sustainability

MDPI

Article

Self-Employment Dynamics of Immigrants and Natives: Individual-level Analysis for the Canadian Labour Market

Amjad Naveed [1], Nisar Ahmad [2,*], Rayhaneh Esmaeilzadeh [3] and Amber Naz [2]

[1] Department of Business Development and Technology (BTECH), Aarhus University, Herning 7400, Denmark; amjadnaveed9@yahoo.com or amjadn@btech.au.dk
[2] College of Economics and Political Science, Sultan Qaboos University, Muscat, Al-Khoud 123, Oman; ammi3212@gmail.com
[3] Ministry of Community and Social Services, Toronto, ON M3M 3A3, Canada; rayhaneh_e@yahoo.com
* Correspondence: nisar@squ.edu.om or nisar_ahmad72@yahoo.com

Received: 13 September 2019; Accepted: 22 October 2019; Published: 26 November 2019

Abstract: This paper analyses the dynamic transitions of self-employment in four states of the Canadian labour market (paid-employment, self-employment, unemployment, and being out of the labour force) by answering three core questions: (1) What are the determinants of the transitions into and out of the four labour market states? (2) Are the probabilities of transitions between immigrants and natives significantly different, and if so, are they due to entry–exit rate gaps between immigrants and natives? (3) What are the proportions of spurious and structural state dependence in the labour market states of immigrants and natives? Our analysis was based on longitudinal data from Canada's Survey of Labour and Income Dynamics (SLID) for males aged 25 to 55 for the period 1993 to 2004. Our results revealed that immigrants rather than natives are relatively more likely to be self-employed during the unemployment period. The findings also confirmed that males with positive investment income or wealth tended to be largely self-employed. From a policy perspective, the government provision of financial support towards self-employment positively benefits natives in seeking self-employment opportunities. Government policies to lessen labour market discrimination promotes the self-employment of immigrants.

Keywords: self-employment; immigrants and natives; entry and exit rate; longitudinal data; multinomial logit

JEL Classification: C33; C35; J18; J21

1. Introduction

The aim of this paper is to identify the main determinants of the transitions (in and out) of self-employed individuals into different labour market states in Canada. Specifically, this study seeks to analyse if entry–exit rate gaps are different between immigrants and natives. It focuses on the dynamic transitions of self-employed individuals by considering four different labour market states: paid-employment, self-employment, unemployment, and being out of the labour force. Using longitudinal data from Canada's Survey of Labour and Income Dynamics (SLID) for males aged 25 to 55 for the period 1993 to 2004, this paper investigates how unobserved individual heterogeneity, structural state dependence, and observable covariates affect individuals' propensities to stay in or out of the four labour market states.

Self-employment has been growing substantially in both Canada and the United States since 1979. The growth of total self-employment was much higher in Canada (around 75 per cent) than in the

United States (about 37 per cent) over the period 1979–1997. The self-employment rate has remained relatively constant (about 10 per cent) in the United States since the 1990s, but it has largely increased in Canada (14 to 18 per cent) as noted by [1]. Based on an empirical study by Kuhn and Schuetze [2], the growth rate of un-incorporated self-employment for Canadians aged 25 to 54, rose significantly from 6.8 per cent in 1982 to 9.5 per cent in 1998. The male self-employment rate increased from 8.1 per cent in 1982 to 11 per cent in 1998. For females, these figures were 5 and 7.8 per cent in 1982 and 1998, respectively. (Note: percent is written as per cent).

Recently, the Dribe and Nystedt [3] study on the self-employment of young and old individuals in the Canadian labour market revealed that younger workers of both genders and older females contributed to the decline of the self-employment rate, whereas the self-employment rate for older males remained almost unchanged A relationship between entrepreneurial learning for older unemployed individuals and the labour market is discussed by Kenny and Rossiter [4], whereas an empirical analysis between immigrants and natives for the Canadian labour market is comprehensively explained by Esmaeilzadeh, et al. [5]. Lechmann and Wunder [6] and Mundra and Uwaifo Oyelere [7] argued that it is essential to discuss the unobserved heterogeneity. This is due to individuals having multiple characteristics, such as, citizenship status, birthplace network, family size, savings, household income, and length of stay. Given its importance, this study controls for unobserved heterogeneity.

To the best of our knowledge, most of the previous studies related to self-employment did not examine the dynamic transition into and out of self-employment, nor did they control for the unobserved individual heterogeneity and endogenous initial conditions problem. This paper specifically examines the effects of both unobserved individual heterogeneity and observed structural persistence on the flow rate into and out of any of the four labour market states of self-employment, paid-employment, unemployment, and being out of the labour force, among Canadian males as a whole and separately for immigrants and natives. (The reasons to analyse only male members is that both male and female have heterogeneous behaviour regarding self-employment due to differences in family responsibilities and other unobserved factors. Therefore, pooling both together would again leave out the problem of unobserved heterogeneity, which creates more complications in an empirical setup. Additionally, the rate of self-employment for males is higher than for females (according to Statistics Canada, the self-employment of males is 62% and for females it is 38%). Therefore, it is more reasonable to analyse the males. However, a similar study could be conducted for self-employment for females.) As well, this research examines the effect of labour market conditions on the probabilities of being self-employed, paid-employed, unemployed, and out of the labour force.

In the context of the above discussion, the contribution of this paper is threefold: (1) What are the determinants of the transitions into and out of different states of labour market? (2) Are the probabilities of transitions significantly different between immigrants and natives, and if so, are they due to the differences in entry–exit rate gaps between immigrants and natives? (3) What are the proportions of spurious and structural state dependence in labour market states and how are they different between immigrants and natives? Based on the above questions, this paper also tries to draw a conclusion about how economic conditions improvements (or deterioration) affect the probability of being self-employed among immigrants and natives. Further, what are the policy implications of the form of structural and spurious state dependence to encourage (or discourage) self-employment? This study is going to discuss very relevant questions that are linked to the Canadian labour market, mainly how to promote self-employment in Canada among natives and immigrants.

The analysis in this paper is based on the data for male self-employment rate (aged 25 to 55) rather than women, who are less likely to be self-employed in Canada [1]. We calculated the percentage distribution of labour market outcomes in Canada as a whole and separately for immigrants and natives over the period 1993–2004. We compared and analysed observed and estimated transition matrices and confined our analysis to entry–exit rates into and out of any of the four states of self-employment, paid-employment, unemployment, and being out of the labour force.

Estimation results show that immigrants are more likely to be self-employed in times of high unemployment rates. All state dependence parameters are positive and statistically significant. Given the importance of male self-employment trends in Canada since the 1990s on labour market demands and employment patterns, the outcome of this research is a valuable resource that benefits policy-makers not only in Canada, but also in many other countries with similar labour market patterns.

The rest of the study is organized as follows. Section 2 reviews selected studies on self-employment and labour markets. Section 3 provides a discussion about structural and spurious state dependence. Section 4 describes the data and descriptive statistics. Section 5 presents an empirical specification of the dynamic model. Section 6 reports the empirical results, and Section 7 concludes.

2. Literature Review

This section provides the review from selected studies which are dealing with self-employment and labour market outcomes. For instance, Manser and Picot [8] examine self-employment rate separately for men and women and as a whole for different categories of age, education, occupation, and industry for the years of 1979, 1989, and 1996. Based on that study, men's self-employment rate was higher than women's for each category and each specific year.

A micro-level study by Carrasco [9] investigated the influence of individual characteristics and the business cycle on the probability of entry into self-employment and on self-employment duration for male workers for the Spanish labour market. Their results show that unemployment raises the probability of entering self-employment, but also increases the hazard of leaving self-employment, especially into unemployment. Fairlie [10] finds that racial differences in asset levels and likelihoods of having self-employed fathers are the main determinants of the gap in the entry rate in the labour market but not for the exit rate.

As seen, the pattern of the self-employment rate varied across all age and gender groups in the 1990s. The level and pattern of the self-employment rate also varied among immigrants and natives and changed from the 1980s to the 1990s. Male immigrants aged 20 to 59, who arrived in Canada in the 1990s, are more likely to be self-employed in unincorporated businesses than those who arrived in the 1980s, according to an empirical study by Frenette [11]. In 1981, around eight percent of male immigrant workers were self-employed. By 1996, this proportion had almost doubled to 14. The self-employment rate rose much faster among recent immigrant workers than among Canadian-born workers, even after accounting for differences in education, age, family composition, visible minority status, and geography. What factors explain such behaviors? Are there any significant explanatory variables affecting people's propensity to be self-employed (rather than to be paid-employed, unemployed, or out of the labour force), or is it primarily the product of some unobserved heterogeneity factors, each individual's background, their history of self-employment, or inertia? Lin, et al. [12] analysed the effect of individual characteristics (labour market experience and macroeconomic conditions) on the probability of moving into or out of self-employment for the Canadian labour market. Their results show that there is a significant impact of these attributes to labour market dynamics.

Storey [13] conducted a comprehensive literature review and identified that there is a strong link between entrepreneurial activities and unemployment. Concerning the self-employment of immigrants and natives, Ramachandran and Shah [14] showed that informational and financial networks usually created by entrepreneurs belong to minority or immigrants groups in Sub-Saharan Africa. Hiebert [15] also investigated the relationship between ethnic labour market segmentation and ethnic entrepreneurialism in Canada. Using census data their results show that there is a close link between the niches where immigrants and minorities find work and those where they become entrepreneurs. Moreover, immigrants have low rates of entrepreneurship, and on the other hand, those who are over-represented in niches tend to start their own businesses. It also confirms the importance of self-employment which benefits the entire labour market.

Henley [16] confirms that state dependence is an important influence on self-employment choice in the British labour market. Bradley [17] found that in the majority of cases, the effect of self-employment

is due in whole or substantial part to the earnings of professional specialists in the case of the USA. Wang [18] show that only production costs, capital cost, and the unemployment rate are significantly related to self-employment or new-firm formation.

Nakhaie, et al. [19] shows that visible minorities, particularly blacks, are the least likely to be self-employed in Canada when compared to Europeans. Particularly, the rate of self-employment for visible minorities is lowest in manufacturing and the primary sectors of the economy. On the other hand, few researchers analysed that it is not necessary that all types of entrepreneurial activities create jobs; however, it is all about the encouragement of high quality and high growth companies through policy measures (for detail, see Shane [20]).

Based on the UK's economy, Jones, et al. [21] explored the link between Indian self-employment and white-owned business and examined the factors behind the growing harmonisation of immigrant's community. Their findings suggest that there is a positive effect of self-employment on the labour market; therefore, facilitation from the government may have a more considerable positive impact on the labour market. A similar type of analysis was also explored on Danish and Canadian labour market by Ahmad, et al. [22] and Ahmad [23]. At a global level, Wang and Naveed [24] shows that social inclusion of immigrants is essential to reduce the income gap between native and immigrants. Vivarelli [25] presents microeconomic evidence from developed and developing countries and mainly show how entrepreneurship is related to observable and unobservable characteristics for both types of countries.

Dribe and Nystedt [3] shows that the rise and fall in self-employment were highly concentrated among unincorporated businesses and own-account self-employment. Based on this research, younger workers (aged 15 to 25) of both genders and older females (aged 55 and over) contributed to the decline, whereas the self-employment rate for older males hardly changed.

Recently, Lechmann and Wunder [6] found that persistence in solo self-employment, as well as transitions from solo self-employment to employer-ship, can largely be explained by observed and unobserved heterogeneity. Mundra and Uwaifo Oyelere [7] discovered that citizenship status, birthplace network, family size, savings, household income, and length of stay are significant for an immigrant's homeownership, which has a strong effect on male employment in Canada.

Few other recent studies have a particular focus on the relationship between an entrepreneur's experience in advanced technology, knowledge, innovation, and productivity, and employment growth (for details, see Amoroso, et al. [26], Audretsch, et al. [27], Aldieri and Vinci [28], Mitze, et al. [29], Naveed and Ahmad [30], Ahmad, et al. [31]). Baumol [32] proposed that entrepreneurship should be considered with caution because there are both productive activities, such as R&D and innovation, and unproductive activities, such as rent—seeking only profit motives rather than growth.

Kenny and Rossiter [4] analyses the relationship between entrepreneurial learning for older unemployed individuals and the labour market. Their results significantly support this relationship. Esmaeilzadeh, Ahmad and Naveed [5] examines the five hourly wage quintiles and quintile zero between immigrants and natives in the Canadian labour market. Their results show that state dependence exists in all hourly wage quintiles. Additionally, education, experience, marital status, immigrant minority status, and age at immigration are leading attributes that affect hourly wage differentials between immigrants and natives. Besides education and experience, technological change also has strong impact on employment growth, which is confirmed by Piva and Vivarelli [33] for the manufacturing and service sectors of European countries.

The above-cited studies do not specifically address the dynamic transition into and out of self-employment, controlling for the unobserved individual heterogeneity and endogenous initial conditions problem. Therefore, the current paper paid particular attention to analysing this, with the use of proper methodology.

3. Structural and Spurious State Dependence

Persistence in self-employment can be a product of unobserved individual heterogeneity, structural state dependence, and some other significant observable covariates. Exploring the main reasons for persistence in self-employment is essential in order to properly estimate the parameters of interest in the dynamic framework model.

Following Heckman [34], past experience may be a proxy for the temporally persistent of unobserved variables that give rise to a conditional relationship between future and past experiences. Individuals may differ in certain unmeasured variables that influence their probability of experiencing the event but are not affected by the experience of it. If these variables are correlated over time and are not properly controlled, the previous experience may appear to be determinant of the future experience only because it is a proxy for such temporally persistent unobserved variables. Improper treatments of unmeasured variables give rise to a conditional relationship between future and past experience that is termed spurious state dependence. State dependence is true or structural if the past experience has a real effect on the probability of observing the individual in a given current state.

Distinguishing between true and spurious state dependence is an important issue in dynamic analysis frameworks that should not be ignored. If the observed persistence in self-employment is apparent due to the past experience (true state dependence), changing labour market policies may be more effective in attracting individuals towards self-employment. If the persistence in self-employment is due to the permanent unobserved characteristics (spurious state dependence), then changing the nature of market policies will have a little real effect on self-employment.

Initial conditions are typically assumed to be truly exogenous variables. According to Heckman [35], this assumption is valid only if the disturbances that generate the processes are serially independent; this is not the case in dynamic models. Therefore, treating initial conditions as exogenous variables yields biased and inconsistent parameter estimates. Assuming an initial stationary process (steady-state) as an alternative to the initial conditions' problem may lead to a suitable solution to the problem, but this assumption is also unattractive in many applications; for example, when the time-varying exogenous variables drive the stochastic process.

According to Chay and Hyslop [36], there is a systematic commonality in the observed dynamics of some discrete processes—such as social assistance, labour force participation, consumer purchases, and firm entry—and exit decisions. All of these phenomena exhibit serial persistence over time, and therefore, need a careful dynamic analysis considering both unobserved heterogeneity and endogenous initial conditions. For example, Hansen, et al. [37] analysed the transitions into and out of social assistance in Canada using a dynamic probit model, controlling for endogenous initial conditions problem and unobserved heterogeneity. Arulampalam, et al. [38] estimated dynamic panel data models of the unemployment incidence of British men, in order to distinguish between the effects of unobserved individual heterogeneity and true state dependence. Controlling for both unobserved characteristics and initial conditions problem is essential in order to properly estimate structural state dependence variables in dynamic non-linear models.

4. Data and Descriptive Statistics

The data was taken from Statistics Canada's Survey of Labour and Income Dynamics (SLID) for the period 1993–2004. In SLID, the focus extends from static measures to the whole range of transitions, durations, and repeat occurrences of people's financial and work situations. Additionally, it has three complete and one incomplete longitudinal dataset. Each complete panel covers six years for almost 15,000 households, which is a suitable source of data for this research. Although public use files of SLID exist, the longitudinal dimension (two years) is not sufficient for the research.

The structural estimate of the dynamic model was based on annual longitudinal data of males who are between 25 and 55 years old between 1993 and 2004. The model examined annual data from the files three panels of SLID. The first panel was from December 1992 to the end of 1998; the second was from December 1995 to the end of 2001; and the third was from December 1998 to the end of 2004.

The unit of analysis in this study was the household to which the respondent belonged as of December 31 of the reference year.

The reason to use this dataset was that it was constituted by a relatively stable labour market period in Canada. Furthermore, we did not have access to the more recent data set because it is confidential and expensive. Additionally, it is not very uncommon to use old, individual-level datasets for empirical analyses. There are many studies on the Canadian labour market who have used the same data and published almost 12 years after the data period (for detail see, Ahmad, et al. [39], Brouillette, et al. [40], Rybczynski [41], Lightman and Gingrich [42], Bahar and Liu [43], Schuetze [44]).

A man was classed self-employed if his classification for the primary job in the reference year, as specified in the job characteristics section of SLID, was of the business type incorporated or unincorporated—with or without paid help. We used the class of worker variable (the data provided for this variable was in concordance with the income information and could be different from the one provided by the respondent) of SLID in the reference year to determine whether a man was self-employed or not in his main job (the main job for the year was defined as the one with the most paid hours in the year. If hours were identical between two jobs, the main job was the one with the greatest earnings or the longest tenure (if earnings were identical)). To find any other states of the labour market than self-employment, we used the labour force status variable of SLID along with the job identifier for the main job.

To control for the local labour market conditions where the individual resided, the dynamic model included information on provincial unemployment rates extracted form Canadian Socio-Economic Information Management System (CANSIM), Table 282-0055 in SLID. In addition to provincial unemployment rates, the model also controlled for marital status, educational attainment, immigration status, parental background, and wealth. To see whether the expected wage of being self-employed rather than to be paid-employed has a significant effect on the probability of being self-employed, paid-employed, unemployed, or out of the labour force, the model included information on predicted values of log-wage differences of being self-employed and paid-employed.

To find whether a man was married (under common-law) or not, we used the marital status variable of SLID. We considered the number of years of schooling completed by a man at the time of entry to the panel as a proxy for his educational attainment (to remove outliers, we considered only observations with years of education greater than (or equal to) 6). For immigration status, we used a dummy variable indicating whether a man was an immigrant at the time of entry to the panel or not. We used the highest level of education completed by the man's father and mother as proxies for the parental background at the time of entry to the panel. A man's parents were educated if they had obtained at least a college diploma or a university degree.

We used the investment income variable of SLID as a proxy for wealth in the estimation. Investment income included the actual amount of dividends (not the taxable amount), interest, and other investment income, such as net partnership income and net rental income.

Table 1 presents the sample characteristics of 8651 males aged 25 to 55 for the period of 1993–2004. As shown, almost 15.9 percent of males aged 25 to 55 were self-employed in the sample and the rest were paid-employed, unemployed, or out of the labour force. Almost 74.7 percent of males in this age group were married and 11.9% were immigrants. The average rate of the unemployment rate in Canada for the period 1993–2004 was close to 8.7%. Moreover, the average year of schooling for males in this sample was around 13.9 years. Almost 16.6 (14.6) percent of males in that sample had educated fathers (mothers) with at least college diplomas or university degrees. Almost 29.7 percent of males aged 25 to 55 had positive investment incomes in the sample and the rest had zero or negative investment incomes.

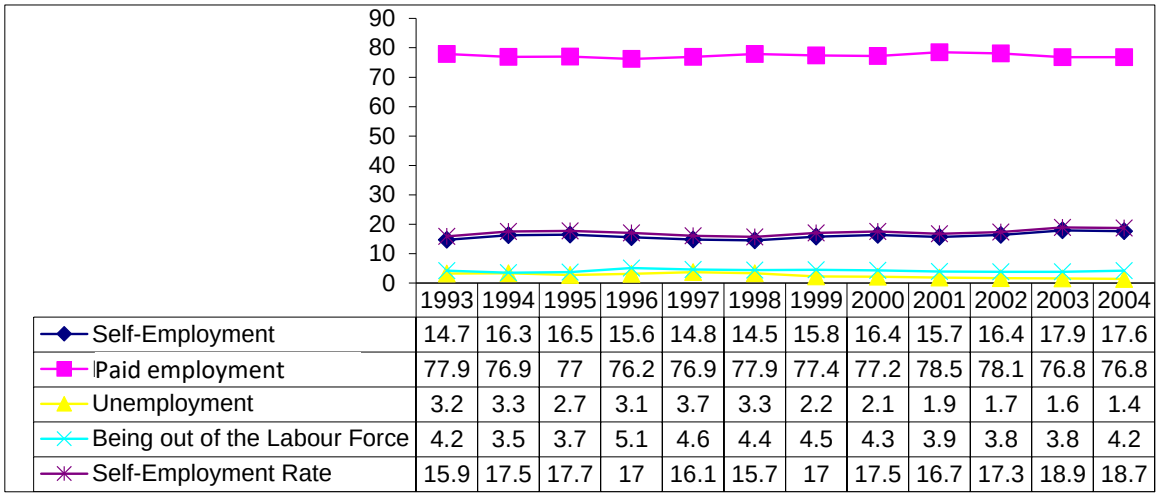
Table 1. Mean observable characteristics, balanced panel, 1993–2004.

Description.		Mean
Labour Market States	Self-Employment [1]	0.159
	Paid-Employment	0.774
	Unemployment	0.025
	Being Out of the Labour Force	0.042
Observed Covariates	Married	0.747
	Years of Education	13.894
	Immigrant	0.119
	Father Education	0.166
	Mother Education	0.146
	Positive Investment	0.297
	Unemployment Rate	8.652
Number of Observation (NT)		51,906

Note: source: Survey of Labour and Income Dynamics (SLID), 1993–2004, based on a sample of 8651 males (51906 observations) aged 25 to 55. The figures are weighted with longitudinal weight variables provided by Statistics Canada in SLID. The figures are rounded to three decimal points. [1]—Ratio of self-employment to total employment. Total employment is the total of self-employment (incorporated plus unincorporated businesses with and without paid help) and paid-employment.

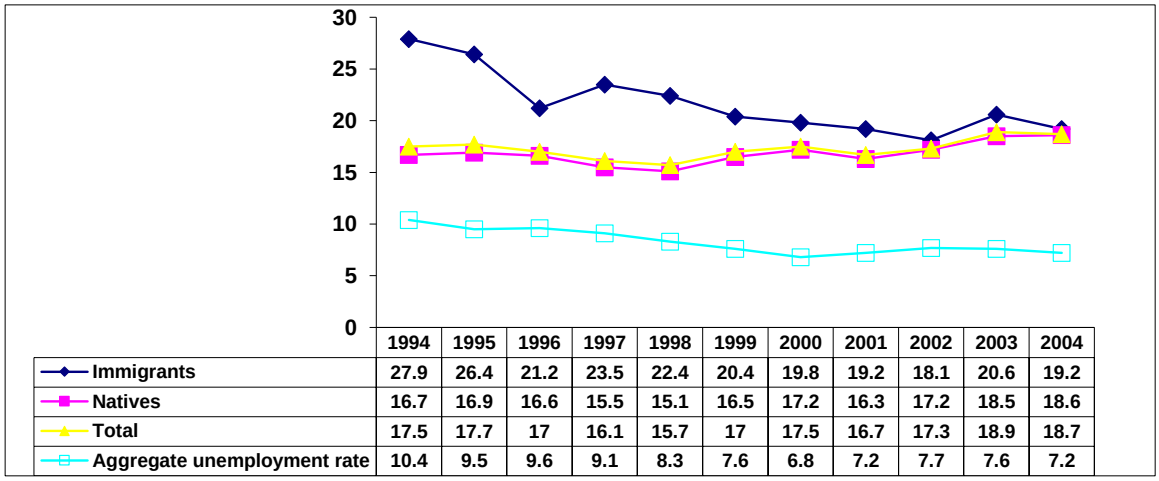
Figure 1 depicts trends in labour market outcomes along with the average self-employment rate for the period 1993–2004. The self-employment rate varied between 15% and 19% over the period 1993–2004 with a rate increasing to 18.7% in 2004. Figure 2 shows the average self-employment rate separately for immigrants and natives along with the aggregate unemployment rate. The pattern of the self-employment rate among immigrants and natives indicates that immigrants are more responsive to the variation in the unemployment rate than natives. As seen, immigrants and natives behave differently with respect to the unemployment rate changes. The unemployment rate decreased substantially during the period 1994–2000 and then slightly increased in the subsequent period of 2000–2004. The gap between immigrants' and natives' self-employment rate has been narrowing gradually during the period 1994–2004. Immigrants' self-employment rate was always higher than the natives' over the period 1994–2004. Natives' self-employment rate and the unemployment rate moved almost in opposite directions over the period of 1994–2004. Only the periods of 1996–1998 and 2001–2002 are those in which the natives' self-employment and unemployment rates moved almost in the same direction. Immigrants' self-employment rate decreased gradually over the period of 1994–2004, with a significant jump-down in 1996 and a rate declining to 18.1% in 2002. No significant pattern of self-employment and unemployment rate change was observed among immigrants over the period of 1994–2004. Different behaviours of immigrants and natives with respect to unemployment rate changes during the period 1994–2004 suggest that cyclical factors alone cannot explain the rise and decline of the self-employment rate among either immigrants or natives.

Tables 2 and 3 report transition probability matrices for the whole sample and separately for immigrants and natives aged 25 to 55 in Canada over the period 1994–2004. In these tables, we examine the issue of state dependence in the raw data. The observed data show a high persistence of self-employment and paid-employment among males aged 25 to 55. However, this persistence is not very different between immigrants and natives, as Table 3 shows.



	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Self-Employment	14.7	16.3	16.5	15.6	14.8	14.5	15.8	16.4	15.7	16.4	17.9	17.6
Paid employment	77.9	76.9	77	76.2	76.9	77.9	77.4	77.2	78.5	78.1	76.8	76.8
Unemployment	3.2	3.3	2.7	3.1	3.7	3.3	2.2	2.1	1.9	1.7	1.6	1.4
Being out of the Labour Force	4.2	3.5	3.7	5.1	4.6	4.4	4.5	4.3	3.9	3.8	3.8	4.2
Self-Employment Rate	15.9	17.5	17.7	17	16.1	15.7	17	17.5	16.7	17.3	18.9	18.7

Figure 1. Trends in labour market outcomes, Canada 1993–2004.



	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Immigrants	27.9	26.4	21.2	23.5	22.4	20.4	19.8	19.2	18.1	20.6	19.2
Natives	16.7	16.9	16.6	15.5	15.1	16.5	17.2	16.3	17.2	18.5	18.6
Total	17.5	17.7	17	16.1	15.7	17	17.5	16.7	17.3	18.9	18.7
Aggregate unemployment rate	10.4	9.5	9.6	9.1	8.3	7.6	6.8	7.2	7.7	7.6	7.2

Figure 2. Trends in average self-employment rate by immigrants and natives, 1993–2004.

Table 2. Transition matrix, conditional probabilities of leaving the previous year's state, Canada 1993–2004.

State at Time t + 1 State at Time t	Self-Employment	Paid-Employment	Unemployment	Being Out of the Labour Force
Self-Employment [1]	0.891	0.100	0.005	0.004
Paid-Employment	0.020	0.962	0.009	0.009
Unemployment	0.051	0.322	0.535	0.091
Being Out of the Labour Force	0.030	0.144	0.068	0.758

Note: source: Survey of Labour and Income Dynamics (SLID), 1993–2004, based on a sample of males aged 25 to 55. [1]—Ratio of self-employment to total employment. Total employment is the total of self-employment (incorporated plus unincorporated businesses with and without paid help) and paid-employment.

Table 3. Transition matrices, conditional probabilities of leaving of the previous year's state by immigrant and native groups, Canada 1993–2004.

Immigrants				
State at Time t + 1 State at Time t	**Self-Employment**	**Paid-Employment**	**Unemployment**	**Being Out of the Labour Force**
Self-employment	0.905	0.088	0.003	0.004
Paid-employment	0.021	0.959	0.012	0.007
Unemployment	0.061	0.241	0.669	0.029
Being Out of the Labour Force	0.049	0.097	0.106	0.748
Natives				
State at time t + 1 State at time t	**Self-Employment**	**Paid-Employment**	**Unemployment**	**Being Out of the Labour Force**
Self-employment	0.888	0.102	0.005	0.004
Paid-employment	0.020	0.962	0.008	0.009
Unemployment	0.048	0.346	0.495	0.110
Being Out of the Labour Force	0.027	0.151	0.063	0.759

Note: source: Survey of Labour and Income Dynamics (SLID), 1993–2004, based on a sample of males aged 25 to 55.

One of the objectives of this paper was to study the factors affecting transitional rates into and out of any of the four labour market states. To do this, we calculated the mean characteristics of Canadian males aged 25 to 55 for different transitional states and provided those in Appendix A Table A1.

5. Model and Empirical Specification

To analyse any movements into and out of any earnings quartiles, we chose a dynamic unordered multinomial logit model (for detail, see Cameron and Trivedi [45]). We analysed the dynamic structure of the model as a first-order Markov process (to find a more general model, one can consider the dynamic structure as a higher order Markov process). Let us assume that individual i belongs to k (alternative) at time t. We suppose that utility V^*_{ikt} is the sum of a deterministic component, U_{ikt}, that depends on regressors and unknown parameters, and an unobserved random component, ϵ_{ikt}.

$$V^*_{ikt} = U_{ikt} + \epsilon_{ikt} \tag{1}$$

This is called an additive random-utility model (ARUM). We observe the outcome $Y_{it} = k$ if alternative q has the highest utility of the alternatives. It follows that:

$$P_r(Y_{it} = k) = P_r\left(V^*_{ikt} > V^*_{ijt}\right) = P_r\left(V^*_{ijt} - V^*_{ikt} \leq 0\right), \text{ for all } j, \tag{2}$$

And given (1),

$$P_r(Y_{it} = k) = P_r\left(\epsilon_{ijt} - \epsilon_{ikt} \leq U_{ikt} - U_{ijt}\right), \tag{3}$$

Now assume that individuals indexed by i ($i = 1, 2, \ldots, N$) belong to any of the following five mutually exclusive and exhaustive boundaries (alternatives) of earnings percentiles of q at time t ($t = 1, 2, ..., T$): self-employment ($k_t = 1$), paid-employment ($k_t = 2$), unemployment ($k_t = 3$), and being out of the labour force ($k_t = 4$). Let the value, for individual i, of belonging to state k at time t U^*_{ikt} be specified as:

$$U_{ikt} = X_{it}.\beta_{1k} + E_{it}.\beta_{2K} + L_{it}.\beta_{3K} + D_i.\beta_{4k} + I_{it}.\beta_{5k} + Z_{it}.\gamma_k, \tag{4}$$

And given 4, V^*_{ikt} can be written as:

$$V^*_{ikt} = X_{it}.\beta_{1k} + E_{it}.\beta_{2K} + L_{it}.\beta_{3K} + D_i.\beta_{4k} + I_{it}.\beta_{5k} + Z_{it}.\gamma_k + \epsilon_{ikt}, \tag{5}$$

where error term, ϵ_{ikt} is composed of an individual, specific, unobserved effect (time-invariant but varying across individuals) and a random error (varying both across time and individuals) as below:

$$\epsilon_{ikt} = \mu_{ik} + \upsilon_{ikt}. \quad (6)$$

X_{it} is a vector of time-varying variables observed, including marital status and investment income (wealth). E_{it} includes information on the expected wages of being self-employed (versus being a paid-employee). To derive this variable, we used a pooled (OLS) estimation method and regressed the log of the hourly wages of being self-employed (and paid-employed) on significant covariates including age, educational attainment, marital status, immigration status, regional status, and time dummies. The predicted values, after that, were used to generate the exogenous explanatory variable,E_{it} as:

$$E_{it} = \hat{Y}_{it}{}^{s} + \hat{Y}_{it}{}^{p} \quad (7)$$

where $\hat{Y}_{it}{}^{s}$ and $\hat{Y}_{it}{}^{p}$ it are the predicted hourly wages of being self-employed and paid employed, respectively (for individual i at time t) (we assume that the correlation between $E_{it}\left(\hat{Y}_{it}{}^{s} and\ \hat{Y}_{it}{}^{p}\right)$ and the error component, ϵ_{ikt}, is zero—exogeneity assumption). Relaxing this assumption leads to biased and inconsistent parameter estimates. To correct for the possible bias, we used a method introduced by Murphy and Topel [46]). L_{it} describes the local labour market conditions where the individual i resides at time t. It includes information on the unemployment rate at the provincial level. D_i is a vector for time-invariant variables, including the individual's immigration status, parental background, and educational attainment at the time of entry to the panel (initial conditions). To allow the effect of local labour market conditions (provincial unemployment rates) and wealth differs between immigrants and natives, the model controls for the possible interaction terms between these variables, termed I_{it}. Z_{it} is a vector of dummy variables indicating the previous labour market state occupied by the individual i (time state dependence). For the usual identification purpose, we took the state of being out of the labour force as the reference state.

The assumption regarding the error term, ϵ_{ikt} can be summarized as follows: ϵ_{ikt} is composed of the two terms: ν_{ikt} and μ_{ikt}, where ν_{ikt} is assumed to follow a Type I extreme value distribution and μ_{ikt} is an unobserved, individual-specific factor, and independent of X_{it}, E_{it}, L_{it}, D_i, and L_{it}, but not Z_{it} (endogeneity problem). If μ_{ikt} is treated as a parameter to be estimated (fixed effects approach), then there is a severe incidental parameter problem. According to Heckman [35], an unobserved time-invariant effect allows for a particular form of serial correlation in ϵ_{ikt}. Following Chamberlain [47], the consistency of the maximum likelihood estimator requires that $T \to \infty$. SLID, as well as most household panel data sets, contain many individuals but only a small and fixed number of T. Random affects analysis in this context may, therefore, seem more applicable than fixed effects analysis.

Given the distribution assumptions of υ_{ikt}, the probability of observing individual i in state k at time t, conditional on X_{it}, E_{it}, L_{it}, D_i, and Z_{it}, and μ_{ik}, can be written as a four-state multinomial logit as:

$$P_{\mathrm{it}}\left(\frac{k}{X,\ \mu_{ik}}\right) = \frac{exp(X_{it}.\beta_{1k} + E_{it}.\beta_{2K} + L_{it}.\beta_{3K} + \ldots + Z_{it}.\gamma_k + \ \mu_{ik})}{\sum_{j=1}^{4} exp\left(X_{it}.\beta_{1j} + E_{it}.\beta_{2j} + L_{it}.\beta_{3K} + \ldots + Z_{it}.\gamma_j + \ \mu_{ij}\right)}. \quad (8)$$

The model also controls for the endogenous initial conditions. The initial conditions problem arises when the start of the observation period does not coincide with the start of the stochastic process that generates individuals' participation experiences. According to Chay and Hyslop [36], dynamic, discrete-choice models that assume the initial conditions to be exogenous are effectively ignoring serial dependence attributable to unobserved heterogeneity, and therefore, lead to upwardly biased estimates of structural state dependence. To account for this problem, we adopted the method suggested by Wooldridge [48].

Following Mroz [49], we assumed that the probability distribution of μ_{iq} could be approximated by a discrete factor distribution with a finite number of support points. Assuming a discrete distribution

for the unobserved factors implies that the cumulative distribution function is approximated by a step function. In particular, the distribution of v_{iq} is given by:

$$P_Y\left(v_{ik} = v_k^m\right) = \pi^m, m = 1, 2, \ldots., M, \tag{9}$$

where π^m is the probability that the unobserved factor takes on the values of v_k^m. To be specific, there are m types of individuals and each individual, i, at any quartiles of k is endowed with a set of unobserved characteristics, v_k^m.

To estimate simultaneously the parameters β_{1k}, $\beta_{2k}, \beta_{3k}, \beta_{4k}$ β_{5k}, $\gamma_k, \lambda_k, \rho_k$, $v_k^1, \ldots\ldots, v_k^M$, and $(p_1, \ldots\ldots p_M)$, we used a logistic transformation as:

$$\pi^m = \frac{exp(p_m)}{\sum_{j=1}^{M} exp(p_m)}, \tag{10}$$

where,

$$0 < \pi^m < 1 , \tag{11}$$

and

$$\sum_{m=1}^{M} \pi_m = 1. \tag{12}$$

To select the number of support points, we calculated the value of the AIC (Akaike information criteria) and the BIC (Bayesian information criteria) (AIC and BIC are measures of goodness of fit) when an additional point of support was added. We stopped adding more support points to the model when either value started decreasing (the likelihood functions are explained in Appendix B). Further, we obtained the entry and exit rates from self-employment, as well as any other labour market states, by following the procedure by Wooldridge [48].

6. Empirical Results

This section reports the estimation results from MLE (Maximum Likelihood Estimation) of the multinomial logit model, controlling for endogenous initial conditions problem and unobserved heterogeneity (as SLID is not a representative random sample, the likelihood function was weighted with sample weights provided by Statistics Canada). As an illustration of the importance of these factors, we also reported the estimation results of a model when there was no control for endogenous initial conditions problem and unobserved heterogeneity. The parameter estimates of MLE models were reported in Appendix A Tables A2 and A3, respectively.

We experimented with different values of support points and found that a model with $M = 4$ fitted the data well. Table 4 reports AIC, BIC, the number of parameters, and the value of the objective function for different model specifications. We used BIC to choose the number of support points in the estimation.

As expected, assuming that the initial conditions were exogenous and also ignoring unobserved factors, generated inflated estimates of the degree of state dependence. Because the model presented in this paper has a non-linear nature, the magnitudes of the coefficient estimates provide little information about the size of the effects of the observable covariates. Therefore, our attention in this research focused on the transition probabilities, the proportion of the estimated state dependence that was spurious, and estimated entry–exit rates (Tables 5–8). The predicted transition matrices were evaluated at the corresponding sample means.

Table 4. Discrete factor model (DFM) specification, information criteria (Akaike information criteria—AIC and Bayesian information criteria—BIC), number of parameters, and value of objective function.

Model Specification			AIC	BIC	Number of Parameters	Value of Objective Function
Controls for Unobserved Heterogeneity	Controls for Endogenous Initial Conditions	Number of Support Points				
No	No	1	23,269.6	23,566.3	42	−11,592.78853
No	Yes	1	22,577.1	22,958.6	54	−11,234.53739
Yes	Yes	2	22,275.9	22,685.7	58	−11,079.95123
Yes	Yes	3	22,142.2	22,580.3	62	−11,009.1173
Yes	Yes	4	22,094.3	22,560.7	66	−10,981.17239
Yes	Yes	5	22,077.3	22,571.9 *	70	−10,968.65664

Note: * indicates statistically significance level at 1%.

Table 5. The transition matrix: predicted conditional probabilities of leaving the previous years' state, with control for the endogenous initial conditions problem, and unobserved heterogeneity.

State at Time t + 1 State at Time t	Self-Employment	Paid-Employment	Unemployment	Being Out of the Labour Force
Self-Employment	0.2879	0.6967	0.0090	0.0064
Paid-Employment	0.0782	0.8986	0.0061	0.0172
Unemployment	0.1309	0.7549	0.0799	0.0342
Being Out of the Labour Force	0.0806	0.7874	0.0261	0.1060

Table 6. Transition matrix for immigrants and natives, and predicted conditional probabilities of leaving the previous year's state, with control for the endogenous initial conditions problem and unobserved heterogeneity.

Immigrants				
State at Time t + 1 State at Time t	**Self-Employment**	**Paid-Employment**	**Unemployment**	**Being Out of the Labour Force**
Self-employment	0.3778	**0.5997**	**0.0181**	**0.0043**
Paid-employment	0.1044	**0.8615**	**0.0188**	**0.0153**
Unemployment	0.1510	**0.6578**	**0.1648**	**0.0256**
Being Out of the Labour Force	0.1042	**0.7310**	**0.0702**	**0.0946**
Natives				
State at Time t + 1 State at Time t	**Self-Employment**	**Paid-Employment**	**Unemployment**	**Being Out of the Labour Force**
Self-employment	0.2850	**0.7000**	**0.0086**	**0.0064**
Paid-employment	0.0772	**0.8999**	**0.0057**	**0.0172**
Unemployment	0.1303	**0.7588**	**0.0764**	**0.0346**
Being Out of the Labour Force	0.0798	**0.7895**	**0.0246**	**0.1062**

Note: the predicted transition values were estimated at the corresponding sample means and were based on the estimates reported in Table 6.

Table 7. Proportion of structural and spurious state dependence in the labour market states by immigrants and natives, Canada 1993–2004.

	Self-Employment		Paid-Employment		Unemployment		Being Out of the Labor Force	
	Structural	Spurious	Structural	Spurious	Structural	Spurious	Structural	Spurious
Immigrant	0.416	**0.584**	**0.921**	**0.079**	**0.278**	**0.722**	**0.144**	**0.856**
Native	0.321	**0.679**	**0.934**	**0.066**	**0.194**	**0.806**	**0.155**	**0.845**
Total	0.324	**0.676**	**0.933**	**0.067**	**0.196**	**0.804**	**0.155**	**0.845**

Note: calculations were based on the estimation results presented in Tables 5 and 6.

Table 8. Estimated entry–exit probability rates by immigrants and natives, controlling for the endogenous initial conditions problem and unobserved heterogeneity, Canada 1993–2004.

	Self-Employment		Paid-Employment		Unemployment		Being Out of the Labor Force	
	Exit	**Entry**	**Exit**	**Entry**	**Exit**	**Entry**	**Exit**	**Entry**
Immigrant	0.627	0.102	0.156	0.706	0.718	0.022	0.854	0.024
Native	0.714	0.079	0.113	0.759	0.846	0.007	0.835	0.029
Total	0.712	0.080	0.114	0.757	0.840	0.008	0.835	0.028

Note: calculations were based on the estimation results presented in Table 6.

Tables 5 and 6 report predicted conditional probabilities of leaving the previous year's state while controlling for the endogenous initial conditions problem and unobserved heterogeneity. However, the results without controlling for initial conditions and unobserved heterogeneity are reported in Appendix A Tables A4 and A5. As expected, when controls for these factors were incorporated in the model, there was a reduction in the estimated state dependence for all states of self-employment, paid-employment, unemployment, and being out of the labour force (Tables 5 and 6).

The transition probabilities that are reported in Tables 5 and 6 (along with Tables A4 and A5) can be used to decompose the predicted state dependence into structural and spurious state dependence. The distinction between true and spurious state dependence is very crucial for economic policymaking. Ignoring the effect of spurious state dependence in observed persistence leads to erroneous policy decision-making. As shown, persistence in any states of self-employment, paid-employment, unemployment, and being out of the labour force for both immigrants and natives is overestimated if controls for endogenous initial conditions and unobserved heterogeneity factors are not incorporated in the model. The probabilities of persistence in self-employment for immigrants and natives are quite close together, about 90.90% and 88.84% respectively, when the model does not control for unobserved factors and endogenous initial conditions (spurious effects). However, when controls for these factors are taken into account, a significant reduction in the probability of persistence in self-employment, as well as the probabilities of other state dependence variables, will occur (the probabilities of persistence in self-employment for immigrants and natives when control for unobserved factors and endogenous initial conditions are taken into account, are 37.78% and 28.50% respectively). Further, the immigrant–native difference in persistence in any labour market state can be realized when the spurious effects are removed from the estimation. One explanation is due to the possible difference between immigrants and natives in unobserved characteristics, such as labour market preferences (some barriers to the labour market for immigrants due to labour market discrimination), abilities, or unemployment experiences, along with observable covariates, such as level of education, parental background, and sensitivity to the labour market conditions.

Table 7 shows the proportion of structural and spurious state dependence in the labour market states for the whole sample and separately for immigrants and natives. The results clearly illustrate the effect of spurious effects in the immigrant-native difference in all states of the labour market. As seen, structural state dependence in self-employment is substantially higher among immigrants than among natives. Instead, natives are predicted to have higher spurious effects in self-employment state than similar immigrants. (For immigrants, much less in the paid-employment state; about 41.6 percent of self-employment state dependence is structural. The equivalent value for natives is 32.1%. In particular, persistence in self-employment stems to a greater extent from unobserved heterogeneity, possibly in self-employment preferences.) For the paid-employment state, previous experience has a strong causal effect on the current experience. Persistence in paid-employment is highly structural for both immigrants and natives. However, natives have slightly higher structural persistence in paid-employment than immigrants (only 7.9 percent of paid-employment persistence among immigrants is attributed to unobserved factors and the initial conditions problem. The equivalent value for natives is 6.6 per cent). Observed persistence in unemployment and being out of the labour force, to some extent, is due to unobserved factors. Structural state dependence in unemployment

is higher among immigrants than among natives, while natives have slightly more persistence in being out of the labour force (for natives, the structural state dependence in unemployment and being out of the labour force states is almost 19.4% and 15.5% respectively. For immigrants, the equivalent proportions of structural state dependence are 27.8% and 14.4% respectively.).

The Table 8 reports estimated entry–exit probability rates for all labour market states, for a whole sample, and separately for natives and immigrants. For the model which ignores the roles of unobserved heterogeneity and endogenous initial conditions, the estimated entry rates into self-employment for immigrants and natives are 3.3% and 2.7% respectively (see Appendix A, Table A6). The estimated entry rates suggest that the higher self-employment rates among immigrants relative to natives are partially due to higher incidences of entering self-employment state in any given time period. When controls for these factors were incorporated into the model, we found significant increases in the estimated entry rates for immigrants and natives in Table 8 (when controls for unobserved heterogeneity and endogenous initial conditions are taken into account, the equivalent the equivalent figures for immigrants and natives change to 10.2% and 7.9% respectively). The reason is the correlation of time-invariant unobserved effects and time state dependence variables. The model which ignores the effects of these factors, falsely assumes that this correlation is zero.

The estimated exit rates, presented in Table 8, show that immigrants have lower exit rates from self-employment state than comparable natives. The estimated transition rates presented in this table suggest that the immigrant–native gap in self-employment participation is due to a combination of both higher entry and lower exit rates among immigrants than similar natives.

For the paid-employment state, immigrants have lower entry and higher exit rates than comparable natives. The net entry rate into the paid-employment state is positive for both immigrants and natives, implying that on average, immigrants and natives are likely to move into the paid-employment state from any other labour market state. Immigrants' entry/exit rates into/from unemployment are higher/lower than natives', while natives have a lower exit and higher entry rates into the being out of the labour force state than immigrants.

Finally, Table 9 shows the predicted and observed distributions of labour market states for a balanced panel for the period of 1994–2004. The predicted distributions were calculated for each year between 1994 and 2004 (t = 2, ..., 12). Overall, the predicted distributions are, to some extent, similar to the observed frequencies, indicating that the empirical model fit the data well.

Table 9. Predicted and observed distribution of labour market states, Canada 1994–2004.

Year	Self-Employment		Paid-Employment		Unemployment		Being Out of the Labor Force	
	Observed	Predicted	Observed	Predicted	Observed	Predicted	Observed	Predicted
1994	0.163	0.155	0.769	0.798	0.033	0.017	0.035	0.030
1995	0.165	0.151	0.770	0.810	0.027	0.014	0.037	0.025
1996	0.156	0.150	0.762	0.812	0.031	0.013	0.051	0.025
1997	0.148	0.154	0.769	0.801	0.037	0.016	0.046	0.030
1998	0.145	0.145	0.779	0.813	0.033	0.014	0.044	0.028
1999	0.158	0.143	0.774	0.813	0.022	0.014	0.044	0.031
2000	0.164	0.157	0.772	0.798	0.021	0.012	0.045	0.032
2001	0.157	0.156	0.785	0.803	0.019	0.011	0.043	0.031
2002	0.164	0.161	0.781	0.801	0.017	0.010	0.039	0.029
2003	0.179	0.157	0.768	0.805	0.016	0.009	0.038	0.029
2004	0.176	0.159	0.768	0.803	0.015	0.009	0.042	0.029

Note: predicted values were calculated based on the estimation results presented in Table 6.

In summary, the results drawn from this study are highly relevant to the economy of Canada. For instance, policymakers can use these results to promote self-employment choices. Further, policies that improve unobserved heterogeneity effects (abilities and skills), such as public or private training programs for the self-employed, may attract both immigrants and natives to self-employment. Additionally, these results are applicable to a large extent for the current and future circumstances in the Canadian labour market. This is especially true after 2000, when no major change regarding

self-employment occurred. For instance, the rate of self-employed workers has been stable, which has been around 15% since 2000 [50]. Even the global financial crises of 2008 did not deviate the stable self-employment rate in Canada. Noting that the years 2000–2004 were included in our sample period, the policy implications of this study are applicable to the current situation.

7. Summary and Conclusions

This paper analyses transitions into and out of self-employment using a Markov process. Four mutually exclusive and totally exhaustive labour market states were considered: paid-employment, self-employment, unemployment, and being out of the labour force. To take into account the effect of endogenous initial conditions problem and unobserved individual heterogeneity, we used longitudinal data from SLID in our estimation. This study adopted a dynamic multinomial logit model with discrete factor approximation for the specification of unobserved individual heterogeneity. The data was restricted to males aged 25 to 55 years old between 1993 and 2004. All estimation results, as well as descriptive statistics, were weighted with sample weights provided by Statistics Canada.

The findings of this study show that the probability of being self-employed among males aged 25 to 55 is high when the unemployment rate is low, ceteris paribus. For the self-employment state, predicted values are slightly below the observed values in most years. The probability of being self-employed can be affected positively by some other significant factors, such as funds or financial assistance from the government. However, these are difficult to assess in SLID, at the time of entry to the self-employment state (initial values). Immigrants and natives behave differently with respect to the unemployment rate changes. For example, immigrants may feel some uncertainty about labour market conditions when the unemployment rate is high, due to the statistical discrimination they may face in the labour market. In addition, the unemployment experience may be very different between immigrants and natives, which causes either group to behave differently in times of high unemployment rates. The high unemployment rate pushes immigrants into self-employment more than natives. In summary, males with positive investment income or wealth tend to be self-employed. However, our findings do not show any significant effects of individuals' wage expectations on the probability of being self-employed or paid-employed. One possible explanation is the non-pecuniary benefits that individuals may obtain when they are self-employed or paid-employed. The results show that the expectation of having a higher salary in self-employment sectors (compared to the paid-employment) decreases the probability of being unemployed among males.

Additionally, these results reveal that parental background has a significant effect on the probability of being self-employed, paid-employed, and unemployed, taking all observed and unobserved effects into account. The effects of education and marriage have the expected signs for self-employment and paid-employment equations. As well, all state dependence variables are statistically significant in all equations of self-employment, paid-employment, and unemployment.

Results from the most general specification suggest that the causal effect of past self- employment on current self-employment is relatively weak and much different from what observed data shows. Looking at observed persistence in self-employment for immigrants and natives, no significant difference between either group was observed. However, immigrants and natives are different in many unobserved and observed characteristics. For instance, unobserved factors are labour market preferences, abilities, and unemployment experiences (which are not observed in the data). Similarly, observable factors may include the level of education, parental background at the time of entry into the panel (initial conditions), marital status, and sensitivity to any changes in labour market conditions. Distinguishing between true and spurious state dependence highlights immigrant-native gaps in unobserved characteristics in any labour market states of self-employment, paid-employment, unemployment, and being out of the labour force.

The higher self-employment rate among immigrants than among natives is due to a combination of both higher entry and lower exit rates among immigrants than comparable natives. Higher structural persistence in self-employment among immigrants than among natives is partially due to the lower

exit rates from self-employment state. On the other hand, the entry rate to self-employment is higher among immigrants.

Moreover, these results indicate that structural factors alone cannot explain the rise or fall in self-employment participation rates among either immigrants or natives over the period of 1993–2004. The structural factors affect the probability of remaining self-employed in consecutive years, and consequently, affect exit rates from the self-employment state only partially. The probability of entering into self-employment is also, to some extent, due to unobserved heterogeneity factors, such as labour market preferences (labour market discrimination among immigrants in comparison with similar natives, which makes immigrants more likely to enter the self-employment state, especially in times of high unemployment). Finally, the significant proportion of spurious effects in the persistence of self-employment among both immigrants and natives indicates that structural factors alone cannot explain the rise or fall in self-employment participation rates over the period 1993–2004.

Based on our findings, policymakers may encourage entrepreneurship, which leads to improving self-employment for both natives and immigrants. Furthermore, it is also important that policy should address unobserved factors, such as abilities and skills (e.g., tailored public or private training programs) that could further attract both immigrants and natives to the state of self-employment. Importantly, the ease of doing business (facilitating access to financial loans, etc.) can further encourage unemployed individuals, and can act as an incentive for new entrants into the labour market to start a business. Besides, policies that encourage longer unemployment spells (e.g., unemployment insurance and social assistance programmes) can be revised to avoid long term state dependence in the unemployment state. Finally, government policies should address the labour market discrimination issues to promote equal opportunities for both natives and immigrants. For future consideration, similar analysis may be extended if longer and updated individual data is available. With the recent data, the research focus could be dedicated to the role of unobserved factors related to different states of individual in the labour market. The findings of this study are applicable to a large extent for the current and future circumstances in the Canadian labour market, because the self-employment rate has been sustained in the last two decades.

Author Contributions: All authors contributed equally to this article.

Funding: This research received no external funding.

Acknowledgments: The authors thank the editors and four anonymous referees for their valuable comments and suggestions. Additionally, we acknowledge the support of the Quebec Inter-University Centre for Social Statistics (QICSS) and Statistics Canada for providing access to micro data.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Mean characteristics by different labour market transitions, Canada 1993–2004.

Observed Characteristics	Persistence in	Transition From		
	SE	SE to PE	SE to UE	PE to SE
Married	0.824	0.772	0.606	0.744
Years of Education	13.758	14.292	12.444	13.956
Immigrant	0.141	0.122	0.075	0.114
Father's Education	0.165	0.212	0.247	0.194
Mother's Education	0.142	0.197	0.121	0.175
Positive Investment	0.406	0.286	0.063	0.290
Unemployment Rate	8.279	8.523	9.855	8.489
Number of Observation	6278	714	36	722

Note: SE: self-employment, PE: paid-employment, UE: unemployment. Source: Survey of Labour and Income Dynamics (SLID), 1993–2004, based on a sample of males aged 25 to 55.

Table A2. Dynamic multinomial logit model of labour market states, controlling for the endogenous initial conditions problem and unobserved heterogeneity.

Description		Self-Employment	Paid-Employment	Unemployment
State Dependence	Self-Employment	6.3295 ** (0.3079)	3.5763 ** (0.3236)	2.3548 ** (0.4071)
	Paid-Employment	2.6393 ** (0.2040)	3.3752 ** (0.1571)	1.1905 ** (0.2045)
	Unemployment	2.1148 ** (0.2927)	1.3668 ** (0.2115)	2.5128 ** (0.2137)
Observed Covariates	Married	0.9395 ** (0.1281)	0.9616 ** (0.1251)	0.1414 (0.1454)
	Years of Education	0.0953 ** (0.0194)	0.1345 ** (0.0191)	0.0338 (0.0213)
	Immigrant	−0.9479 * (0.5762)	0.0401 (0.5522)	−0.3677 (0.6049)
	Father Education	0.7213 ** (0.1962)	0.7462 ** (0.1926)	0.6765 ** (0.2232)
	Mother Education	−0.4379 ** (0.1816)	−0.2973 * (0.1780)	−0.5502 ** (0.2295)
	Positive Investment	0.3662 * (0.2136)	0.0723 (0.1947)	0.0428 (0.1560)
	Unemployment Rate	−0.0255 * (0.0143)	0.0005 (0.0153)	0.0393 ** (0.0171)
Interaction Terms	Positive Investment & Immigrant	−0.2162 (0.4188)	−0.1959 (0.3981)	−0.0717 (0.1572)
	Unemployment Rate & Immigrant	0.1657 ** (0.0706)	-0.0132 (0.0678)	0.1310 * (1.8662)
Derived Exogenous Variable	Expected wage [1]	−0.2541 (0.1904)	−0.2392 (0.1865)	−0.4980 ** (0.2173)
Intercept	Type 1	−7.9453 **	−7.0486 **	−4.2123 **
	Type 2	−7.1888 **	−9.5903 **	−7.1402 **
	Type 3	−6.3274 **	−2.3942 **	−1.5723 **
	Type 4	−2.6502 **	−2.1440 **	−6.3270
Probability	Type 1		43%	
	Type 2		8.9%	
	Type 3		33%	
Number of Individuals		8651	Log-Likelihood	−10981.17239
Information Criteria			AIC	22094.3
			BIC	22560.7

Note: The estimation results are based on annually observation of 8651 males aged 25 to 55. The figures are weighted with longitudinal weight variables provided by Statistics Canada in SLID. The numbers inside the parentheses are the standard errors. The asterisked figures are statistically significant (** indicates significance at the 0.05 or 0.001 level, and * indicates significance at the 0.10 level). [1]—expected wage of being self-employed than to be paid-employed.

Table A3. Dynamic multinomial logit model of labour market states, with no control for the endogenous initial conditions problem or unobserved heterogeneity.

Description		Self-Employment	Paid-Employment	Unemployment
State Dependence	Self-Employment	8.5587 ** (0.2583)	4.7385 ** (0.2286)	2.6529 ** (0.3054)
	Paid-Employment	3.8218 ** (0.1619)	6.0671 ** (0.0918)	2.3684 ** (0.1302)
	Unemployment	2.5572 ** (0.2339)	2.9565 ** (0.1382)	4.1338 ** (0.1458)
Observed Covariates	Married	0.8578 ** (0.1086)	0.8177 ** (0.0893)	−0.0343 (0.1136)
	Years of Education	0.0903 ** (0.0154)	0.1175 ** (0.0135)	0.0158 (0.0173)
	Immigrant	−0.0470 (0.4485)	0.2892 (0.3934)	0.2815 (0.4501)
	Father Education	0.7071 ** (0.1676)	0.6599 ** (0.1505)	0.5678 ** (0.1853)
	Mother Education	−0.1833 (0.1623)	−0.0998 (0.1432)	−0.2586 (0.1961)
	Positive Investment	0.6944** (0.1236)	0.3595 ** (0.1115)	−0.4614 ** (0.1719)
	Unemployment Rate	−0.0259 ** (0.0131)	−0.0085 (0.0110)	0.0384 ** (0.0132)
Interaction Terms	Positive Investment & Immigrant	−0.1518 (0.3482)	0.0466 (0.3179)	0.1199 (0.3943)
	Unemployment Rate & Immigrant	0.0202 (0.0519)	−0.0574 (0.0449)	0.0476 (0.0495)
Derived Exogenous Variable	Expected wage	−0.0435 (0.1581)	−0.0225 (0.1356)	−0.2799 (0.1743)
Intercept		−4.8247 **	−3.5577 **	−3.1048 **
Number of Individuals		8651	Log-Likelihood	−11,592.78853
Information Criteria		AIC	23,269.6	
		BIC	23,566.3	

Note: the estimation results were based on annual observations of 8651 males aged 25 to 55. The asterisked figures are statistically significant (** indicates significance at the 0.05 or 0.001 level, and * indicates significance at the 0.10 level).

Table A4. Transition matrix, predicted conditional probabilities of leaving the previous year's state, with no control for the endogenous initial conditions problem or unobserved heterogeneity.

State at Time t / State at Time t + 1	Self-Employment	Paid-Employment	Unemployment	Being Out of the Labour Force
Self-Employment	0.8892	0.1026	0.0045	0.0037
Paid-Employment	0.0199	0.9627	0.0082	0.0092
Unemployment	0.0594	0.4520	0.4067	0.0819
Being Out of the Labour Force	0.0421	0.2174	0.0576	0.6829

Note: the predicted transition values were estimated at the corresponding sample means and were based on the estimates reported in Table A3.

Table A5. Transition matrix for immigrants and natives, predicted conditional probabilities of leaving previous year's state, with no control for the endogenous initial conditions problem or unobserved heterogeneity.

Immigrants				
State at Time t + 1 State at Time t	**Self-Employment**	**Paid-Employment**	**Unemployment**	**Being Out of the Labour Force**
Self-employment	0.9090	0.0787	0.0089	0.0034
Paid-employment	0.0269	0.9353	0.0262	0.0116
Unemployment	0.0486	0.2997	0.5922	0.0595
Being Out of the Labour Force	0.0440	0.1792	0.1179	0.6589
Natives				
State at Time t + 1 State at Time t	**Self-Employment**	**Paid-Employment**	**Unemployment**	**Being Out of the Labour Force**
Self-employment	0.8884	0.1036	0.0043	0.0037
Paid-employment	0.0196	0.9636	0.0077	0.0091
Unemployment	0.0603	0.4621	0.3944	0.0832
Being Out of the Labour Force	0.0421	0.2196	0.0541	0.6842

Note: the predicted transition values were estimated at the corresponding sample means and were based on the estimates reported in Table A3.

Table A6. Estimated entry-exit probability rates by immigrants and natives, with no control for the endogenous initial conditions problem or unobserved heterogeneity, Canada 1993—2004.

	Self-Employment		**Paid-Employment**		**Unemployment**		**Being Out of the Labor Force**	
	Exit	**Entry**	**Exit**	**Entry**	**Exit**	**Entry**	**Exit**	**Entry**
Immigrant	0.091	0.033	0.065	0.178	0.408	0.033	0.341	0.032
Native	0.112	0.027	0.036	0.222	0.606	0.011	0.316	0.032
Total	0.111	0.027	0.037	0.220	0.593	0.012	0.317	0.032

Note: calculations were based on the estimation results presented in Table A3.

Appendix B

Log Likelihood Function

The likelihood contribution for individual i with observed quartile states $(k, \ldots\ldots k_T)$ given all observed and unobserved effects can be written as:

$$L_i(v_i) \;=\; \prod_{t\,=\,2}^{T} P_{\mathrm{it}}\left(k/\mathrm{X}, \overline{\mathrm{X}}_i, Z_{i1}, v_{ik}\right), \tag{A1}$$

and therefore,

$$L_i(v_i) \;=\; \prod_{t\,=\,2}^{T} \frac{exp\left(X_{it}.\beta_{1k} + \ldots + Z_{it}.\gamma_k + \overline{X}_i.\lambda_k + \; Z_{i1}.\rho_k + v_{ik}\right)}{\sum_{j\,=\,1}^{4} exp\left(X_{it}.\beta_{1j} + \ldots + Z_{it}.\gamma_j + \overline{X}_i.\lambda_j + \; Z_{i1}.\rho_j + v_{ij}\right)}, \tag{A2}$$

where is v_i a vector of v_{ik} for $k_t \;=\; 1, 2, 3, 4$. As mentioned earlier, there are m types of individuals i with the set of unobserved characteristics, v_k^m, which is the vector of $\left(v_k^1, \ldots\ldots, v_k^M\right)$. Therefore, we can write the unconditional log-likelihood function as

$$logL_i(v_i) \;=\; log \sum_{m\,=\,1}^{M} \pi_m L_i({v_k}^m)\,, \tag{A3}$$

and finally,

$$L_{TN} = \sum_{i=1}^{N} log \sum_{m=1}^{M} \prod_{t=2}^{T} \pi_m . \frac{exp\left(X_{it}.\beta_{1k} + \ldots + Z_{it}.\gamma_k + \overline{X}_i.\lambda_k + Z_{i1}.\rho_k + \nu_{ik}\right)}{\sum_{j=1}^{4} exp\left(X_{it}.\beta_{1j} + \ldots + Z_{it}.\gamma_j + \overline{X}_i.\lambda_j + Z_{i1}.\rho_j + \nu_{ij}\right)}. \quad \text{(A4)}$$

References

1. Ahmad, N. State dependence in unemployment. *Int. J. Econ. Financ. Issues* **2014**, *4*, 93–106.
2. Ahmad, N.; Esmaeilzadeh, R.; Hansen, J. Immigrant-Native Differences in Earnings Mobility Processes. *Rev. Econ. Financ.* **2014**, *4*, 13–32.
3. Ahmad, N.; Naveed, A.; Naz, A. A hierarchical analysis of structural change and labour productivity convergence across regions, countries and industries within the EU. *Labour Ind. A J. Soc. Econ. Relat. Work* **2019**, 1–18. [CrossRef]
4. Ahmad, N.; Svarer, M.; Naveed, A. The Effect of Active Labour Market Programmes and Benefit Sanctions on Reducing Unemployment Duration. *J. Labor Res.* **2019**, 1–28. [CrossRef]
5. Aldieri, L.; Vinci, C.P. Innovation effects on employment in high-tech and low-tech industries: Evidence from large international firms within the triad. *Eurasian Bus. Rev.* **2018**, *8*, 229–243. [CrossRef]
6. Amoroso, S.; Audretsch, D.B.; Link, A.N. Sources of knowledge used by entrepreneurial firms in the European high-tech sector. *Eurasian Bus. Rev.* **2018**, *8*, 55–70. [CrossRef]
7. Arulampalam, W.; Booth, A.L.; Taylor, M.P. Unemployment persistence. *Oxf. Econ. Pap.* **2000**, *52*, 24–50. [CrossRef]
8. Audretsch, D.B.; Seitz, N.; Rouch, K.M. Tolerance and innovation: The role of institutional and social trust. *Eurasian Bus. Rev.* **2018**, *8*, 71–92. [CrossRef]
9. Bahar, S.; Liu, H. *Unincorporated Self-employment in Canada, 1989 to 2010*; Statistics Canada: Ottawa, ON, Cannada, 2015.
10. Baumol, W.J. Entrepreneurship: Productive, unproductive, and destructive. *J. Bus. Ventur.* **1996**, *11*, 3–22. [CrossRef]
11. Bradley, D.E. A Second Look at Self-employment and the Earnings of Immigrants 1. *Int. Migr. Rev.* **2004**, *38*, 547–583. [CrossRef]
12. Brouillette, D.; Kostyshyna, O.; Kyui, N. Downward nominal wage rigidity in Canada: Evidence from micro-level data. *Can. J. Econ./Rev. Can. D'économique* **2018**, *51*, 968–1002. [CrossRef]
13. CAMERON, A.C.; TRIVEDI, P.K. *Microeconometrics: Methods and Applications*; Cambridge University Press: Cambridge, UK, 2005.
14. Carrasco, R. Transitions to and from self-employment in Spain: An empirical analysis. *Oxf. Bull. Econ. Stat.* **1999**, *61*, 315–341. [CrossRef]
15. Chamberlain, G. Panel data. *Handb. Econom.* **1984**, *2*, 1247–1318.
16. Chay, K.Y.; Hyslop, D.R. Identification and estimation of dynamic binary response panel data models: Empirical evidence using alternative approaches. In *Safety Nets and Benefit Dependence*; Emerald Group Publishing Limited: Bingley, UK, 2014.
17. Dribe, M.; Nystedt, P. Is there an intermarriage premium for male immigrants? Exogamy and earnings in Sweden 1990–2009. *Int. Migr. Rev.* **2015**, *49*, 3–35. [CrossRef]
18. Esmaeilzadeh, R.; Ahmad, N.; Naveed, A. Do Immigrants Catch-up with the Natives in Terms of Earnings? Evidence from Individual Level Data of Canada. *Int. Migr.* **2018**, *56*, 204–242. [CrossRef]
19. Fairlie, R.W. The absence of the African-American owned business: An analysis of the dynamics of self-employment. *J. Labor Econ.* **1999**, *17*, 80–108. [CrossRef]
20. Frenette, M. Do the falling earnings of immigrants apply to self-employed immigrants? *Labour* **2004**, *18*, 207–232. [CrossRef]
21. Hansen, J.; Lofstrom, M.; Zhang, X. *State Dependence in Canadian Welfare Participation*; Institute of Labor Economics (IZA): Bonn, Germany, 2006.
22. Heckman, J.J. Heterogeneity and state dependence. In *Studies in Labor Markets*; University of Chicago Press: Chicago, IL, USA, 1981.

23. Heckman, J.J. *The Incidental Parameters Problem and the Problem of Initial Conditions in Estimating a Discrete Time-Discrete Data Stochastic Process and Some Monte Carlo Evidence*; University of Chicago Center for Mathematical studies in Business and Economics: Chicago, IL, USA, 1987.
24. Henley, A. Self-employment status: The role of state dependence and initial circumstances. *Small Bus. Econ.* **2004**, *22*, 67–82. [CrossRef]
25. Hiebert, D. Economic associations of immigrant self-employment in Canada. *Int. J. Entrep. Behav. Res.* **2002**, *8*, 93–112. [CrossRef]
26. Jones, T.; Mascarenhas-Keyes, S.; Ram, M. The ethnic entrepreneurial transition: Recent trends in British Indian self-employment. *J. Ethn. Migr. Stud.* **2012**, *38*, 93–109. [CrossRef]
27. Kenny, B.; Rossiter, I. Transitioning from unemployment to self-employment for over 50s. *Int. J. Entrep. Behav. Res.* **2018**, *24*, 234–255. [CrossRef]
28. Kuhn, P.J.; Schuetze, H.J. Self-employment dynamics and self-employment trends: A study of Canadian men and women, 1982–1998. *Can. J. Econ./Rev. Can. D'économique*. [CrossRef]
29. Lechmann, D.S.; Wunder, C. The dynamics of solo self-employment: Persistence and transition to employership. *Labour Econ.* **2017**, *49*, 95–105. [CrossRef]
30. Lightman, N.; Gingrich, L.G. The intersecting dynamics of social exclusion: Age, gender, race and immigrant status in Canada's labour market. *Can. Ethn. Stud.* **2013**, *44*, 121–145. [CrossRef]
31. Lin, Z.; Picot, G.; Compton, J. The entry and exit dynamics of self-employment in Canada. *Small Bus. Econ.* **2000**, *15*, 105–125. [CrossRef]
32. Maanser, M.E.; Picot, G. The role of self-employment in US and Canadian job growth. *Mon. Lab. Rev.* **1999**, *122*, 10.
33. Manser, M.E.; Picot, G. Self-employment in Canada and the United States. *Perspect. Labour Income* **1999**, *11*, 37–44.
34. Mitze, T.; Naveed, A.; Ahmad, N. International, intersectoral, or unobservable? Measuring R&D spillovers under weak and strong cross-sectional dependence. *J. Macroecon.* **2016**, *50*, 259–272.
35. Mroz, T.A. Discrete factor approximations in simultaneous equation models: Estimating the impact of a dummy endogenous variable on a continuous outcome. *J. Econom.* **1999**, *92*, 233–274. [CrossRef]
36. Mundra, K.; Uwaifo Oyelere, R. Determinants of homeownership among immigrants: Changes during the great recession and beyond. *Int. Migr. Rev.* **2017**. [CrossRef]
37. Murphy, K.M.; Topel, R.H. Estimation and inference in two-step econometric models. *J. Bus. Econ. Stat.* **2002**, *20*, 88–97. [CrossRef]
38. Nakhaie, R.; Lin, X.; Guan, J. Social capital and the myth of minority self-employment: Evidence from Canada. *J. Ethn. Migr. Stud.* **2009**, *35*, 625–644. [CrossRef]
39. Naveed, A.; Ahmad, N. Technology spillovers and international borders: A spatial econometric analysis. *J. Borderl. Study.* **2016**, *31*, 441–461. [CrossRef]
40. Piva, M.; Vivarelli, M. Technological change and employment: Is Europe ready for the challenge? *Eurasian Bus. Rev.* **2018**, *8*, 13–32. [CrossRef]
41. Ramachandran, V.; Shah, M.K. Minority entrepreneurs and firm performance in sub-Saharan Africa. *J. Dev. Stud.* **1999**, *36*, 71–87. [CrossRef]
42. Rybczynski, K. What drives self-employment survival for women and men? Evidence from Canada. *J. Labor Res.* **2015**, *36*, 27–43. [CrossRef]
43. Schuetze, H.J. Self-employment and retirement in Canada: The labour force dynamics of older workers. *Can. Public Policy* **2015**, *41*, 65–85. [CrossRef]
44. Shane, S. Why encouraging more people to become entrepreneurs is bad public policy. *Small Bus. Econ.* **2009**, *33*, 141–149. [CrossRef]
45. Statistcs Canada. *Self Employed Canadians: Who and Why? Labour Statistics at Glance by Lahouaria Yssaad and Vincent Ferrao*; Catalogue no. 71-222-X. ISSN 1710-4254; Statistcs Canada: Ottawa, ON, Canada, 2019; ISBN 978-0-660-31039-8167-178.
46. Storey, D.J. The birth of new firms—Does unemployment matter? A review of the evidence. *Small Bus. Econ.* **1991**, *3*, 167–178. [CrossRef]
47. Vivarelli, M. Is entrepreneurship necessarily good? Microeconomic evidence from developed and developing countries. *Ind. Corp. Chang.* **2013**, *22*, 1453–1495. [CrossRef]

48. Wang, C.; Naveed, A. The Social Inclusion and Inequality Nexus: EU versus non-EU migrants. *Int. Migr.* **2019**, *57*, 41–62. [CrossRef]
49. Wang, S.-W. Determinants of new firm formation in Taiwan. *Small Bus. Econ.* **2006**, *27*, 313–321. [CrossRef]
50. Wooldridge, J.M. Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. *J. Appl. Econom.* **2005**, *20*, 39–54. [CrossRef]