

Determinants of Labour Union Membership in Canada:  
A Study Using Multivariate Regression Analysis of Individual Level Data from the  
Survey of Labour and Income Dynamics

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## Section 1: Introduction

Since 1975, labour union density has been gradually declining across Canada.<sup>1</sup> Previous research has shown that the rate of union membership decline varies across socio-economic and demographic backgrounds, as well as sector and industry of employment.<sup>2</sup> Using data from the Labour Force Survey, Survey of Union Membership and Labour Market Activity Survey Galarneau and Sohn show that membership rates have declined most notably for men, younger workers, and workers in industries such as manufacturing and oil and gas production.<sup>3</sup>

Though it has been declining, union membership has been argued to be beneficial not only to union members, but to the labour force as a whole.<sup>4</sup> Using data from Statistics Canada and the International Monetary Fund, Brennan found union density and average hourly earnings for Canadian workers to be tightly positively correlated, with a correlation coefficient of 0.85.<sup>5</sup> Brennan also found that union density and the adjusted national wage bill, which represents wages and salaries as a percentage of GDP, to be positively correlated, arguing that unions increase living standards for Canadian workers as a whole.<sup>6</sup> To understand why unionization rates are declining, I believe it is necessary to have an accurate understanding of which members of the labour force are currently participating in unions, and which variables increase or decrease their propensity to do so. The motivation for producing this paper is to contribute to the creation of such an understanding.

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<sup>1</sup> Jordan Brennan. "The Creation of a Shared Prosperity in Canada". Canadian Centre for Policy Alternatives, (2014). 10.

<sup>2</sup> Diane Galarneau and Thao Sohn. "Long-term Trends in Unionization". Statistics Canada, Insights on Canadian Society, (2013). 1.

<sup>3</sup> Galarneau and Sohn. Long-term Trends. 2.

<sup>4</sup> Brennan. Shared Prosperity. 12.

<sup>5</sup> Brennan. Shared Prosperity. 12.

<sup>6</sup> Brennan. Shared Prosperity. 11.

This paper will add to, and help bring together the results of previous literature analyzing the determinants of unionization rates, and to serve as a resource in understanding which Canadian workers are participating in unions and which are not. The primary research questions of this paper are: what determines union membership for workers in the Canadian labour force, and do unions in fact provide benefits to Canadian workers. Using data from the 2011 Survey of Labour and Income Dynamics (SLID) which provides recent and relevant individual level data this paper will examine the effects of the following on union membership:

- Industry of employment
- Sector of employment
- Education
- Full or part time employment status
- Age
- Sex
- Province of residence

I will also perform a simple Ordinary Least Squares (OLS) regression to help determine if union membership does provide benefits for Canadian workers by examining its impact on workers' wages. The data and methods used will be described in further detail in a later section.

The remainder of this report is organized as follows: Section 2 summarizes relevant literature on union membership, decline, and the benefits provided by unions. Section 3 describes the economic theory of union formation. Section 4 discusses current policies affecting union formation. Section 5 describes the methods used and the data from which this report draws on. Section 6 displays the results from the two regressions as well summary statistics. Section 7

concludes with a discussion of the results and how they relate to the previously presented literature, economic theory, and policies.

## **Section 2: Literature Review**

A large body of literature has examined the determinants of union membership, causes, rates, and variation in union membership decline as well as the benefits provided by unions. In the following section I will summarize a selection of these articles to help illuminate the broader context to which this paper seeks to contribute.

Galarneau and Sohn create a consistent time series from 1981 to 2012 by combining data from the Labour Force Survey, Labour Market Activity Survey, and Survey of Work History to analyze the decline in unionization rates in Canada over this period.<sup>7</sup> Their study shows the differences in the decline of union membership based on age, sex, province of residence, and industry of employment. While the overall unionization rate declined from 38% to 30% during this period, it did not decline equally for all workers, and some industries even saw slight increases.<sup>8</sup>

Galarneau and Sohn reported that rates dropped from 42% to 29% for men, with the biggest decline being among men aged 24 to 34. Overall rates for women remained relatively stable, although women younger than 45 saw their rates decline it was offset by growth in women 45 to

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<sup>7</sup> Galarneau and Sohn. Long-term Trends. 1.

<sup>8</sup> Galarneau and Sohn. Long-term Trends. 4.

64. From 1981 to 2012 unionization declined in all provinces, with the largest decline happening in British Columbia, 13 percentage points and New Brunswick 11 percentage points. Manitoba had the smallest decline, 3 percentage points.<sup>9</sup> While previous research asserts that the decline in unionization was explained by employment shifts from industries and occupations with traditionally high unionization rates such as manufacturing, to sectors with lower rates such as service, Galarneau and Sohn (2013) show that changes within industries account for much of the decline. Industries that saw the largest decline include: manufacturing, 7 percentage points, utilities, 5 percentage points, and mining, oil and gas with 5 percentage points. Conversely, within service producing industries some industries saw an increase in unionization rates, particularly for management and administrative positions which increased by 5 percentage points.<sup>10</sup>

Using representative individual level data from the first round of the European Social Survey in 2003, Schnabel and Wagner (2005) provide an empirical analysis of the determinants of unionization in 18 European Union countries. Using identical probit regression models for each country which consist of explanatory variables that include: personal characteristics such as age, sex, full or part time employment status, blue or white collar employment, level of education, attitudinal variables, and workplace characteristic variables such as firm size, they determined that many individual level variables have a significant impact on union membership.<sup>11</sup>

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<sup>9</sup> Galarneau and Sohn. Long-term Trends. 3.

<sup>10</sup> Galarneau and Sohn. Long-term Trends. 4.

<sup>11</sup> Schnabel and Wagner. Determinants of Union Membership. 18.

Despite vast social, political, traditional and historical differences across countries they found personal characteristics to play a significant role in determining union membership. In 10 of the 18 countries, men were found to be more likely to be members of unions.<sup>12</sup> Employee attitude towards unions was found to be the most widespread and significant variable in explaining union membership.<sup>13</sup> The size of the workplace was also found to be a significant contributor to determining union membership, with larger workplaces being more likely to be unionized.<sup>14</sup>

Using a sample of 9,417 Canadian workers from the 1989 Labour Market Activity Survey covering 16 different professional and management occupation groups, White provides an empirical analysis of the differences between professions in their propensity to unionize.<sup>15</sup> Using probit regression, White finds that which profession a worker is employed in has significant impact on their probability of union membership, with nurses, teachers, and social science employees having the highest propensity, and religion, management, and administrative positions having the lowest.<sup>16</sup> White also regressed the impact of education on union membership, and contrary to other studies, found only the high school graduate variable to be statistically significant in determining union membership.<sup>17</sup> Hypothesizing that increasing levels of education have a positive impact on union membership, I will provide my own analysis of the effect of education in a later section of this paper.

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<sup>12</sup> Schnabel and Wagner. Determinants of Union Membership. 19.

<sup>13</sup> Schnabel and Wagner. Determinants of Union Membership. 18.

<sup>14</sup> Schnabel and Wagner. Determinants of Union Membership. 18.

<sup>15</sup> Frank White. "Occupational Determinants of Professional Union Membership". *Industrial Relations*, (1994). 1.

<sup>16</sup> White. Occupational Determinants. 18.

<sup>17</sup> White. Occupational Determinants. 18.

Having discussed some of the literature on the determinants of unionization and the variation in unionization decline, the last portion of this section will discuss previous research on the benefits provided by unions.

Using data from Australia, Canada, Japan, Korea, Switzerland and the United States and unconditional quantile regression, Fournier and Koske show that with the exception of the United States, unionized workers in these countries earn more than their non-unionized counterparts.<sup>18</sup> He also shows that within unions income is more equally dispersed, and that higher union density reduces income inequality across the work force.<sup>19</sup>

According to Brennan, unions have been the primary institutional tool through which Canadian workers have enjoyed increasing wages tied to increasing productivity, and their decline has resulted in stagnating wages in spite of increasing productivity.<sup>20</sup> By compiling data into a time series from 1920 to 2010 Brennan shows there is a statistical relationship between union density, and the change of inflation-adjusted average wages with a correlation coefficient of 0.52.<sup>21</sup>

Similar to Fournier and Koske, Brennan argues that unionized workers earn higher wages than non-unionized workers, however he also argues that higher union density leads to higher wages

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<sup>18</sup> Jean-Marc Fournier and Isabell Koske. "Less Income Inequality and More Growth – Are they Compatible? Part 7. The Drivers of Labour Earnings Inequality – An Analysis Based on Conditional and Unconditional Quantile Regressions". OECD Publishing Economics Department, (2012). 25.

<sup>19</sup> Fournier and Koske. Less Income Inequality. 24.

<sup>20</sup> Brennan. Shared Prosperity. 7.

<sup>21</sup> Brennan. Shared Prosperity. 14.

for the entire labour force.<sup>22</sup> Brennan asserts that unions serve to raise social expectations for compensation and these effects ‘spillover’ into non-unionized workplaces. Using data from Statistics Canada Brennan creates a time series from 1920 to 2010 to plot the relationship between union density and the national wage bill, which equals all wages and salaries as a percentage of GDP.<sup>23</sup> He finds the two to be strongly positively correlated, with a statistically significant correlation coefficient of 0.78, showing that the more significant the presence of unions, the higher the average wage of all workers.<sup>24</sup>

In a later section of this paper I will perform my own regression attempting to capture the effects of union membership on wages. However, due to the limitations of the data and scope of this paper I will only seek to answer if being a union member contributes to increased income, rather than examine its effects on the labour force as a whole.

By examining the benefits and working conditions stipulated in union member contracts, as well as interviewing union members, Hagedorn et al argue that as well as monetary benefits, unions provide non-monetary benefits to their members.<sup>25</sup> Of unions whose contracts were examined, most were found to include retirement or pension plans, paid time off, and healthcare coverage.<sup>26</sup> They also show that union members are less likely to be exposed to hazardous or unsafe working conditions due to contracts that specifically outline employer’s responsibility to provide a safe

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<sup>22</sup> Brennan. Shared Prosperity. 11.

<sup>23</sup> Brennan. Shared Prosperity. 11.

<sup>24</sup> Brennan. Shared Prosperity. 12.

<sup>25</sup> Jenn Hagedorn, Claudia Paras, Howard Greenwich, Amy Gahopian. “The Role of Labor Unions in Creating Working Conditions That Promote Public Health”. American Journal of Public Health, (2016). 989.

<sup>26</sup> Hagedorn et al. The Role of Labor. 991.



working environment, as well as protections for employees who bring safety hazards to the attention of their supervisor.<sup>27</sup>

### **Section 3: Economic Theory of Union Membership**

Traditional economic theory often uses the framework of the supply and demand model to analyze the determinants of union formation.<sup>28</sup> Viewing union membership as a good, and workers as utility-maximizing individuals, this analysis finds demand for union membership to be based positively on its benefits and negatively on its costs.<sup>29</sup> Benefits to workers can be monetary or non-monetary, and costs include factors such as union dues. Demand is also positively correlated with the cost of substitutes for unions, and negatively correlated with availability of substitutes, such as social welfare benefits.<sup>30</sup> As with all suppliers, unions face budget constraints and therefore the supply of unions will be positively correlated with union revenues, and negatively correlated with costs such as organizing, providing services to members, and fixed costs.<sup>31</sup>

This form of analysis faces two significant challenges in explaining the determinants of union formation and membership. First, because many of the costs and benefit variables needed for supply and demand analysis are not directly measurable, empirical studies must use proxy

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<sup>27</sup> Hagedorn et al. *The Role of Labor*. 993.

<sup>28</sup> Schnabel and Wagner. *Determinants of Union Membership*. 5.

<sup>29</sup> Schnabel and Wagner. *Determinants of Union Membership*. 6.

<sup>30</sup> Schnabel and Wagner. *Determinants of Union Membership*. 6.

<sup>31</sup> Schnabel and Wagner. *Determinants of Union Membership*. 6.

variables, which makes it difficult to determine their exact effects.<sup>32</sup> For example benefits such as grievance procedures and member influence over the labour process are difficult to value, and directly measureable variables like union density must be used as proxies for difficult to measure costs to unions.

Second, a supply and demand analysis excludes important challenges to union formation including the free-rider problem and social influences. The free-rider problem occurs in workplaces where unions provide their services to members and non-members alike, providing an incentive for workers to remain outside of the union to avoid paying fees while still receiving the benefits.<sup>33</sup> It also fails to capture the social pressures that influence union membership, such as worker frustration over lack of control in the work place, and pressure from fellow employees to either unionize or remain unionized.<sup>34</sup>

## **Section 4: Policy Review**

In Canada, a workplace can be unionized through one of two methods: a secret ballot vote, or automatic card-check certification.<sup>35</sup> In the secret ballot method, a union must present the labour board with a prescribed percentage of signed union cards, which ranges from 35% in Quebec to over 50% in Newfoundland, to trigger a vote.<sup>36</sup> Once the cards have been received, the employer

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<sup>32</sup> Schnabel and Wagner. Determinants of Union Membership. 6.

<sup>33</sup> Schnabel and Wagner. Determinants of Union Membership. 7.

<sup>34</sup> Schnabel and Wagner. Determinants of Union Membership. 7.

<sup>35</sup> Colin Craig. "Policy Brief: A Closer Look at Secret Ballot Union Certification Votes". The Manning Centre, (2016). 2.

<sup>36</sup> Craig. Policy Brief. 2.

is informed and a vote is administered among the employees by neutral government officials. In provinces with automatic card-check certification, if a union can provide the labour board with a certain percentage of signed union cards the workplace becomes automatically unionized, without a vote.<sup>37</sup> However this threshold is generally higher than that required to trigger a secret ballot vote, for example before a legislative change removing automatic card-check in Manitoba the threshold was 65%.<sup>38</sup>

The two different methods have shown to have significant impact on both certification attempts and success rates, with the secret ballot method reducing both, and automatic card-check increasing both.<sup>39</sup> In his 2004 study Riddell found that when secret ballot voting was introduced in British Columbia unionization success rates fell by 19%, and rebounded by nearly the same amount when it was replaced with automatic card-check.<sup>40</sup> The study also showed that the five provinces with automatic card-check had an average unionization rate of 35% compared to 31% for those with secret ballot.<sup>41</sup>

Another policy aspect affecting union formation success rates and density is the existence of mandatory dues. In the United States employees at unionized workplaces are not required to pay union dues unless they are used for activities directly related to representing the employee, and in

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<sup>37</sup> Amela Karabegovic, Niels Veldhuis, Jason Clemens. "Explaining Canada's High Unionization Rates". The Fraser Forum, (2005). 1.

<sup>38</sup> Mark Hudson. "Bill 7: Unfavourable for Manitoban Workers". Canadian Centre for Policy Alternatives, (2016). 1.

<sup>39</sup> Karabegovic. Explaining Canada's High Rates. 28.

<sup>40</sup> Karabegovic. Explaining Canada's High Rates. 28.

<sup>41</sup> Karabegovic. Explaining Canada's High Rates. 28.

the 22 “Right-to-Work” states mandatory dues are completely prohibited.<sup>42</sup> However, in Canada all provinces allow unions to collect mandatory dues from all employees at a unionized work place. This has shown to increase union formation success rates and density as it serves to eliminate the previously mentioned free-rider problem, allowing unions to generate the funds needed to sustain them.

Having now discussed the economic theory of union membership as well as the effect of legislative policies on union formation and membership, the following section will describe the data and methods used to create my analysis of the individual level determinants of union membership.

## **Section 5: Methods & Data**

This analysis uses public-use microdata files from the 2011 Survey of Labour and Income Dynamics (SLID) which is a cross-sectional survey gathering information on income, labour, and family variables from Canadian citizens.<sup>43</sup> The SLID began in 1993 and covers the 10 Canadian provinces, excluding Indian reserves, residents of institutions and military barracks. Initially proposed as a longitudinal survey with a focus on labour, income and the relationships between them and family composition, the SLID was then redesigned to be a source of cross-sectional household income data.<sup>44</sup> The SLID compliments other labour market activity surveys by including the changes experienced by individuals over time. The SLID uses computer-

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<sup>42</sup> Karabegovic. Explaining Canada’s High Rates. 29.

<sup>43</sup> “Survey of Labour and Income Dynamics, 2001 [Canada]”. Statistics Canada, (2015). 4.

<sup>44</sup> Survey of Labour. 4.

assisted telephone interviewing to collect data from respondents with the objective of understanding the economic well-being of Canadians by recording the economic shifts individuals and families go through, how they vary with changes in their work, family makeup, and other factors such as the receipt of government transfers.<sup>45</sup>

The SLID data is used to estimate two regression models using STATA. First, a Probit regression explaining the determinants of individual union membership, and second an Ordinary Least Squares (OLS) regression to explain the effect of union membership on income. The explanatory variables chosen were inspired by the previous literature discussed in the literature review, and their individual significance will be described in the following.

The explanatory variables used in the probit regression are as follows. The dependent variable is '*union*' which is a dummy variable equal to one if the respondent is a member of a union, and zero if not. To control for possible provincial differences, dummy variables are created for each of the 10 provinces in which respondents may reside; *NF*, *PEI*, *NS*, *NB*, *QB*, *ON*, *MB*, *SK*, *AB*, and *BC*. *MB* is used as the base, and is therefore excluded from the regression to avoid collinearity. To control for possible differences between sexes, the dummy variable '*female*' is included, which equals one if the subject is female, and zero otherwise. To control for the effects of age, a continuous variable '*age*' which measures respondents' age is included. To control for the effects of full or part-time employment, a dummy variable '*fulltime*' is included, which equals one if the subject is a full-time employee, and zero otherwise. To control for the effects

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<sup>45</sup> Survey of Labour. 4.

of education, 3 dummy variables are used. '*nohs*' is the base variable and is equal to one if the respondents highest level of education is less than high school, and zero otherwise. '*yeshs*' is equal to one if the respondents highest level of education is high school, and zero otherwise. '*postsecondary*' is equal to one if the respondent has an education greater than high school, and zero otherwise. To control for the effects of public or private sector employment, a dummy variable '*public*' is included which is equal to one if the respondent is a public sector employee, and zero otherwise.

The largest number of explanatory variables is used to control for differences between industries of employment. Industry of employment is separated into 15 categories, for each of which a dummy variable is created where the variable is equal to one if the respondent is employed in that industry, and zero otherwise. Health care and social assistance employees are represented by the dummy variable '*hcsoc*', this is the base variable and is omitted from the regression. Agriculture employees are represented by '*agri*', forestry, fishing and mining by '*FFM*', utilities by '*utilities*', construction by '*construction*', manufacturing by '*manufacturing*', trades by '*trade*', transportation by '*transport*', financial sector by '*finance*', science and technology by '*scitech*', business by '*business*', education by '*education*', information, culture and recreation by '*infoculrec*', service by '*service*', and lastly public administration by '*pubadmin*'.

The probit regression is structured as follows:

$$\begin{aligned} \text{union}_i = & \beta_0 + \beta_1 \text{NF}_i + \beta_2 \text{PEI}_i + \beta_3 \text{NS}_i + \beta_4 \text{NB}_i + \beta_5 \text{QB}_i + \beta_6 \text{ON}_i + \beta_7 \text{SK}_i + \beta_8 \text{AB}_i + \beta_9 \text{BC}_i + \\ & \beta_{10} \text{female}_i + \beta_{11} \text{age}_i + \beta_{12} \text{public}_i + \beta_{13} \text{fulltime}_i + \beta_{14} \text{yeshs}_i + \beta_{15} \text{postsecondary}_i + \beta_{16} \text{agri}_i + \\ & \beta_{17} \text{trade}_i + \beta_{18} \text{manufacturing}_i + \beta_{19} \text{scitech}_i + \beta_{20} \text{finance}_i + \beta_{21} \text{transport}_i + \beta_{22} \text{FFM}_i + \end{aligned}$$

$$\beta_{23}\text{pubadmin}_i + \beta_{24}\text{service}_i + \beta_{25}\text{infoculrec}_i + \beta_{26}\text{education}_i + \beta_{27}\text{business}_i + \beta_{28}\text{utilities}_i + \beta_{29}\text{construction}_i + \varepsilon_i$$

For the OLS regression, the dependent variable is a continuous variable ‘*income*’ which represents respondents annual after tax income. The explanatory variable is a dummy variable ‘*union*’ which is equal to one if the respondent is a member of a union, and zero if not.

The OLS regression is structured as follows:

$$\text{income}_i = \beta_0 + \beta_1\text{union}_i + \varepsilon_i$$

## Section 6: Results

Table 1: Probit regression results; dependent variable: union membership

Variable	Coefficient	Standard Error
Province of residence (base is MB)		
NF	.287488	.01963
PEI	-.0968089***	.01894
NS	-.0718295***	.01565
NB	-.0720062***	.01512
QB	.0915836***	.01425
ON	-.0293849**	.0125
SK	-.0164409	.01604
AB	-.0886834***	.01318

BC	-.0168712	.015
Female (base is male)	-.0284696***	.00704
Age	.0019771***	.00024
Highest level of education (base is less than high school)		
High School Graduate	.0309776**	.01293
Post-Secondary Education	.0226489**	.01015
Full-Time Employee (base is part-time employee)	.052147***	.0086
Public Sector Employee (base is private sector)	.4660957***	.0106
Industry of Employment (base is healthcare and social assistance)		
Agriculture	-.2725129***	.00966
Trades	-.1555694***	.01014
Manufacturing	-.013619	.01359
Science + Technology	-.2554239***	.00827
Finance	-.2163375***	.00965
Transportation	.0422576**	.0175
Forestry, Fishing, Mining	-.0159697	.02012
Public Administration	.0199358	.02636
Service	-.2176572***	.01073
Information, culture, recreation	-.1073815***	.01335
Education	.0501835***	.01308
Business	-.1414006***	.01465
Utilities	-.0012264	.02788
Construction	-.0202619	.01504
R-Squared	0.2854	



Number of Observations	26,284	
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\*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

From Table 1 we see the following results:

Being a resident of NF increases the probability of union membership by 0.287488, however this result is not statistically significant. Being a resident of PEI decreases the probability of union membership by 0.0968089, significant at 1%. Being a resident of NS decreases the probability of union membership by 0.0718295, significant at 1%. Being a resident of NB decreases the probability of union membership by 0.0720062, significant at 1%. Being a resident of QB increases the probability of union membership by 0.0915836, significant at 1%. Being a resident of ON decreases the probability of union membership by 0.0293849, significant at 5%. Being a resident of SK decreases the probability of union membership by 0.0164409, however this result is not statistically significant. Being a resident of AB decreases the probability of union membership by 0.0886834, significant at 1%. Being a resident of BC decreases the probability of union membership by 0.0168712, however this result is not statistically significant.

Being female shows to reduce the probability of union membership by 0.0284696, significant at 1%. A 1 year increase in age is shown to increase the probability of union membership by 0.0019771%, significant at 1%. Being a high school graduate to increase the probability of union membership by 0.0309776%, significant at 5%. Having a post-secondary education to increase the probability of union membership by 0.0226489%, significant at 5%. Being a public sector employee increases the probability of union membership by 0.4660957%, significant at

1%. Being a full-time employee increases the probability of union membership by 0.052147%, significant at 1%.

The increased or decreased probability of union membership by industry of employment from the probit regression are as follows:

Agriculture: decreases the probability of union membership by 0.2725129%, significant at 1%.

Trades: decreases the probability of union membership by 0.1555694%, significant at 1%.

Manufacturing: decreases the probability of union membership by 0.0.13619%, however this result is not statistically significant.

Science and Technology: decreases the probability of union membership by 0.2554239%, significant at 1%.

Finance: decreases the probability of union membership by 0.2163375%, significant at 1%.

Transportation: increases the probability of union membership by 0.0422576%, significant at 5%.

Forestry, Fishing and Mining: decreases the probability of union membership by 0.0159697%, however this result is not statistically significant.

Public Administration: increases the probability of union membership by 0. 0199358%, however this result is not statistically significant.

Service: decreases the probability of union membership by 0.2176572%, significant at 1%.

Information, Culture and Recreation: decreases the probability of union membership by -0.1073815%, significant at 1%.

Education: increases the probability of union membership by 0.0501835%, significant at 1%.

Business: decreases the probability of union membership by -0.1414006%, significant at 1%.

Utilities: decreases the probability of union membership by -0.0012264%, however this result is not statistically significant.

Construction: decreases the probability of union membership by 0.0202619%, however this result is not statistically significant.

Table 2: Summary Statistics for Probit Regression

Variable	Percent of Sample
Union Member	33.50%
Female	50.67%
Female, Union Member	17.69%
Public Sector Employee	27.37%
Public Sector Employee, Union Member	20.73%
Full-Time Employee	81.60%
Full-Time Employee, Union Member	29.00%
High School Graduate	14.66%
High School Graduate, Union Member	4.12%
Post-Secondary Education	72.73%

Post-Secondary Education, Union Member	26.72%
Transportation Employee	4.29%
Transportation Employee, Union Member	0.02%
Manufacturing Employee	10.19%
Manufacturing Employee, Union Member	0.03%
Service Employee	10.15%
Service Employee, Union Member	0.01%

Table 3: OLS regression results; dependent variable: annual after tax income

Variable	Coefficient	Standard Error
Union Membership		
Union Member	10489.02***	372.1276
R-Squared	0.0282	
F-Statistic	794.49	
Number of Observations	27,354	

\*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

From Table 3 we see the following result:

Being a union member increases annual after tax income by \$10,489.02, significant at 1%.

Table 4: Summary Statistics for OLS Regression

Variable	Percent of sample
Union Member	33.34%
Not a Union Member	66.66%

## Section 7: Discussion

Having presented the results from the probit and OLS regressions as well as summary statistics, the final section of this paper will discuss the significance of those results as well as how they relate to previous literature, economic theory, and policies effecting union membership. I will also discuss some limitations of the data.

Firstly, the results from the OLS regression show us that union members earn \$10,489.02 more than non-unionized workers. The regression only has an R-Squared of 0.0282 and therefore there are, unsurprisingly, many other factors that affect income. Though the regression is limited, the result is consistent with that of Brennan's whose time series data shows that union density and wages are positively correlated.<sup>46</sup> This result provides evidence in answering one of the two primary research questions proposed in the introduction of this paper: do unions provide benefits for Canadian workers. The result lends weight to the argument that they do in fact provide benefits for workers, at least in the form of increased wages. To answer the second

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<sup>46</sup> Brennan. Shared Prosperity. 14.

primary research question; what determines union membership, I will discuss the results of the probit regression.

As previously mentioned in the policy review section, the method by which unions are formed, either a secret ballot vote or automatic card-check certification have a significant impact on the level of unionization with secret ballot vote decreasing rates, and automatic certification increasing rates.<sup>47</sup> As union certification is provincially legislated, we would expect the results from the probit regression done in this paper to show a higher probability of union membership in the provinces that allow automatic certification; Manitoba, Quebec, Prince Edward Island, and New Brunswick. Note that though I previously mentioned automatic certification has been removed in Manitoba, at the time the SLID data was collected, automatic certification was still possible in the province. Manitoba is used as the base in the regression, and therefore all results are in relation to it. From the regression we see that Quebec is the only province with a statistically significant higher probability of unionization, 0.0915836. All of the provinces in which automatic card check is not allowed and the results are statistically significant; NS, ON, AB, and BC, show a negative probability of respondents being union members compared to Manitoba. This is consistent with previous data showing that policies governing union formation have significant impact on unionization rates.

When looking at the probit results on the effects of sex and age in determining union membership, we find women are less likely to be members than men, -0.0284696, while being

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<sup>47</sup> Craig. Policy Brief. 2.

older increases the odds of union membership by 0.0019771 per year of age. These results are fairly consistent with those of other studies previously discussed. From the summary statistics provided in Table 2 we see that 50.57% of the SLID respondents were women, and therefore deviation of results from previous literature is unlikely to be the result of one sex being more highly represented in the data, as both sexes make up a near identical proportion of the data. Galarneau and Sohn show that in Canada in 2012 28.5% of men were union members compared to 31.3% of women, while Schnabel and Wagner found that in 10 of 18 European Union countries, men were more likely to be members of unions. So while the results of this paper show women are less likely to be members of unions, consistent with Schnabel and Wagner's results but not with Galarneau and Sohn's, in all three studies the differences in probability of union membership between sexes is relatively small. Galarneau and Sohn also show that older workers are more likely to be members of unions, consistent with the results of this study.<sup>48</sup>

From the probit regression results we can see the single strongest determinant of union membership is being a public sector employee, with a coefficient of 0.4660957. This is not surprising as according to Statistics Canada 71.3% of public sector employees were union members, compared to only 15.2% of private sector employees.<sup>49</sup>

In the introduction of this paper, I hypothesized that increasing levels of education would increase the probability of union membership. While the results show that both high school graduates and those with post-secondary education are indeed more likely to be members of

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<sup>48</sup> Galarneau and Sohn. Long-term Trends. 2.

<sup>49</sup> Staff Writer. "Unionization Rates Falling". Statistics Canada, (2017).

unions than those with less than a high school education, we see that high school graduates have a higher probability of union membership than those with post-secondary education, with coefficients of 0.039776 and 0.0226489 respectively. This is consistent with White's results, who found only high school graduation to be statistically significant in effecting union membership.<sup>50</sup>

When looking at the effect of full or part-time employment, the results show full-time employees are more likely to be members of unions, with a coefficient of 0.052147. Tannock and Flocks assert that a large proportion of part-time employees are young, often students, and may be working on short term contracts or jobs with high turnover rates.<sup>51</sup> They argue that these workers are often less aware of the benefits unionization could provide them, and due to the unstable nature of their employment are more difficult to organize into unions.<sup>52</sup> The results of this study are then consistent with the assertions made by Tannock and Flocks.

When looking at the effects of industry of employment, we see that workers employed in transportation and education have the highest probabilities of union membership, with respective coefficients of 0.0422576 and 0.0501835. Of the thirty largest unions in Canada, five are teachers unions and two are transportation unions.<sup>53</sup> The two largest unions in Canada, the Canadian Union of Public Workers and the National Union of Public and General Workers, also

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<sup>50</sup> White. Occupational Determinants. 18.

<sup>51</sup> Stuart Tannock and Sara Flocks. "I Know What It's Like to Struggle: The Working Lives of Young Students in an Urban Community College". *Labor Studies Journal*, (2003). 2.

<sup>52</sup> Tannock and Flocks. I Know What It's Like. 22.

<sup>53</sup> Staff Writer. "Labour Organizations in Canada". Government of Canada, (2016).



include teachers and transportation workers among their members.<sup>54</sup> In 2012 transportation workers had a unionization rate of 40.5%, and education employees 68%, both being significantly higher than the average of 29.9%.<sup>55</sup> When looking at the least represented industries, in 2012, agriculture was the industry with the lowest union density in Canada, just 3.6%.<sup>56</sup> From the probit regression, we can see that of SLID respondents agriculture workers had the lowest probability of union membership, with a coefficient of -0.2725129. Therefore we can see that the results from this study closely align with the rates of unionization throughout different industries.

Though the regressions presented in this study help identify determinants of union membership, the use of only individual level data does result in a limited explanation. As discussed in the theory section, workers demand for unions is partially determined by the benefits unions provide them such as increased wages, grievance procedures, and influence over the labour process. Supply of unions can be partially determined by their ability to generate revenues as well as the costs they face. Revenues are positively related to supply, and costs negatively. As shown in the policy review section, legislation affecting the manner in which union formation occurs, and the laws governing the collection of union dues also have a significant impact on unionization rates. Generating a complete explanation of the determinants of union formation would require the inclusion of these factors as well as others, however this data is beyond what is provided in the SLID.

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<sup>54</sup> Staff Writer. "Labour Organizations in Canada". Government of Canada, (2016).

<sup>55</sup> Galarneau and Sohn. Long-term Trends. 4.

<sup>56</sup> Galarneau and Sohn. Long-term Trends. 4.

Overall, the results from the probit and OLS regressions done here are consistent with those of the previous literature presented. Hopefully, by affirming these results, this study will help contribute to an accurate understanding of which members of the labour force are currently participating in unions, and which are not. I believe this understanding is an essential component in explaining why Canada has had continuously declining unionization rates, despite the benefits they have shown to provide workers.

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