives in a month, 0 otherwise
Social contact with friends and relatives infrequently	Dummy variable 1, if respondent had less than three times face to face social contacts with friends or relatives in a month, 0 otherwise
Membership or participation in formal groups or organizations	Dummy variable 1, if the respondent was a member or participant in at least one formal groups or organizations in the past 12 months, zero otherwise
Rural	Dummy variable 1, if respondent lives in rural area or small town (non-CMA/non-CA), 0 otherwise
Newfoundland and Labrador	Dummy variable 1, if respondent lives in Newfoundland and Labrador, 0 otherwise
Prince Edward Island	Dummy variable 1, if respondent lives in Prince Edward Island, 0 otherwise
Nova Scotia	Dummy variable 1, if respondent lives in Nova Scotia, 0 otherwise
New Brunswick	Dummy variable 1, if respondent lives in New Brunswick, 0 otherwise
Quebec	Dummy variable 1, if respondent lives in Quebec, 0 otherwise
Ontario	Dummy variable 1, if respondent lives in Ontario, 0 otherwise, <b>base group</b>
Manitoba	Dummy variable 1, if respondent lives in Manitoba, 0 otherwise
Saskatchewan	Dummy variable 1, if respondent lives in Saskatchewan, 0 otherwise
Alberta	Dummy variable 1, if respondent lives in Alberta, 0 otherwise
British Columbia	Dummy variable 1, if respondent lives in British Columbia, 0 otherwise
Year 2003	Dummy variable 1, if the survey is done in year 2003, 0 otherwise
Year 2005	Dummy variable 1, if the survey is done in year 2005, 0 otherwise
Year 2008	Dummy variable 1, if the survey is done in year 2008, 0 otherwise
Year 2010	Dummy variable 1, if the survey is done in year 2010, 0 otherwise
Year 2013	Dummy variable 1, if the survey is done in year 2013, 0 otherwise, <b>base group</b>
Population size (3km)	Continuous variable, counts the population within a 3km radius from an individual's place of residence
Access (3km)	Continuous variable, counts the number of charitable organizations within a 3km radius from an individual's place of residence

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**Table 3.3: Average number of charities in a 3km buffer by population size for volunteers and non-volunteers**

Volunteer				
	First quartile pop<2,639	Second quartile 2,640<pop<24,729	Third quartile 24,730<pop<53,301	Fourth quartile 53,303<pop<286,979
Access3km	6	34	79	307
Non-volunteer				
	First quartiles pop<2,639	Second quartiles 2,640<pop<24,729	Third quartiles 24,730<pop<53,301	Fourth quartiles 53,303<pop<286,979
Access3km	6	32	74	294

1-Source is the GSS cycles 2013, 2010, 2008, 2005 and 2003. 2-The summary statistics of the data are weighted by the frequency weight.

**Table 3.4: Summary statistics for the full sample and by self-reported health status**

Variable	Full sample	Excellent/very good	Good	Fair/poor
<b>Dependent variable (%)</b>				
Self-reported health		57.83	29.38	12.79
<b>Independent Variables</b>				
Volunteer	38.70	42.29	35.81	29.12
<b>Sex (%)</b>				
Male	49.26	49.90	49.28	46.30
<b>Age (#)</b>				
Age	44.81	42.41	46.31	52.23
<b>Marital status (%)</b>				
Married/common law	62.09	62.84	62.37	58.09
Widowed	4.64	3.40	5.14	9.08
Separated/divorced	6.71	5.63	7.00	10.90
Single/never married	26.51	28.08	25.44	21.84
<b>Education level (%)</b>				
Less than high school	16.88	13.66	18.69	27.28
Graduated from high school	29.52	28.38	31.41	30.31
Post-secondary diploma or certificate	28.25	28.74	28.18	26.21
University degree	24.96	28.90	21.26	15.67
<b>Labour force status (%)</b>				
Full-time	37.32	40.04	37.31	25.04
Part-time	27.89	30.83	26.00	18.92
Not employed	33.91	28.25	35.77	55.24
<b>Household income (%)</b>				
Less than \$20,000	5.97	4.13	6.41	13.26
\$20,000-\$39,999	13.18	10.90	14.84	19.68
\$40,000-\$59,999	15.12	14.41	16.19	15.89
\$60,000-\$79,999	12.79	12.96	13.32	10.79
\$80,000-\$99,999	10.54	11.69	9.77	7.12
Over \$100,000	26.21	31.00	21.75	14.79
<b>Age of youngest child in the household (%)</b>				
No children	58.10	56.47	58.24	65.16
Youngest child in household is <5 years old	11.77	13.17	10.98	7.25
Youngest child in household is between 5-14 years old	16.93	18.19	16.60	12.02
Youngest child in household is >14 years	13.20	12.17	14.18	15.57
<b>Length of time living in Canada (%)</b>				
Born in Canada	78.98	80.30	76.57	78.54
Immigrant, over 15 years	12.92	11.37	14.53	16.26

**Table 3.4: Summary statistics for the full sample and by self-reported health status**

Variable	Full sample	Excellent/very good	Good	Fair/poor
Immigrant, less than 15 years	7.79	8.02	8.60	4.90
<b>Urban/Rural indicator (%)</b>				
Urban	82.09	82.71	81.68	80.19
<b>Province of residence of the respondent (%)</b>				
Newfoundland and Labrador	1.61	1.70	1.44	1.58
Prince Edward Island	2.95	2.87	2.95	3.34
Nova Scotia	0.42	0.41	0.41	0.45
New Brunswick	2.31	2.12	2.44	2.88
Quebec	23.62	23.49	23.99	23.38
Ontario	38.42	38.71	38.10	37.86
Manitoba	3.56	3.46	3.72	3.61
Saskatchewan	3.00	2.85	3.24	3.14
Alberta	10.59	10.99	10.03	10.06
British Columbia	13.52	13.39	13.69	13.70
<b>Population size (#)</b>				
Population size-3km	41,756	41,912	41,719	41,139
<b>Year (%)</b>				
2003	14.50	15.81	12.90	12.29
2005	15.00	13.86	16.65	16.34
2008	16.59	15.29	18.21	18.75
2010	16.84	15.21	18.78	19.75
2013	37.07	39.83	33.47	32.88
<b>Number of observations</b>	110,624	63,974	32,501	14,149

1-Source: GSS cycles 2013, 2010, 2008, 2005 and 2003. 2- Data are weighted by the frequency weights provided in survey.

**Table 3.5: Summary statistics for the full sample and by self-rated life satisfaction**

Variable	Full sample	Very satisfied	Somewhat satisfied	Very dissatisfied
<b>Dependent variable (%)</b>				
Self-rated life satisfaction		66.19	31.31	2.50
<b>Independent Variables</b>				
Volunteer	38.70	41.43	33.86	27.20
<b>Sex (%)</b>				
Male	49.26	48.98	50.12	45.72
<b>Age (#)</b>				
Age	44.81	45.09	43.99	47.70
<b>Marital status (%)</b>				
Married/common law	62.09	65.76	55.55	46.86
Widowed	4.64	4.47	4.81	6.98
Separated/divorced	6.71	5.28	8.92	16.85
Single/never married	26.51	24.43	30.67	29.22
<b>Education level (%)</b>				
Less than high school	16.88	16.64	17.00	21.65
Graduated from high school	29.52	28.79	30.80	32.73
Post-secondary diploma or certificate	28.25	28.38	27.99	28.22
University degree	24.96	25.82	23.83	16.53
<b>Health status (%)</b>				
Excellent/very good	57.83	68.97	37.29	20.32
Good	29.38	24.41	40.40	22.94
Fair/poor	12.79	6.62	22.31	56.74
<b>Labour force status (%)</b>				
Full-time	37.32	37.60	37.58	26.67
Part-time	27.89	28.38	27.45	20.49
Not employed	33.91	33.16	34.06	51.81
<b>Household income (%)</b>				
Less than \$20,000	5.97	4.73	7.67	17.33
\$20,000-\$39,999	13.18	11.96	15.22	20.05
\$40,000-\$59,999	15.12	14.67	16.04	15.57
\$60,000-\$79,999	12.79	12.91	12.79	9.45
\$80,000-\$99,999	10.54	10.98	9.88	7.12
Over \$100,000	26.21	28.77	21.84	13.15
<b>Age of youngest child in the household (%)</b>				
No children	58.10	57.76	58.35	63.90
Youngest child in household is <5 years old	11.77	12.37	10.80	7.87
Youngest child in household is between 5-14 years old	16.93	17.03	16.93	14.59

**Table 3.5: Summary statistics for the full sample and by self-rated life satisfaction**

Variable	Full sample	Very satisfied	Somewhat satisfied	Very dissatisfied
Youngest child in household is >14 years	13.20	12.84	13.92	13.65
<b>Length of time living in Canada (%)</b>				
Born in Canada	78.98	80.10	76.73	77.42
Immigrant, over 15 years	12.92	12.57	13.50	15.12
Immigrant, less 15 years	7.79	7.08	9.35	7.04
<b>Urban/Rural indicator (%)</b>				
Urban	82.09	81.09	84.04	83.96
<b>Province of residence of the respondent (%)</b>				
Newfoundland and Labrador	1.61	1.76	1.31	1.35
Prince Edward Island	2.95	2.97	2.87	3.31
Nova Scotia	0.42	0.43	0.40	0.41
New Brunswick	2.31	2.39	2.12	2.56
Quebec	23.62	24.80	21.54	18.59
Ontario	38.42	37.44	40.24	41.76
Manitoba	3.56	3.58	3.49	3.75
Saskatchewan	3.00	3.10	2.82	2.70
Alberta	10.59	10.37	11.04	10.74
British Columbia	13.52	13.16	14.18	14.81
<b>Population size (#)</b>				
Population size-3km	41,756	39,876	45,431	45,503
<b>Year (%)</b>				
2003	14.50	14.97	13.81	10.86
2005	15.00	14.05	16.63	19.72
2008	16.59	17.01	15.81	15.20
2010	16.84	15.31	19.85	19.40
2013	37.07	38.66	33.90	34.81
<b>Number of observations</b>				
	110,624	73,222	34,636	2,766

1-Source: GSS cycles 2013, 2010, 2008, 2005 and 2003. 2- Data are weighted by the frequency weights provided in survey.

**Table 3.6: The effect of volunteering on the health and life satisfaction, ordered probit approach**

Variable	Health			Life satisfaction		
	Model (1)			Model (2)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.061*** (0.004)	-0.029*** (0.002)	-0.033*** (0.002)	0.048*** (0.004)	-0.040*** (0.003)	-0.008*** (0.001)
<b>Number of observations</b>	110,624			110,624		

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors. 3- The regression models are weighted by the probability weight. 4- Full results are in table 3.A1 of appendix.

**Table 3.7: The causal effect of volunteering on the health and life satisfaction, CMP approach**

Variable	Health			Life satisfaction		
	Model (3)			Model (4)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.239*** (0.094)	-0.100*** (0.028)	-0.138*** (0.066)	0.057 (0.061)	-0.048 (0.051)	-0.009 (0.010)
Male	0.008 (0.005)	-0.003* (0.002)	-0.004 (0.003)	-0.014*** (0.004)	0.012*** (0.004)	0.002*** (0.001)
Age	-0.003*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)
Widowed	0.030*** (0.007)	-0.013*** (0.003)	-0.017*** (0.004)	-0.041*** (0.007)	0.034*** (0.006)	0.007*** (0.001)
Separated/divorced	-0.039*** (0.008)	0.017*** (0.005)	0.023*** (0.004)	-0.120*** (0.006)	0.101*** (0.005)	0.019*** (0.001)
Single/never married	-0.023*** (0.006)	0.010*** (0.003)	0.013*** (0.003)	-0.065*** (0.006)	0.055*** (0.005)	0.010*** (0.001)
Less than high school	-0.054*** (0.011)	0.023*** (0.007)	0.031*** (0.004)	0.043*** (0.006)	-0.036*** (0.005)	-0.007*** (0.001)
Graduated from high school	-0.008 (0.007)	0.004 (0.003)	0.005 (0.004)	0.011** (0.005)	-0.009** (0.004)	-0.002** (0.001)
University degree	0.038** (0.017)	-0.016* (0.009)	-0.022*** (0.008)	-0.007 (0.009)	0.006 (0.007)	0.001 (0.001)
Part-time	0.000 (0.010)	-0.000 (0.004)	-0.000 (0.006)	0.002 (0.007)	-0.002 (0.006)	-0.000 (0.001)
Not employed	-0.076*** (0.006)	0.032*** (0.003)	0.044*** (0.007)	0.010 (0.007)	-0.008 (0.006)	-0.002 (0.001)
Less than \$20,000	-0.166*** (0.026)	0.070*** (0.019)	0.096*** (0.008)	-0.103*** (0.011)	0.087*** (0.009)	0.016*** (0.002)
\$20,000-\$39,999	-0.098*** (0.017)	0.041*** (0.012)	0.057*** (0.006)	-0.078*** (0.008)	0.066*** (0.007)	0.012*** (0.001)
\$40,000-\$59,999	-0.062*** (0.014)	0.026*** (0.008)	0.036*** (0.005)	-0.054*** (0.008)	0.046*** (0.006)	0.009*** (0.001)
\$60,000-\$79,999	-0.054***	0.023***	0.031***	-0.037***	0.031***	0.006***

**Table 3.7: The causal effect of volunteering on the health and life satisfaction, CMP approach**

Variable	Health			Life satisfaction		
	Model (3)			Model (4)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
	(0.010)	(0.007)	(0.004)	(0.007)	(0.006)	(0.001)
\$80,000-\$99,999	-0.017*	0.007	0.010**	-0.032***	0.027***	0.005***
	(0.009)	(0.004)	(0.005)	(0.007)	(0.006)	(0.001)
Youngest child in household is <5 years old	0.017**	-0.007**	-0.010*	0.007	-0.006	-0.001
	(0.008)	(0.003)	(0.005)	(0.007)	(0.006)	(0.001)
Youngest child in household is between 5-14 years old	-0.023**	0.010**	0.014*	-0.023***	0.020***	0.004***
	(0.012)	(0.004)	(0.008)	(0.008)	(0.007)	(0.001)
Youngest child in household is >14 years	-0.041***	0.017***	0.024***	-0.041***	0.035***	0.007***
	(0.006)	(0.003)	(0.004)	(0.006)	(0.005)	(0.001)
Immigrant, over 15 years	-0.024***	0.010**	0.014***	0.007	-0.006	-0.001
	(0.009)	(0.005)	(0.004)	(0.006)	(0.005)	(0.001)
Immigrant, less than 15 years	0.005	-0.002	-0.003	-0.026**	0.022**	0.004***
	(0.014)	(0.006)	(0.008)	(0.010)	(0.009)	(0.002)
Good				-0.208***	0.175***	0.033***
				(0.005)	(0.005)	(0.001)
Fair/poor				-0.402***	0.338***	0.064***
				(0.009)	(0.009)	(0.002)
Urban	0.013	-0.005*	-0.007	-0.019***	0.016***	0.003***
	(0.008)	(0.003)	(0.005)	(0.006)	(0.005)	(0.001)
Newfoundland and Labrador	0.043***	-0.018***	-0.025***	0.047***	-0.039***	-0.007***
	(0.008)	(0.005)	(0.005)	(0.008)	(0.007)	(0.001)
Prince Edward Island	-0.013*	0.005*	0.008	0.015**	-0.013**	-0.002**
	(0.008)	(0.003)	(0.005)	(0.008)	(0.006)	(0.001)
Nova Scotia	0.000	-0.000	-0.000	0.010	-0.008	-0.002
	(0.010)	(0.004)	(0.006)	(0.011)	(0.009)	(0.002)
New Brunswick	-0.021**	0.009**	0.012***	0.038***	-0.032***	-0.006***
	(0.008)	(0.004)	(0.004)	(0.008)	(0.007)	(0.001)
Quebec	0.045***	-0.019***	-0.026***	0.061***	-0.051***	-0.010***
	(0.014)	(0.004)	(0.010)	(0.009)	(0.008)	(0.002)



**Table 3.7: The causal effect of volunteering on the health and life satisfaction, CMP approach**

Variable	Health			Life satisfaction		
	Model (3)			Model (4)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Manitoba	-0.016** (0.007)	0.007** (0.003)	0.010** (0.005)	0.017** (0.007)	-0.014** (0.006)	-0.003** (0.001)
Saskatchewan	-0.040*** (0.009)	0.017*** (0.003)	0.023*** (0.007)	0.026*** (0.009)	-0.022*** (0.008)	-0.004*** (0.001)
Alberta	-0.011 (0.007)	0.005 (0.003)	0.006 (0.004)	-0.012* (0.007)	0.010* (0.006)	0.002* (0.001)
British Columbia	-0.004 (0.006)	0.001 (0.002)	0.002 (0.003)	0.002 (0.006)	-0.002 (0.005)	-0.000 (0.001)
Population size-3km	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Year 2003	0.034*** (0.005)	-0.014*** (0.002)	-0.020*** (0.003)	0.003 (0.005)	-0.002 (0.004)	-0.000 (0.001)
Year 2005	-0.049*** (0.006)	0.020*** (0.005)	0.028*** (0.003)	-0.033*** (0.005)	0.028*** (0.004)	0.005*** (0.001)
Year 2008	-0.075*** (0.005)	0.031*** (0.005)	0.043*** (0.004)	0.017*** (0.006)	-0.014*** (0.005)	-0.003*** (0.001)
Year 2010	-0.084*** (0.008)	0.035*** (0.007)	0.049*** (0.003)	-0.052*** (0.006)	0.043*** (0.005)	0.008*** (0.001)
<b>Instrumental variables (first stage)</b>						
Access (3km)		1.65e-4*** (3.59e-5)			1.62e-4*** (3.58e-5)	
Access (3km) <sup>2</sup>		-5.06e-8** (2.14e-8)			-5.08e-8** (2.13e-8)	
<b>The validity of instruments</b>						
Cragg-Donald Wald F statistics		35			33	
Endogeneity test (atanrho_12)		-0.326***			-0.018***	

**Table 3.7: The causal effect of volunteering on the health and life satisfaction, CMP approach**

		Health		Life satisfaction		
		Model (3)		Model (4)		
Variable	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
		(0.000)		(0.000)		
<b>Number of observations</b>		110,624		110,624		

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors except for the endogeneity test where it is the p-value in parenthesis. 3- The regression models are weighted by the probability weight. 4- Dummy variables for the missing values of marital status, education, immigration status, income level and employment status are also included in the regression models, but suppressed for brevity.

**Table 3.8: The causal effect of volunteering on the health and life satisfaction, including ‘permanent income’ CMP approach**

Variable	Health			Life satisfaction		
	Model (5)			Model (6)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.314*** (0.052)	-0.117*** (0.006)	-0.198*** (0.046)	0.102 (0.065)	-0.085 (0.053)	-0.017 (0.012)
<b>Instrumental variables (first stage)</b>						
Access (3km)		5.25e-4*** (9.44e-5)			4.90e-4*** (9.99e-5)	
Access (3km) <sup>2</sup>		-1.52e-7*** (5.51e-8)			-1.52e-7** (5.85e-8)	
<b>The validity of instruments</b>						
Cragg-Donald Wald F statistics		37			34	
Endogeneity test (atanrho_12)		-0.504*** (0.000)			-0.104*** (0.000)	
<b>Number of observations</b>		110,624			110,624	

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the probability weight. 4- Full results are in table 3.A2 of appendix.

**Table 3.9: The causal effect of volunteering on health and life satisfaction, control for social network, CMP approach**

Variable	Health			Life satisfaction		
	Model (7)			Model (8)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.167** (0.081)	-0.075** (0.032)	-0.092* (0.049)	0.102 (0.064)	-0.085 (0.053)	-0.017 (0.012)
Social contact with friends and relatives very frequently	0.022*** (0.004)	-0.010** (0.004)	-0.012*** (0.004)	0.037*** (0.006)	-0.031*** (0.006)	-0.006*** (0.001)
Social contact with friends and relatives infrequently	-0.042*** (0.011)	0.019*** (0.006)	0.023*** (0.005)	-0.056*** (0.009)	0.047*** (0.008)	0.009*** (0.001)
No membership or participation in formal groups or organizations	-0.041*** (0.008)	0.019*** (0.004)	0.023*** (0.004)	-0.005 (0.007)	0.004 (0.005)	0.009 (0.001)
<b>Instrumental variables (first stage)</b>						
Access (3km)		1.57e-4*** (3.60e-5)			1.57e-4*** (3.60e-5)	
Access (3km) <sup>2</sup>		-4.76e-8** (2.14e-8)			-4.76e-8** (2.14e-8)	
<b>The validity of instruments</b>						
Cragg-Donald Wald F statistics		32			30	
Endogeneity test (atanrho_12)		-0.190*** (0.000)			-0.114*** (0.000)	
<b>Number of observations</b>		110,624			110,624	

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the probability weight. 4- All the other control variables are suppressed for brevity.

**Table 3.10: The causal effect of volunteering on the health and life satisfaction by gender, CMP approach**

Female						
Health				Life satisfaction		
Model (9)				Model (10)		
Variable	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/ poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.243* (0.133)	-0.097** (0.037)	-0.145 (0.096)	0.162*** (0.056)	-0.131*** (0.042)	-0.030** (0.015)
<b>Instrumental variables (first stage)</b>						
Access (3km)	1.77e-4*** (4.79e-5)			1.77e-4*** (4.79e-5)		
Access (3km) <sup>2</sup>	-4.02e-8 (2.91e-8)			-4.02e-8 (2.91e-8)		
<b>The validity of instruments</b>						
Cragg-Donald Wald F statistics	29			27		
Endogeneity test (atanrho_12)	-0.325*** (0.000)			-0.237*** (0.000)		
<b>Number of observations</b>	61,741			61,741		
Male						
Health				Life satisfaction		
Model (11)				Model (12)		
Variable	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.212* (0.127)	-0.097** (0.046)	-0.116 (0.082)	0.023 (0.061)	-0.019 (0.052)	-0.003 (0.009)
<b>Instrumental variables (first stage)</b>						
Access (3km)	1.49e-4*** (5.32e-5)			1.44e-4*** (5.31e-5)		
Access (3km) <sup>2</sup>	-5.54e-8* (3.11e-8)			-5.31e-8* (3.10e-8)		
<b>The validity of instruments</b>						
Cragg-Donald Wald F statistics	10			10		
Endogeneity test (atanrho_12)	-0.282*** (0.000)			-0.056*** (0.000)		
<b>Number of observations</b>	48,863			48,863		

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the probability weight. 4- All the other control variables are suppressed for brevity.

**Table 3.11: The causal effect of volunteering on the health and life satisfaction by age, CMP approach**

<b>Age &lt; 35</b>						
Health				Life satisfaction		
Model (13)				Model (14)		
Variable	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/ poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.207** (0.095)	-0.117*** (0.043)	-0.090* (0.052)	0.038 (0.060)	-0.034 (0.053)	-0.005 (0.007)
<b>Instrumental variables (first stage)</b>						
Access (3km)	2.00e-4*** (6.20e-5)			1.96e-4*** (6.19e-5)		
Access (3km) <sup>2</sup>	-6.49e-8* (3.52e-8)			-6.44e-8* (3.52e-8)		
<b>The validity of instruments</b>						
Cragg-Donald Wald F statistics	15			14		
Endogeneity test (atanrho_12)	-0.310*** (0.000)			-0.025*** (0.000)		
<b>Number of observations</b>	29,816			29,816		
<b>35 &lt; Age &lt; 65</b>						
Health				Life satisfaction		
Model (15)				Model (16)		
Variable	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.274*** (0.049)	-0.105*** (0.010)	-0.168*** (0.039)	0.130** (0.060)	-0.105*** (0.047)	-0.025* (0.013)
<b>Instrumental variables (first stage)</b>						
Access (3km)	1.90e-4*** (4.93e-5)			1.86e-4*** (4.94e-5)		
Access (3km) <sup>2</sup>	-6.65e-8** (3.01e-8)			-6.65e-8** (3.02e-8)		
<b>The validity of instruments</b>						
Cragg-Donald Wald F statistics	19			17		
Endogeneity test(atanrho_12)	-0.421*** (0.000)			-0.173*** (0.000)		
<b>Number of observations</b>	57,985			57,985		

**Table 3.11: The causal effect of volunteering on the health and life satisfaction by age, CMP approach**

Age > 65						
Health				Life satisfaction		
Model (17)				Model (18)		
Variable	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.090 (0.206)	-0.022 (0.050)	-0.068 (0.156)	0.079 (0.067)	-0.065 (0.055)	-0.014 (0.012)
<b>Instrumental variables (first stage)</b>						
Access (3km)	2.01e-4*** (7.42e-5)			2.08e-4*** (7.37e-5)		
Access (3km) <sup>2</sup>	-5.36e-7 (4.56e-8)			-5.75e-8 (4.52e-8)		
<b>The validity of instruments</b>						
Cragg-Donald Wald F statistics	11			12		
Endogeneity test (atanrho_12)	0.014** (0.020)			-0.070*** (0.000)		
<b>Number of observations</b>	22,823			22,823		

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10 % levels respectively. 2-The number in the parentheses are robust standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the probability weight. 4- All the other control variables are suppressed for brevity.

### Appendix 3.A

**Table 3.A1: The effect of volunteering on the health and life satisfaction, ordered probit approach, full regression results**

Variable	Health			Life satisfaction		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.061*** (0.004)	-0.029*** (0.002)	-0.033*** (0.002)	0.048*** (0.004)	-0.040*** (0.003)	-0.008*** (0.001)
Male	0.002 (0.004)	-0.001 (0.002)	-0.001 (0.002)	-0.014*** (0.004)	0.012*** (0.003)	0.002*** (0.001)
Age	-0.003*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)
Widowed	0.028*** (0.007)	-0.013*** (0.003)	-0.015*** (0.004)	-0.041*** (0.007)	0.035*** (0.006)	0.007*** (0.001)
Separated/divorced	-0.047*** (0.006)	0.022*** (0.003)	0.025*** (0.003)	-0.120*** (0.006)	0.101*** (0.005)	0.019*** (0.001)
Single/never married	-0.023*** (0.006)	0.011*** (0.003)	0.012*** (0.003)	-0.065*** (0.006)	0.055*** (0.005)	0.010*** (0.001)
Less than high school	-0.069*** (0.006)	0.032*** (0.003)	0.037*** (0.003)	0.043*** (0.006)	-0.036*** (0.005)	-0.007*** (0.001)
Graduated from high school	-0.016*** (0.005)	0.007*** (0.002)	0.008*** (0.003)	0.010** (0.005)	-0.009** (0.004)	-0.002** (0.001)
University degree	0.063*** (0.005)	-0.030*** (0.002)	-0.034*** (0.003)	-0.006 (0.005)	0.005 (0.004)	0.001 (0.001)
Part-time	0.016*** (0.005)	-0.007*** (0.002)	-0.008*** (0.003)	0.003 (0.005)	-0.003 (0.004)	-0.005 (0.001)
Not employed	-0.065*** (0.005)	0.031*** (0.002)	0.035*** (0.003)	0.011** (0.005)	-0.009** (0.004)	-0.002** (0.001)
Less than \$20,000	-0.200*** (0.008)	0.093*** (0.004)	0.107*** (0.004)	-0.104*** (0.008)	0.088*** (0.007)	0.017*** (0.001)
\$20,000-\$39,999	-0.122*** (0.007)	0.057*** (0.003)	0.065*** (0.004)	-0.079*** (0.006)	0.066*** (0.005)	0.012*** (0.001)
\$40,000-\$59,999	-0.080***	0.038***	0.043***	-0.055***	0.046***	0.009***



**Table 3.A1: The effect of volunteering on the health and life satisfaction, ordered probit approach, full regression results**

Variable	Health			Life satisfaction		
	Model (1)			Model (2)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
	(0.006)	(0.003)	(0.003)	(0.006)	(0.005)	(0.001)
\$60,000-\$79,999	-0.065*** (0.007)	0.030*** (0.003)	0.035*** (0.004)	-0.037*** (0.006)	0.031*** (0.005)	0.006*** (0.001)
\$80,000-\$99,999	-0.026*** (0.007)	0.012*** (0.003)	0.014*** (0.004)	-0.032*** (0.007)	0.027*** (0.006)	0.005*** (0.001)
Youngest child in household is <5 years old	0.007 (0.007)	-0.003 (0.003)	-0.004 (0.004)	0.007 (0.006)	-0.006 (0.005)	-0.001 (0.001)
Youngest child in household is between 5-14 years old	-0.005 (0.006)	0.002 (0.003)	0.002 (0.003)	-0.022*** (0.005)	0.019*** (0.004)	0.004*** (0.001)
Youngest child in household is >14 years	-0.041 (0.006)	0.019 (0.003)	0.022 (0.003)	-0.041*** (0.006)	0.035*** (0.005)	0.007*** (0.001)
Immigrant, over 15 years	-0.036*** (0.006)	0.017*** (0.003)	0.019*** (0.003)	0.007 (0.005)	-0.006 (0.005)	-0.001 (0.001)
Immigrant, less than 15 years	-0.015* (0.008)	0.007* (0.004)	0.008* (0.004)	-0.027*** (0.008)	0.023*** (0.006)	0.004*** (0.001)
Good				-0.208*** (0.004)	0.175*** (0.003)	0.033*** (0.001)
Fair/poor				-0.403*** (0.005)	0.340*** (0.004)	0.064*** (0.001)
Urban	0.001 (0.005)	-0.000 (0.002)	-0.000 (0.003)	-0.020*** (0.005)	0.016*** (0.004)	0.003*** (0.001)
Newfoundland and Labrador	0.045*** (0.008)	-0.021*** (0.004)	-0.024*** (0.004)	0.047*** (0.008)	-0.039*** (0.007)	-0.007*** (0.001)
Prince Edward Island	-0.008 (0.007)	0.004 (0.003)	0.004 (0.004)	0.016*** (0.007)	-0.013*** (0.006)	-0.002*** (0.001)
Nova Scotia	0.004 (0.010)	-0.002 (0.005)	-0.002 (0.006)	0.010 (0.010)	-0.008 (0.009)	-0.002 (0.002)
New Brunswick	-0.027*** (0.008)	0.013*** (0.004)	0.015*** (0.004)	0.038*** (0.008)	-0.032*** (0.007)	-0.006*** (0.001)

**Table 3.A1: The effect of volunteering on the health and life satisfaction, ordered probit approach, full regression results**

Variable	Health			Life satisfaction		
	Model (1)			Model (2)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Quebec	0.021*** (0.005)	-0.010*** (0.002)	-0.011*** (0.003)	0.060*** (0.005)	-0.050*** (0.004)	-0.009*** (0.001)
Manitoba	-0.010 (0.007)	0.005 (0.003)	0.005 (0.004)	0.017*** (0.007)	-0.014*** (0.006)	-0.003*** (0.001)
Saskatchewan	-0.028*** (0.008)	0.013*** (0.004)	0.015*** (0.004)	0.026*** (0.007)	-0.022*** (0.006)	-0.004*** (0.001)
Alberta	-0.005 (0.007)	0.002 (0.003)	0.003 (0.004)	-0.011* (0.006)	0.009* (0.005)	0.002* (0.001)
British Columbia	-0.000 (0.006)	0.000 (0.003)	0.000 (0.003)	0.002 (0.006)	-0.002 (0.005)	-0.000 (0.001)
Population size-3km	-6.67e-8 (4.43e-8)	3.12e-8 (2.07e-8)	3.55e-8 (2.36e-8 )	-2.62e-7*** (4.13e-8)	2.20e-7*** (3.47e-8)	4.15e-8*** (6.62e-9)
Year 2003	0.031*** (0.005)	-0.015*** (0.002)	-0.017*** (0.003)	0.003 (0.005)	-0.002 (0.004)	-0.000 (0.001)
Year 2005	-0.053*** (0.005)	0.025*** (0.003)	0.028*** (0.003)	-0.033*** (0.005)	0.028*** (0.004)	0.005*** (0.001)
Year 2008	-0.073*** (0.005)	0.034*** (0.002)	0.039*** (0.003)	0.017*** (0.005)	-0.014*** (0.004)	-0.003*** (0.001)
Year 2010	-0.090*** (0.006)	0.042*** (0.003)	0.048*** (0.003)	-0.052*** (0.006)	0.043*** (0.005)	0.008*** (0.001)
<b>Number of observations</b>	110,624			110,624		

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors. 3- The regression models are weighted by the probability weight. 4- Dummy variables for the missing values of marital status, education, immigration status, income level and employment status are also included in the regression models, but suppressed for brevity.

**Table 3.A2: The causal effect of volunteering on the health and life satisfaction, including 'permanent income' CMP approach**

Variable	Health			Life satisfaction		
	Model (5)			Model (6)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.314*** (0.052)	-0.117*** (0.006)	-0.198*** (0.046)	0.102 (0.065)	-0.085 (0.053)	-0.017 (0.012)
Male	0.012*** (0.004)	-0.005*** (0.001)	-0.008*** (0.003)	-0.012*** (0.004)	0.010*** (0.004)	0.002*** (0.001)
Age	-0.003*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)
Widowed	0.022*** (0.007)	-0.008*** (0.003)	-0.014** (0.005)	-0.045*** (0.008)	0.038*** (0.007)	0.007*** (0.001)
Separated/divorced	-0.045*** (0.008)	0.017*** (0.004)	0.028*** (0.004)	-0.128*** (0.007)	0.107*** (0.006)	0.021*** (0.001)
Single/never married	-0.031*** (0.006)	0.011*** (0.003)	0.019*** (0.003)	-0.069*** (0.005)	0.058*** (0.005)	0.011*** (0.001)
Less than high school	-0.052*** (0.010)	0.019*** (0.006)	0.033*** (0.004)	0.044*** (0.006)	-0.037*** (0.005)	-0.007*** (0.001)
Graduated from high school	-0.007 (0.006)	0.003 (0.002)	0.004 (0.003)	0.010* (0.005)	-0.008* (0.004)	-0.002* (0.001)
University degree	0.031** (0.012)	-0.011** (0.006)	-0.019*** (0.006)	-0.006 (0.009)	0.005 (0.008)	0.001 (0.002)
Part-time	-0.012* (0.006)	0.005** (0.002)	0.008* (0.004)	-0.006 (0.006)	0.005 (0.005)	0.001 (0.001)
Not employed	-0.091*** (0.005)	0.034*** (0.005)	0.057*** (0.005)	-0.004 (0.007)	0.003 (0.005)	0.001 (0.001)
Investment income	0.018** (0.009)	-0.007* (0.004)	-0.011** (0.005)	0.019** (0.008)	-0.016** (0.007)	-0.003*** (0.001)
Dwelling type: low rise apartment	-0.016** (0.007)	0.006** (0.003)	0.010** (0.004)	-0.006 (0.007)	0.005 (0.006)	0.001 (0.001)

**Table 3.A2: The causal effect of volunteering on the health and life satisfaction, including 'permanent income' CMP approach**

Variable	Health			Life satisfaction		
	Model (5)			Model (6)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Dwelling type: high rise apartment	-0.010 (0.009)	0.004 (0.003)	0.006 (0.005)	0.012 (0.008)	-0.010 (0.007)	-0.002 (0.001)
Dwelling type: other	-0.025*** (0.006)	0.009*** (0.003)	0.016*** (0.003)	-0.008 (0.005)	0.007 (0.004)	0.001 (0.001)
Dwelling not owned by a member of household	-0.057*** (0.008)	0.021*** (0.005)	0.036*** (0.004)	-0.034*** (0.006)	0.028*** (0.005)	0.006*** (0.001)
Youngest child in household is <5 years old	0.020*** (0.007)	-0.008*** (0.002)	-0.013*** (0.005)	0.009 (0.007)	-0.008 (0.006)	-0.002 (0.001)
Youngest child in household is between 5-14 years old	-0.031*** (0.008)	0.011*** (0.002)	0.019*** (0.006)	-0.025*** (0.009)	0.021*** (0.007)	0.004*** (0.002)
Youngest child in household is >14 years	-0.034*** (0.006)	0.013*** (0.003)	0.021*** (0.004)	-0.035*** (0.006)	0.029*** (0.005)	0.006*** (0.001)
Immigrant, over 15 years	-0.023*** (0.008)	0.009** (0.004)	0.014*** (0.004)	0.006 (0.006)	-0.005 (0.005)	-0.001 (0.001)
Immigrant, less than 15 years	0.006 (0.011)	-0.002 (0.004)	-0.004 (0.007)	-0.029** (0.011)	0.024** (0.010)	0.005*** (0.002)
Good				-0.207*** (0.007)	0.173*** (0.007)	0.034*** (0.001)
Fair/poor				-0.400*** (0.012)	0.334*** (0.014)	0.066*** (0.002)
Urban	0.026*** (0.005)	-0.010*** (0.002)	-0.016*** (0.004)	-0.010 (0.006)	0.008 (0.005)	0.002 (0.001)
Newfoundland and Labrador	0.032*** (0.008)	-0.012*** (0.003)	-0.020*** (0.005)	0.041*** (0.008)	-0.034*** (0.007)	-0.007*** (0.001)
Prince Edward Island	-0.021*** (0.007)	0.008*** (0.003)	0.013*** (0.004)	0.009 (0.007)	-0.007 (0.006)	-0.001 (0.001)

**Table 3.A2: The causal effect of volunteering on the health and life satisfaction, including 'permanent income 'CMP approach**

Variable	Health			Life satisfaction		
	Model (5)			Model (6)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Nova Scotia	-0.005 (0.010)	0.002 (0.004)	0.003 (0.006)	0.006 (0.010)	-0.005 (0.009)	-0.001 (0.002)
New Brunswick	-0.025*** (0.008)	0.009*** (0.004)	0.016*** (0.005)	0.033*** (0.008)	-0.027*** (0.007)	-0.005*** (0.001)
Quebec	0.052*** (0.009)	-0.019*** (0.002)	-0.033*** (0.008)	0.063*** (0.010)	-0.053*** (0.008)	-0.010*** (0.002)
Manitoba	-0.023*** (0.007)	0.008*** (0.003)	0.014*** (0.004)	0.012 (0.007)	-0.010 (0.006)	-0.002 (0.001)
Saskatchewan	-0.048*** (0.007)	0.018*** (0.003)	0.030*** (0.006)	0.020** (0.009)	-0.017** (0.008)	-0.003** (0.001)
Alberta	-0.011* (0.006)	0.004* (0.002)	0.007 (0.004)	-0.010 (0.007)	0.009 (0.005)	0.002 (0.001)
British Columbia	-0.007 (0.005)	0.003 (0.002)	0.005 (0.003)	0.000 (0.006)	-0.000 (0.005)	-0.000 (0.001)
Population size-3km	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Year 2003	0.001 (0.011)	0.000 (0.004)	-0.001 (0.007)	0.005 (0.012)	-0.004 (0.010)	-0.001 (0.002)
Year 2005	-0.072*** (0.006)	0.027*** (0.005)	0.045*** (0.003)	-0.024*** (0.005)	0.020*** (0.004)	0.004*** (0.001)
Year 2008	-0.103*** (0.011)	0.038*** (0.006)	0.065*** (0.009)	0.018 (0.013)	-0.015 (0.011)	-0.003 (0.002)

**Table 3.A2: The causal effect of volunteering on the health and life satisfaction, including 'permanent income' CMP approach**

		Health		Life satisfaction		
		Model (5)		Model (6)		
Variable	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Year 2010	-0.098*** (0.007)	0.036*** (0.006)	0.062*** (0.004)	-0.037*** (0.006)	0.031*** (0.005)	0.006*** (0.001)
<b>Number of observations</b>		110,624		110,624		

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the probability weight. 4- Dummy variables for the missing values of marital status, education, immigration status, employment status, type of dwelling, whether the dwelling is owned by a member of household and whether the individual receive investment income are also included in the regression models, but suppressed for brevity.

## Appendix 3.B

### Alternative instruments

To render my analysis more comparable to existing studies, I also estimate models using a measure of religiosity and the length of time living in city or local community as alternative instruments. Employing these instruments allows me to test for variations in the estimated Local Average Treatment Effects (LATE). Religiosity has been used many times as an instrument for volunteering when estimating the effect of volunteering on health and life satisfaction. The literature has established that measures of religiosity may motivate volunteering behaviour (e.g., Borgonovi, 2008; Fiorillo and Nappo, 2016). To justify the length of time living in community as an instrument Schultz et al. (2008) argue that the number of years living in community is correlated with social capital (volunteering), through its effect on the mobility rate (DiPasquale and Glaeser, 1999).

To test the robustness of my results to the choice of instrument I re-estimate the models using religiosity and length of time living in city or community as separate instruments. To measure length of living in a city or community I use the following question “How long have you lived in this city or local neighbourhood?” which is collected in six categorical formats: less than 6 month, 6 month to less than 1 year, 1 year to less than 3 years, 3 years to less than 5 years, 5 years to less than 10 years, 10 years and over. I record this variable into hierarchical yes/no response which takes value one if an individual lives in city or local community more than 10 years and zero otherwise. To measure religiosity I use the following question “Not counting events such as weddings or funerals, during the past 12 months, how often did you participate in religious activities or attend religious services or meetings?” which is collected in five categorical format: at least once a week, at least once a month, at least 3 times a year, once or

two twice a year and not at all. I record this variable into binary variable that takes value one if individual participate in religious activity at least once a week and zero otherwise.

Table 3.B3 reports the results when I use length of time living in city or local community as an instrument for being a volunteer. In this case, I find that volunteering increases the probability of reporting excellent/very good health by 16.8% points and decreases the probability of reporting good and fair/poor health status by 7.6% and 9.3% points respectively – a lower impact on excellent health, but in the ballpark of our main findings. However, I now find that volunteering has a positive and statistically significant impact on life satisfaction as well. The local average treatment effect from identifying volunteers through length of time in a neighbourhood is much higher than that which arises when we identify volunteers through access to charitable organizations.

Using religious participation as an instrument, being a volunteer increases the probability of reporting excellent/very good health status by 12.3% point and decreases the probability of reporting good and fair/poor health status by 5.7% and 6.6% points respectively (table 3.B4). Volunteering thus has a smaller impact on excellent health than was found with the other estimations, but it is still large and positive. Like with the length of time in a neighbourhood, identifying volunteers through religiosity has a positive and significant impact, now on life satisfaction.



**Table 3.B3: The causal effect of volunteering on the health and life satisfaction, alternative instrument, CMP approach**

Variable	Health			Life satisfaction		
	Model (19)			Model (20)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.168** (0.075)	-0.076** (0.030)	-0.093** (0.045)	0.169*** (0.046)	-0.139*** (0.035)	-0.030*** (0.011)
<b>Instrumental variables (first stage)</b>						
Live in city or community >10	0.041*** (0.005)			0.040*** (0.005)		
<b>The validity of instruments</b>						
Cragg-Donald Wald F statistics	152			147		
Endogeneity test (atanrho_12)	-0.187*** (0.000)			-0.241*** (0.000)		
<b>Number of observations</b>	109,720			109,720		

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the probability weight. 4- All the other control variables are suppressed for brevity.

**Table 3.B4: The causal effect of volunteering on the health and life satisfaction, alternative instrument, CMP approach**

Variable	Health			Life satisfaction		
	Model (21)			Model (22)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.123** (0.020)	-0.057** (0.001)	-0.066** (0.011)	0.180*** (0.017)	-0.148*** (0.013)	-0.033*** (0.004)
<b>Instrumental variables (first stage)</b>						
Frequent religious attendance	0.236*** (0.005)			0.234*** (0.005)		
<b>The validity of instruments</b>						
Cragg-Donald Wald F statistics	3,945			3,885		
Endogeneity test (atanhrho_12)	-0.109*** (0.000)			-0.275*** (0.000)		
<b>Number of observations</b>	109,720			109,720		

1-The asterisks \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the probability weight. 4- All the other control variables are suppressed for brevity.