

Potential Self-Employment Earnings And Selection Effects in Canada

by

Andrew J. Dyck

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Abstract

There is conflicting evidence regarding the effect that a strong self-employment sector has for a nation's economic performance. However, the self-employed continue to be of great interest to researchers. This paper extends the work of Bernhardt (1993) who analyzed potential earnings for the self-employed among a cross-section of white Canadian males. Results from this longitudinal study of Canadians suggest that self-employment earnings relative to paid-employment earnings and wealth controls are significant in explaining the self-employment decision. These results are then compared to several different sub-samples of the Canadian population based on sex and education. Results are fairly consistent across subsets of the population in the structural equation, however, the effect of education reveals that subsets of the population may view self-employment differently. I find that the influence of potential earnings on the probability of becoming self-employed differs significantly between university and non-university educated individuals.

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1 Introduction

There are many indications from the literature on self-employment that those individuals choosing this labour activity have higher job satisfaction (Andersson, 2008; Blanchflower and Oswald, 1998) and they are less likely to report their work as mentally straining (Andersson, 2008) despite working longer hours than workers in paid-employment (Blanchflower and Oswald, 2004). This is a likely explanation why roughly seventy percent of Americans report that they would like to work for themselves (ISSP, 2005). Although these survey results point to a great desire for workers to become self-employed, the rate of self-employment in Canada has remained between 12 and 17 percent indicating that there is a large number of Canadian workers who could increase their personal well-being but, for whatever reason, do not. There is also some indication that a strong self-employment sector can promote economic progress (Carree and Thurik, 2003). The purpose of this paper is to investigate some of the determinants of self-employment at the micro level that may explain the apparent disparity between the desire to be self-employed and acting upon this desire.

The empirical model used in this paper is an extension of the earlier work on Canadian self-employment by Bernhardt (1993) who studies comparative advantage in self-employment in Canada using data collected in 1981. This work utilizes a statistical procedure proposed by Borjas and Bronars (1989) to calculate the potential income of workers in paid-employment (self-employment) had they chosen to work in self-employment (paid work). Borjas and Bronars (1989) find that the difference between an individual's actual and potential income, one's comparative advantage, has a significant effect on one's decision to be self-employed. While comparative advantage in paid work and self-employment is a factor in determining employment choice unobserved effects are also a significant factor. The aim of this paper is to search out some of these unobserved effects in a longitudinal analysis setting that may explain the individual characteristics of Canada's self-employed workers.

This paper is organized as follows. Section 2 of provides a brief summary of

previous literature concerning self-employment. Section 3 presents a description of the data and an econometric model used to study self-employment in Canada. We begin by estimating the potential income of workers in both self-employment and paid work and then use these results as part of a structural self-employment probit equation. A discussion of the results of this empirical model is follows in the fourth section and a fifth section concludes the paper.

2 Literature Review

It is likely that at one point or another many of us have wondered what it would be like to work for ourselves instead of selling our labour to someone else. It is not surprising then to find that a large portion of Canadian workers would choose self-employment over working for someone else if given that choice. For several years the International Social Survey Programme (ISSP) has asked such a question of people around the globe. The 2005 ISSP Work Orientations survey asks respondents the question: Suppose you were working and could choose between different kinds of jobs. Which of the following would you choose? a)being an employee or b)being self-employed. The results reveal that about 53 percent of Canadians would choose to be self-employed if given such a choice. International data from the same survey summarized in table 11 of appendix A show similar results for several nations around the world.

Table 1: International Self-Employment Desire Summary (ISSP)

	Percentage preferring to be:		Respondents
	Employed by Someone Else	Self-Employed	
Canada	46.66	53.34	808
USA	37.96	62.04	1499
Great Britain	54.84	45.16	775
Australia	48.05	51.95	1767
Mexico	21.27	78.73	1355

There are many that believe that entrepreneurship is indicative, and an integral

part, of a healthy economy. It is thought that small entrepreneurial firms are important to the economy because they are responsible for a great deal of innovation, market competition, product diversity, and growth in GDP. Carree and Thurik (2003) provide a summary of empirical results that support the importance of entrepreneurship in the macro economy. However, there is also a growing body of literature that suggests that the link between self-employment, a form of entrepreneurship, is tenuous at best. Among this literature are studies by Blanchflower and Freeman (1994) and Blanchflower and Shadforth (2007).

The attraction to research on self-employment is largely to provide insight into two questions discussed above. What effect, if any, does self-employment have for the macro performance of an economy and why is it that some individuals choose to be self-employed while others do not? The second question of who chooses self-employment is the main focus of this paper and has been a topic of interest to economists. To address this question in an empirical setting researchers often choose a discrete choice model of the form:

$$\begin{aligned}
 Y_i^* &= X_i\beta + u_i \\
 Y_i &= \begin{cases} 1 & \text{if } X_i\beta > u_i \\ 0 & \text{otherwise} \end{cases}
 \end{aligned}$$

where Y_i^* is a latent indicator variable and X_i is a matrix of variables explaining the likelihood of choosing self-employment. This explanatory matrix may include information concerning education, work experience, age, sex, immigrant status, and wealth. Previous results suggest that there is some consensus for several of these variables while others are more sensitive to changes in the model, variable definition, or dataset. Past results for some of the common components of X_i are summarized in the sections below.

Education

Economic intuition and theory suggest that one of the most important determinants of the self-employment choice is a worker's educational attainment. However, theory also suggests that the influence of this factor on self-employment may be ambiguous. A highly educated worker gains valuable human capital and can be better able to market these abilities than one with lower education. As found by Rees and Shah (1986), this serves to reduce the coefficient of variation on self-employment income and positively influence one's decision to become self-employed. Other studies finding a positive relationship between education and self-employment include: Borjas (1986) and Evans and Leighton (1989). However, a second effect of education exists and it tends to be negatively correlated with self-employment. This effect implies that a highly educated worker may be less likely to suffer through cyclical unemployment and find that their labour is in higher demand making it easier to find well-paying jobs. Borjas and Bronars (1989), Evans (1984), and Kidd (1993) find that this negative effect of higher education effect dominates the positive effects. It should be noted that results of these three studies can be sensitive to specification of educational categories, social groupings, and the method used to measure education.

Labour Experience

Results concerning work experience in the self-employment decision are found to be more consistent in the existing literature. The studies of Borjas (1986), Brock and Evans (1988), Rees and Shah (1986), Borjas and Bronars (1989), and Kidd (1993) all find that there is a positive relationship between total labour experience and self-employment. These authors present results that suggest increasing years of labour experience causes a positive selection into self-employment. The results, however, can change sign when dividing the sample into groups based on race or immigrant status as with Kidd (1993) who tested differences between English and non-English speaking workers.

Other Influences

Apart from the influence of education and experience on self-employment, authors have also attempted to estimate the effects of other socio-economic variables. These other influences often display the same lack of consensus as with education and work experience. For example, Blanchflower and Oswald (1990) find that the propensity for males to be self-employed is higher than for females, while de Wit (1993) finds the opposite to be true. A positive relationship between marriage and self-employment is found by Borjas (1986), Rees and Shah (1986), and Bernhardt (1993) but a negative relationship is found by de Wit (1993).

Many studies including that of Borjas and Bronars (1989) and Frenette (2004) focused on the role of self-employment for immigrants. For many immigrants, ethnic enclaves provide a familiar atmosphere that enables them to integrate into the host country. Chiswick and Miller (2005) find that immigrants who open businesses catering to their enclave can have lower incomes because they may not gain the English proficiency of those who do not reside within an enclave.

Structural Equations

There is often a fairly large gap between the incomes of paid workers and the self-employed. This difference will play an important role for those considering entering into self-employment. Therefore, a structural equation approach that considers this selection process is important in advancing our understanding of why one chooses self-employment. Unfortunately, relatively few authors have chosen to estimate a structural self-employment equation that accounts for the selection process. Bernhardt (1994) and Rees and Shah (1986) provide two studies among the few studies that attempt a structural equation methodology. The findings of these authors are far more sensitive to specification changes than reduced form studies but several results become clear from their analysis. Structural equation studies, for the most part, sup-

port the results of reduced-form models concerning education and work experience. Results concerning the selection coefficient into self-employment in Rees and Shah (1986) and de Wit and van Winden (1989) suggest that workers may be pushed into self-employment by factors in the labour market rather than pulled in by education or ability.

2.1 Longitudinal Studies

Longitudinal studies of self-employment allow the researcher to estimate the decision making process through time and capture some of the dynamics of what factors influence one becoming self-employed. The work of Bosma, de Wit, and Carree (2005) is one attempt to explain both self-employment entry and exit rates. The authors find that self-employment entry can be influenced by a wide array of factors and often displays similar results to cross-section studies. Other notable studies that use longitudinal data include Blau (1987), Bates (1990) and Blanchflower and Meyer (1994). These studies also present similar findings for education and work-experience as was found in cross-section approaches.

Longitudinal data allows the authors the opportunity to investigate issues that are not available in a cross-sectional study. For example, the element of time in a longitudinal dataset allows Bates (1990) to consider changes through time among a sample of American workers including movement in and out of self-employment. This author finds that survival in self-employment depends positively on self-employment experience and individual ability.

3 Data and Methodology

3.1 The Data

Data used in this study comes from Statistics Canada's Survey of Labour and Income Dynamics (SLID). Starting in 1993 this computer assisted telephone survey is conducted every year for a large sample of individuals aged 16 or older in roughly 20,000

households. Survey response is voluntary and each panel of respondents are followed for a period of six years. Starting in 1998 a new panel is introduced every three years so at any given time after this date there is an overlap of two panels.

The target population for the survey is all Canadians in the ten provinces excluding those residing in an institution or living on reservation land. Exclusion of these groups represents about three percent of the Canadian population and Statistics Canada estimates that this exclusion is negligible since the survey is successful in capturing roughly 85 percent of its target population.¹ This study uses the first four panels of the SLID which will cover the years 1996 - 2004.² For a panel-study such as that conducted here there are few resources that offer more accuracy or depth of information as the SLID.

In order to remove the effect of those new to the workforce and those preparing for retirement, individuals used in this study are restricted to those between the ages of 24 and 59. After removing agricultural and part-time workers (those working an average of less than 35 hours per week) there is a total sample size of just over 32,000 over the years 1996-2004 available for estimation. Prior to any estimation, the data is split into several samples used to compare and contrast results based on certain characteristics to that found using the full sample. Table 9 in appendix A summarizes information for these samples for the year 2000³.

The SLID dataset reveals, not surprisingly, that the number of workers that move into or out-of self-employment is fairly low. Figure 1 summarizes the flow of employment choices for full-time workers in the sample. Workers who are either paid employees or self-employed together represent between 67 and 75 percent of the sample, unemployed workers make up 2 to 5 percent of the sample, and about a quarter

¹Statistics Canada on-line SLID documentation found at <http://www.statcan.ca/>

²While some data is available for 1992-1995, this first cycle of the survey was slightly different than others complicating comparisons. Recently released data concerning the years 2005 and 2006 were not available at the time of study.

³The space required to include regression tables for all years of the study would fill many pages of an appendix. As such these tables have been omitted, however, interested parties may contact the author for further information.



Figure 1: Self-Employment Choices in Canada

of the sample is not in the labour force. The portion of people in self-employment remains fairly constant through time with a slight upward trend while the number of people in paid-employment displays a somewhat stronger upward trend. In fact, investigation of the SLID sample reveals that a high percentage (98 percent for paid work and 88 percent for self-employment) of workers remain in the same sector of employment during the time they were surveyed with just a handful of workers making the move in or out of self-employment.

Since there are often fixed costs to entering self-employment and usually higher uncertainty, one may think that self-employed workers would have average earnings that are higher than paid employees to compensate them for the added risk of self-employment. However, as we see in table 2 the opposite is true for workers in Canada during the time period studied here. Wage-earners report average annual earnings roughly \$6,000 higher than the self-employed over the eight-year period examined. This table indicates that, of the high portion of workers who report a desire for self-

Table 2: Mean Earnings by Employment Group

	Paid Workers	Self-Employed
1996	\$ 33,178.11	\$ 26,704.04
1997	\$ 34,065.65	\$ 27,097.18
1998	\$ 36,387.71	\$ 28,594.12
1999	\$ 36,675.65	\$ 29,033.73
2000	\$ 37,996.49	\$ 30,299.94
2001	\$ 39,109.07	\$ 33,154.72
2002	\$ 40,151.69	\$ 34,901.20
2003	\$ 41,419.04	\$ 34,432.15
2004	\$ 43,221.46	\$ 36,630.07

employment, those that choose self-employment may give up both higher earnings and stable incomes⁴ in exchange for higher job satisfaction reported by self-employed workers discussed earlier. The importance of earnings differences is expanded upon later in the paper in section 4 by comparing reported earnings relative to potential earnings.

So far I have discussed trends in employment choices among Canadian workers, however, since this study aims to capture some of the dynamics of a longitudinal sample, consideration of flows in and out of self-employment is also important. Table 3, what Blachflower and Meyer (1994) call the transition matrix, is constructed by transforming the data to focus on employment transitions from year-to-year. This table builds upon the numbers presented earlier regarding worker's reluctance to move from one employment choice to another and gives us a better understanding of flows into self-employment for full-time workers who are employed all year. For example, we see from this transition matrix that the number of workers choosing to enter into self-employment remains around 2 percent of all fully employed workers throughout the sample period.

⁴Rees and Shah (1986) indicate that the coefficient of variation on self-employment earnings can be as much as three times that of wage earners.

Table 3: Transitions Into Self-Employment (Percent of Sample)

Year	1994	1995	1996	1997	1998	1999
Self-Employed in Both Periods	13.22	10.48	10.24	12.2	17.81	19.51
Entered Into Self-Employment	2.80	2.08	1.88	1.98	2.60	1.97
Not Self-Employed in Either Period	83.98	87.44	87.88	85.82	79.6	78.52

Year	2000	2001	2002	2003	2004
Self-Employed in Both Periods	19.47	19.53	18.64	18.33	20.66
Entered Into Self-Employment	1.31	0.81	0.92	1.95	1.24
Not Self-Employed in Either Period	79.21	79.66	80.44	79.72	78.09

3.2 The Model

3.2.1 Reduced Form Equation

Following the work of Borjas and Bronars (1989) we will assume that worker incomes can be summarized by the following three equations.

$$\ln Y_{i,t}^s = Z_{i,t} \gamma^s + \epsilon_{i,t}^s \quad (1)$$

$$\ln Y_{i,t}^w = Z_{i,t} \gamma^w + \epsilon_{i,t}^w \quad (2)$$

$$\ln C_{i,t} = R_{i,t} \delta + \epsilon_{i,t}^c \quad (3)$$

The first two equations show the log of earnings in self-employment and paid work for individual i in time period t . The matrix Z appearing in equations (1) and (2) represents a set of factors explaining the log of earnings. We assume that workers may choose to become self-employed at any time, but in moving into self-employment there are some fixed costs C_i barring free entry which is shown in equation three. Factors affecting this reservation value are collected in R . Based on the above criteria workers

enter self-employment only when the following equation is true for individual i :

$$\begin{aligned}
Y_{i,t}^s - Y_{i,t}^w &> C_{i,t} \\
&\text{or} \\
\ln \frac{Y_{i,t}^s}{Y_{i,t}^w} &> \ln C_{i,t}
\end{aligned} \tag{4}$$

We can then combine equations one through four above to summarize the worker's employment choice as follows:

$$\begin{aligned}
R_{i,t}\delta + \epsilon_{i,t}^c &< Z_{i,t}\gamma^s + \epsilon_{i,t}^s - Z_{i,t}\gamma^w - \epsilon_{i,t}^w \\
R_{i,t}\delta + Z_{i,t}\gamma^w - Z_{i,t}\gamma^s &< \epsilon_{i,t}^s - \epsilon_{i,t}^w - \epsilon_{i,t}^c \\
R_{i,t}\delta + Z_{i,t}(\gamma^w - \gamma^s) &< \epsilon_{i,t}^s - \epsilon_{i,t}^w - \epsilon_{i,t}^c \\
X_{i,t}\beta &< \epsilon_{i,t}^0
\end{aligned} \tag{5}$$

where $X_{i,t} = [R_{i,t}, Z_{i,t}]$ and $\beta = [\delta, (\gamma^w - \gamma^s)]$. Finally, this implies the reduced form discrete choice equation for sectoral choice defined below:

$$\begin{aligned}
Y_{i,t}^* &= X_{i,t}\beta + u_i \\
Y_{i,t} &= \begin{cases} 1 & \text{if } X_{i,t}\beta > u_i \\ 0 & \text{otherwise} \end{cases}
\end{aligned} \tag{6}$$

3.2.2 Actual and Potential Earnings

Treating equation (6), the reduced form model, as a selection equation we can use this information to list equations describing a worker's expected income. We could estimate the income equations (1) and (2) above without consideration of the sample selection equation, however, this would cause the expected value of error terms $\epsilon_{i,t}^s$ and $\epsilon_{i,t}^w$ to be non-zero. The expected income for self-employed and paid workers are thus defined as:

$$E[\ln Y_{i,t}^s | X_{i,t}\beta > u_i] = Z_{i,t}\gamma^s - a_s \left(\frac{f_{i,t}}{F_{i,t}} \right) \tag{7}$$

$$E[\ln Y_{i,t}^w | X_{i,t}\beta < u_i] = Z_{i,t}\gamma^w + a_w \left(\frac{f_{i,t}}{1 - F_{i,t}} \right) \tag{8}$$

The fraction in equation (7) is what Heckman (1979) calls the inverse mills ratio, which is used to control for the aforementioned selection problems. The inverse mills ratio is constructed by using $f_i = f(X_i\beta)$ and $F_i = F(X_i\beta)$, which are the standard normal probability density function (PDF) and standard normal cumulative distribution function (CDF) evaluated at $X_i\beta$.

In addition to equations (7) and (8) which describe actual income conditional on sector choice we will also be interested in finding potential income in the sector not chosen. Again using information from reduced form estimates we are able to write the log of earnings in sectors not chosen by individual i at time t as:

$$E[\ln Y_{i,t}^s | X_{i,t}\beta < u_i] = Z_{i,t}\gamma^s + a_s \left(\frac{f_{i,t}}{1 - F_{i,t}} \right) \quad (9)$$

$$E[\ln Y_{i,t}^w | X_{i,t}\beta > u_i] = Z_{i,t}\gamma^w - a_w \left(\frac{f_{i,t}}{F_{i,t}} \right) \quad (10)$$

These equations describe the expected earnings that an individual could expect to earn in the sector they did not choose to work in given their personal characteristics summarized in $Z_{i,t}$ and $X_{i,t}$.

Equations (7) through (10) describing the conditional expected earnings of workers include subscripts both for individual i as well as year t . A non-parametric technique developed by Kyriazidou (1997) exists for estimation of panel-data sample selection models. However, in this paper we are interested in results obtained during the two-step procedure described by Heckman and Sedaleck (1990) and used by Borjas and Bronars (1989) and Bernhardt (1994). I will estimate the system using a series of cross-sections initially to generate a new relative earnings variable that will be used in a random effects structural equation. The series of cross-sectional equations estimated for each t of T years are:

Reduced Form Probit

$$Y_i = X_i\beta + u_i \quad (6')$$

Expected Earnings Conditional on Sector Chosen

$$E[\ln Y_i^s | X_i \beta > u_i] = Z_i \hat{\gamma}^s - a_s \left(\frac{\hat{f}_i}{\hat{F}_i} \right) \quad (7')$$

$$E[\ln Y_i^w | X_i \beta < u_i] = Z_i \hat{\gamma}^w + a_w \left(\frac{\hat{f}_i}{1 - \hat{F}_i} \right) \quad (8')$$

Expected Earnings Conditional on Sector Not Chosen

$$E[\ln Y_i^s | X_i \beta < u_i] = Z_i \hat{\gamma}^s + \hat{a}_s \left(\frac{\hat{f}_i}{1 - \hat{F}_i} \right) \quad (9')$$

$$E[\ln Y_i^w | X_i \beta < u_i] = Z_i \hat{\gamma}^w - \hat{a}_w \left(\frac{\hat{f}_i}{\hat{F}_i} \right) \quad (10')$$

Finally, the estimates from equations (7') through (8') are used to create a new relative earnings variable that tracks the difference between potential and actual earnings. This variable is defined as $\ln Y^s - \ln Y^w$ for all individuals. It is predicted that those choosing self-employment will have positive relative earnings while those choosing paid-employment will have a negative value for this variable. Augmenting the matrix of independent variables $X_{i,t}$ with the relative earnings variable we obtain a new matrix of regressors $V_{i,t}$. I then use this new matrix of regressors to estimate a structural probit equation that utilizes information from all years in the sample, hopefully capturing the dynamics present in a longitudinal sample. This equation is of the form:

$$Y_{i,t} = V_{i,t} \delta + \eta_{i,t} \quad (11)$$

4 Results

In the process of estimation described above the first results that are available for consideration are a set of coefficients from equation (6) describing worker selection effects. These results are summarized in table 4 for the year 2000 which includes survey respondents from cycles 2, 3, and 4.⁵ Five columns in the table separate the five sub-samples used for comparison throughout the analysis.

⁵In the interests of brevity, estimation results for the year 2000 is the only year of nine reported in the text. Results for all years can be obtained by contacting the author.

Table 4: Year 2000 Selection Effects

	(1)	(2)	(3)	(4)	(5)
	White Males	University	High School	Full Sample	Females
Years of School	0.001 (0.014)	0.042 (0.028)	-0.105 (0.118)	-0.009 (0.012)	-0.046 (0.022)**
Work Exp	-0.014 (0.024)	0.024 (0.041)	0.051 (0.041)	-0.002 (0.017)	0.007 (0.027)
Work Exp ²	0.062 (0.062)	-0.031 (0.121)	-0.124 (0.115)	0.038 (0.048)	0.011 (0.084)
University Education	-0.014 (0.128)			0.036 (0.098)	0.223 (0.168)
English Speaker	0.665 (0.211)***	0.062 (0.308)	-0.138 (0.323)	0.083 (0.164)	-0.179 (0.295)
Immigrant	0.138 (0.194)	-0.141 (0.296)	0.379 (0.29)	0.097 (0.14)	-0.161 (0.268)
Married	0.396 (0.101)***	0.565 (0.178)***	0.467 (0.178)***	0.328 (0.080)***	0.138 (0.129)
Investment Income	0.232 (0.026)***	0.274 (0.048)***	0.188 (0.050)***	0.169 (0.021)***	0.059 (0.034)*
Home Owner	0.196 (0.158)	-0.362 (0.229)	0.807 (0.316)**	0.118 (0.115)	0.137 (0.173)
Sex		0.161 (0.162)	0.23 (0.172)	0.333 (0.075)***	
Constant	-2.538 (0.595)***	-2.537 (0.894)***	-2.503 (1.371)*	-0.754 -0.836	-1.475 (0.534)***
Observations	2103	759	701	3866	1635
Chi ² :	137.7	79.15	43.29	133.81	22.42

Robust standard errors in parentheses

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

Removed from this table are results for a series of regressors controlling for health.

These results can be found in table 12 of appendix A

Estimation results from the selection equation present a number of expected results and some that are a little less expected. For example, the wealth controls suggested by Bernhardt (1994) and Borjas and Bronars (1989) take positive signs as expected. However, it is interesting to note that home ownership is only statistically significant in a handful of the regressions while investment income is significant throughout them all.

The result regarding home ownership suggests that, as has been presented in the previous literature above, home ownership can represent one's ability to raise the necessary funds to start a business. However, the lack of statistical significance in some of the analysis there are times when other influences dominate this effect. We now turn to an effect that is related to home ownership but shows greater influence on self-employment.

It seems an interesting proposition to suggest that investment income could be a better predictor of self-employment than home ownership. After all, being a home owner (short of sub-prime market distortions) indicates a certain level of economic self-sufficiency and stability. The message behind investment income is a little more difficult to decipher. It could suggest a high degree of risk loving behaviour or an aptitude for business matters, which would be consistent with choosing self-employment, or investment earnings could simply be another measure of income.

I reason that investment income and home ownership both belong in the selection equation as they capture two separate wealth effects. These two effects are seen best when comparing coefficients between samples. Consider the instance of home ownership in the sample of high school graduates. Here home ownership shows a stronger effect on self-employment than the other groups while investment income is less important for this group. University graduates have the opposite experience with regard to these two wealth controls. This is indicative, firstly of the differing self-employment experiences of university and high school graduates and second, that self-employment for those with a high school education are involved in starting busi-

nesses that rely greatly on sufficient startup funding. This later comment is especially important for the startup firms of university graduates, whose education puts them in a place to market skills that require less investment for startup.

In the second stage of the estimation results from the selection equation are used to compute selection consistent estimates for self- and paid-employment earnings. These coefficient estimates are summarized in table 6 for wage-earners and table 5 for the self-employed. The results presented are, again, for the year 2000 and separated into five columns based on the sub-sample used in estimation. The coefficients presented for this stage of estimation can be compared across sub-samples within each table or between the two tables to consider differences between wage-earners and the self-employed that may be present.

Results from the selection adjusted self-employment income equation presented in table 5 tell us an interesting story about the differences between sub-samples used in this study. For example, the effect of a university education has a much stronger effect on income for females than males. In fact, the effect on females is nearly double that of males indicating that, at the margin, a female worker has much more to gain from a university education than her male counterpart. This highlights an important relationship between gender, education, and income. Females have a high potential for earnings that can be leveraged by increasing their education. While this potential also exists for men it is much less pronounced than for their female counterparts.

The next story told by table 5 comes from the statistical insignificance of two tested effects and are interesting to bring to the reader's attention. The goals driving married individuals can be quite different than for those who are single. Although large coefficients on marriage in table 5 seem to support the idea that this variable is important, yet standard errors are too large to obtain statistically significant estimates. This same lack of relationship is found for those having English as their mother tongue. It appears that, *ceteris paribus* and among the self-employed, an unmarried non-native English speaker will earn just as much as a married English

Table 5: Year 2000 Self-Employment Income Effects

	(1)	(2)	(3)	(4)	(5)
	White Males	University	High School	Full Sample	Female
Years of School	0.049 (0.024)**	0.09 (0.042)**	-0.24 (0.153)	0.044 (0.019)**	0.02 (0.045)
Work Exp	0.016 (0.032)	-0.019 (0.059)	0.029 (0.051)	0.024 (0.022)	0.062 (0.038)*
Work Exp ²	-0.006 (0.078)	0.092 (0.19)	-0.074 (0.124)	-0.048 (0.06)	-0.188 (0.116)
University Degree	0.591 (0.222)***			0.645 (0.179)***	1.152 (0.342)***
English Speaker	0.122 (0.346)	-0.059 (0.254)	-0.032 (0.439)	-0.012 (0.18)	-0.198 (0.232)
Married	0.212 (0.187)	0.591 (0.415)	0.183 (0.23)	0.209 (0.147)	0.232 (0.25)
Sex		-0.135 (0.299)	0.652 (0.277)**	0.411 (0.131)***	
Immigrant	-0.195 (0.258)	-0.557 (0.312)*	-0.489 (0.426)	-0.218 (0.175)	-0.149 (0.247)
$-\frac{f(X\beta)}{F(X\beta)}$	0.05 (0.167)	0.332 (0.263)	0.32 (0.289)	0.044 (0.185)	-0.593 (0.543)
Constant	9.127 (0.720)***	9.55 (1.295)***	12.802 (2.135)***	8.951 (0.557)***	8.023 (1.034)***
Observations	335	92	84	475	117
Adjusted R-squared	0.13	0.10	0.23	0.20	0.25

Robust standard errors in parentheses

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

speaker.

Some of the significant effects mentioned above for the self-employed are shown to be absent for wage earners as seen in table 6. These differences may be explained, at least in part, by the nature of earnings between these two groups. Referring back to table 2 we are reminded that average earnings for paid workers are higher than for the self-employed. Furthermore, as Rees and Shah (1986) note for a sample of United Kingdom workers, the coefficient of variation on self-employment income can be as much as thrice that of wage earners.

Table 6: Year 2000 Wage-Earner Income Effects

	(1)	(2)	(3)	(4)	(5)
	White Males	University	High School	Full Sample	Females
Years of School	0.034 (0.005)***	0.00 (0.01)	0.086 (0.027)***	0.043 (0.004)***	0.062 (0.007)***
Work Exp	0.057 (0.007)***	0.068 (0.011)***	0.027 (0.013)**	0.055 (0.005)***	0.05 (0.008)***
Work Exp ²	-0.121 (0.020)***	-0.154 (0.034)***	-0.026 (0.034)	-0.108 (0.015)***	-0.086 (0.024)***
University Degree	0.244 (0.049)***			0.278 (0.033)***	0.257 (0.048)***
English Speaker	-0.052 (0.062)	0.03 (0.089)	-0.002 (0.107)	0.026 (0.041)	0.08 (0.057)
Married	0.093 (0.038)**	-0.092 (0.07)	0.02 (0.052)	-0.026 (0.029)	-0.084 (0.044)*
Sex		0.209 (0.048)***	0.278 (0.050)***	0.22 (0.024)***	
Immigrant	0.138 (0.065)**	0.078 (0.094)	-0.032 (0.096)	0.028 (0.039)	0.046 (0.058)
$-\frac{f(X\beta)}{1-F(X\beta)}$	0.333 (0.140)**	0.414 (0.196)**	0.174 (0.155)	0.593 (0.139)***	1.254 (0.425)***
Constant	9.604 (0.118)***	10.228 (0.197)***	8.906 (0.347)***	9.155 (0.087)***	8.763 (0.160)***
Observations	1740	664	604	3345	1503
Adjusted R ²	0.25	0.23	0.21	0.34	0.34

Robust standard errors in parentheses

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

Unlike the self-employed, the incomes of wage earners, when controlled for selection effects by including the regressor $\frac{f(X\beta)}{1-F(X\beta)}$, are affected by work experience. This is not a revolutionary finding, however, recalling that work-experience is not a predictor of self-employment income leads one to reconsider the reasons why work experience is thought of as having a positive affect on earnings. Work experience influences income by signalling to potential employers that a given worker has demonstrated skills and ability in a given area. However, if work experience is considered a proxy for skills obtained during employment it should be significant for both groups of workers. Since it is not significant for the self-employed I suggest that this link may not be as strong among certain subsets of the population, namely the self-employed. Further evidence that the self-employed may be pushed into self-employment when they feel that the value of their marginal product cannot be represented by the experience based pay grades common to paid-employment.

Another key difference between the earnings equation for self- and paid-employment comes from the effect of marriage on earnings. Table 6 shows us that married workers enjoy higher earnings than their single counterparts in samples restricted by sex. The signs on these coefficients in columns (1) and (5) of table 6 are what we would expect and this is worth noting to remind the reader that these effects are not present within the earnings equation for self-employed workers.

The final stage of estimation in this study is to estimate the structural regression equation (11) using a random effects probit procedure. This method combines results of the previous stages of estimation by including the relative earnings variable as a regressor. In this case relative earnings is defined as the difference between self- and paid-employment earnings, whether actual or predicted, for an individual. Information on relative earnings for the five samples of interest to this paper are summarized in table 7. On average, Canadians make employment choices according to their ability in a given sector of employment. For example, in the full sample column of table 7 relative wages are generally positive for the self-employed and negative for those

Table 7: Self-Employed and Paid Worker Relative Earnings at Group Means

Year	Employment	Full Sample	Females	White Males	University	High School
1996	Paid Workers	-0.098	-0.318	-0.146	1.152	0.717
	Self-Employed	-0.027	-0.120	-0.150	-0.044	-0.430
1997	Paid Workers	0.169	0.413	-0.032	0.216	-0.664
	Self-Employed	-0.216	-0.313	-0.312	0.205	-0.139
1998	Paid Workers	-0.234	-0.556	-0.281	0.929	-0.187
	Self-Employed	0.093	-0.693	-0.130	0.614	-0.330
1999	Paid Workers	-0.124	-0.075	-0.230	0.374	-0.623
	Self-Employed	0.097	-0.441	0.106	0.767	-0.356
2000	Paid Workers	-0.127	-1.391	-0.191	0.581	0.186
	Self-Employed	0.798	2.028	0.261	0.731	-0.067
2001	Paid Workers	-0.186	-0.210	-0.295	0.716	0.161
	Self-Employed	0.320	0.137	0.376	1.383	0.000
2002	Paid Workers	0.070	-0.076	-0.018	0.029	0.197
	Self-Employed	0.133	-0.192	0.084	0.985	0.153
2003	Paid Workers	0.112	2.064	-0.236	0.156	1.172
	Self-Employed	0.045	0.314	0.086	0.690	0.091
2004	Paid Workers	0.396	0.803	0.115	0.624	0.847
	Self-Employed	0.362	0.701	0.344	0.713	-0.075

Relative Earnings is the difference between actual and potential earnings calculated as self-employment minus paid-employment earnings

in paid-employment. This relationship breaks down in the Female and High-School sub-samples where table 7 shows that relative earnings show a bias towards paid employment.

The importance of relative earnings in predicting self-employment decisions is expanded upon in the presentation of estimation results from a longitudinal structural probit described in equation (11) using random effects in table 8. Not surprisingly a highly significant positive predictor of self-employment is the relative earnings of an individual. Indeed workers are able to identify their own skills and weaknesses and choose either self- or paid-employment accordingly.

The above is true except for workers in the sample restricted to university graduates. It is difficult to explain this phenomenon, however, there are several reasons why we might expect relative earnings to be negatively correlated with self-employment in a sample of university graduates. For example, some may be unwilling to accept

Table 8: Structural Probit Regressions

	(1)	(2)	(3)	(4)	(5)
	Females	White Males	High School	University	Full Sample
Education	0.004 (0.016)	-0.009 (0.016)	0.070 (0.047)	0.110 (0.213)	-0.003 (0.014)
Work Experience	0.029 (0.023)	0.050 (0.024)**	0.063 (0.060)	0.093 (0.061)	0.032 (0.021)
Work Experience ²	-0.090 (0.068)	-0.073 (0.067)	-0.121 (0.189)	-0.190 (0.163)	-0.034 (0.058)
Relative Earnings	0.079 (0.034)**	0.470 (0.053)***	0.334 (0.091)***	-0.370 (0.103)***	0.543 (0.057)***
Immigrant	0.076 (0.171)	0.089 (0.219)	0.097 (0.398)	0.572 (0.450)	0.155 (0.183)
Home Owner	0.484 (0.141)***	0.209 (0.135)	0.428 (0.279)	0.510 (0.357)	0.308 (0.122)**
English Speaker	-0.170 (0.176)	0.272 (0.220)	-0.194 (0.393)	0.032 (0.441)	-0.011 (0.190)
Investment Income	0.186 (0.027)***	0.227 (0.029)***	0.285 (0.051)***	0.336 (0.068)***	0.226 (0.023)***
Sex			0.783 (0.255)***	0.970 (0.285)***	0.799 (0.103)***
Constant	-7.885 (0.368)***	-8.650 (0.428)***	-13.127 (1.120)***	-15.331 (2.723)***	-13.219 (0.367)***
Observations	13802	17471	6945	5592	32350
Individuals	6530	7757	3071	2570	14783
Chi ² :	70.03	134.18	62.07	47.95	277.36

Standard Errors in Parentheses

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

certain types of work once they get their degrees even though it may pay them better. This would be particularly true of those who attain their PhD degree. These individuals may be willing to accept a teaching position that does not pay them as well as work outside of academia in exchange for what they deem to be a preferable lifestyle.

An individual's wealth is significant in predicting self-employment, however, it is investment income rather than home ownership that has the greatest effect. One explanation for the significance of wealth controls in predicting self-employment is that starting a business can require large initial outlays of investment. Home ownership can help individuals get access to the startup funds they require as it can be used as collateral on bank loans for their business. It is also possible that success early on in one's life allows them the financial resources to purchase a home and this success is what is captured in the home-ownership category.

However, the structural regression results suggest that this wealth effect is dominated by the investment income effect in all but one sample. Investment income is included as a wealth control along with home ownership since it captures a slightly different wealth effect. Rather than signalling one's financial ability to start a business as with home ownership, investment income can be indicative of an individual's risk taking propensity – something that the self-employed often need in great quantities.

5 Conclusion

We have seen that roughly half of Canadians express some desire to work for themselves when asked by the International Social Survey Programme. However, we have also seen that only about 17 percent of Canadian workers can be counted as self-employed. This raises the question of why more Canadians do not open their own businesses and enjoy the higher job satisfaction of self-employed workers reported by Anderson (2008).

This study extends the work of Bernhardt (1994) using a longitudinal two-step

methodology. My results confirm Bernhardt's result that wealth controls such as home ownership and investment income are significant in predicting whether Canadians choose self- or paid-employment. Furthermore, actual earnings relative to potential earnings are also a significant predictor of self-employment.

Bernhardt (1994) concludes his study on self-employment in Canada by discussing several areas for future study following his work. Firstly, Bernhardt suggests testing his model for subsets of the population to see if the general results hold up. My work shows that results are similar across five sub-sets of the Canadian population for many items of interest. When considering the effect of relative earnings on self-employment a peculiar result is found for university graduates. I suggest that one reason these workers are less likely to become self-employed even when their potential earnings indicate they should is due to one's desire for certain lifestyles that are less concerned with wealth than quality of life.

A second suggestion proposed by Bernhardt is to consider testing his model using smaller samples where details about each individual and their personality are available for analysis. Unfortunately, at this time the availability of data hinders researchers from carrying out such analysis on Canadian workers. An application of the method outlined in this study using survey data that collects detailed personal preferences of individuals could provide even further insight into some of the determinants of self-employment not included in relative earnings, education, or work experience.

Furthermore, in this study the relative earnings variable was calculated for each year individually. Future researchers who develop a methodology that calculates relative earnings longitudinally could check the robustness of the findings of this paper. The combination of a highly detailed self-employment dataset with the above mentioned methodology enhancement should prove to be an area of particular interest for researchers who wish to promote our understanding of self-employment in Canada.

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A Figures and Tables

Table 9: Estimation Sample Details

Estimation Sample	Description
Full Sample	The basis for all samples used in this study. Includes all SLID respondents between 24 and 59 reporting an average work week greater than 35 hours.
Female	The full sample filtered to remove male workers
White-Males	To make this study comparable to that of Borjas and Bronars (1989) and Bernhardt (1994) the sample is restricted to male workers reporting their race as Caucasian.
High-School Graduates	Sample includes only those individuals who have obtained a high school education but no post-secondary.
University Graduates	Sample includes only those who have obtained a bachelor degree or higher.

Table 10: Canadian Labour Force in Self-Employment

	Female	White Males	University Graduates	High-School Graduates	Full Sample
1996	14.05%	18.63%	17.95%	14.88%	16.84%
1997	13.57%	17.30%	16.27%	14.01%	16.04%
1998	13.18%	16.78%	14.33%	14.23%	15.33%
1999	14.78%	17.92%	16.44%	15.94%	16.68%
2000	13.70%	17.17%	15.70%	15.52%	15.90%
2001	11.57%	15.57%	14.02%	13.45%	14.18%
2002	11.40%	15.78%	14.55%	13.65%	14.28%
2003	12.68%	17.88%	16.00%	15.77%	15.83%
2004	12.64%	18.30%	17.03%	15.51%	16.07%

Table 11: International Self-Employment Desire (ISSP)

	Percentage preferring to be:	
	Employed by Someone Else	Self-Employed
Australia	48.05	51.95
Bulgaria	47.71	52.29
Canada	46.66	53.34
Cyprus	55.08	44.92
Czech Republic	71.96	28.04
Denmark	70.33	29.67
Dominican Republic	26.09	73.91
East Germany	59.17	40.83
Finland	75.29	24.71
Flanders	71.6	28.4
France	61.45	38.55
Great Britain	54.84	45.16
Hungary	65.08	34.92
Ireland	53	47
Israel	55.45	44.55
Japan	65.27	34.73
Latvia	56.87	43.13
Mexico	21.27	78.73
New Zealand	46.03	53.97
Norway	71.31	28.69
Philippines	17.89	82.11
Portugal	48.38	51.62
Russia	52.07	47.93
Slovenia	51.6	48.4
South Africa	47.38	52.62
South Korea	34.54	65.46
Spain	69.46	30.54
Sweden	70.4	29.6
Switzerland	52.1	47.9
Taiwan	49.72	50.28
USA	37.96	62.04
West Germany	54.78	45.22

1. Data above is presented in the 2005 International Social Survey Programme available on-line at <http://www.issp.org/>

Table 12: Year 2000 Selection Effects (Health Status Coefficients)

	(1)	(2)	(3)	(4)	(5)
	White Males	University	High School	Full Sample	Females
Very Poor Health	-0.988 (0.431)**	-1.534 (0.576)***		-1.921 (0.785)**	0.343 (0.276)
Poor Health	-0.992 (0.429)**	-1.575 (0.579)***	-0.17 (0.2)	-2.014 (0.784)**	0.086 (0.281)
Some Health Problems	-0.97 (0.433)**	-1.576 (0.593)***	0.142 (0.212)	-1.976 (0.785)**	0.224 (0.285)
Good Health	-0.821 (0.488)*	-2.583 (0.727)***	-0.862 (0.377)**	-1.96 (0.802)**	
Very Good Health				-1.809 (0.887)**	
Excellent Health	1.029 (0.869)				
Observations	2103	759	701	3866	1635
Chi ² :	137.7	79.15	43.29	133.81	22.42

Robust standard errors in parentheses

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