Review of Economics & Finance
Submitted on 25/09/2013
Article ID: 1923-7529-2014-01-13-20
Nisar Ahmad, Rayhaneh Esmaeilzadeh, and Jørgen Hansen

Immigrant-Native Differences in Earnings Mobility Processes

Nisar Ahmad (Corresponding author)
Department of Border Region Studies, University of Southern Denmark
Sønderborg, Alsion 2, 6400, Denmark
Tel: 65501773, Cell: 26843599, Web: http://www.sdu.dk/en/ifg

Rayhaneh Esmaeilzadeh
Ministry of Community and Social Services
Toronto, Ontario, M3M 3A3, Canada

Jørgen Hansen
Department of Economics, Concordia University
1455 de Maisonneuve Blvd. West, H 1155, Montreal, H3G 1M8, Canada

***A*bstract:** This study compares the earnings mobility between immigrants and natives within and between Denmark and Canada. Both countries have different labour market conditions and immigration history which leads to an interesting comparison of earning mobility processes. The paper employs a dynamic multinomial logit model with discrete factor approximation for the specification of unobserved individual heterogeneity. The model takes into account the effect of the endogenous initial conditions problem and unobserved heterogeneity to separate structural and spurious state dependence. The results show that immigrants-native differences in earnings mobility, structural state dependence, and segmentation of earnings distribution are relatively more prominent in Denmark compared to Canada.

JEL Classifications: C33, C35, J15, J38, J61

Keywords: Discrete Factor Approximation, Earnings Mobility Process, Immigrants and Natives, Quartile Mobility Rates, Spurious and Structural State Dependence

1. Introduction

Measuring earnings dynamics could be very interesting for policy makers and researchers. For example, the optimal design of unemployment insurance, social assistance, and other income support programs depend on a good understanding of earnings dynamics and the distribution of earnings in a longer-term perspective. In particular, if a large number of individuals have low earnings or shorter unemployment spells, then this problem can be addressed with various types of unemployment insurance. On the other hand, if smaller numbers of individuals have longer spells then long term structural solutions are required (skill enhancement programs). Similarly, labour market programs, specifically related to human capital development, can be designed and evaluated more accurately with a better understanding of the earnings mobility. For example, if we observe that earnings tend to rise for individuals who stay longer in the labour market, then policies should aim to get people started in the labour market[1].

[1] The policy discussion is derived from Finnie (1997).

Various studies have been carried out to analyze the earnings mobility of the United States and other European countries (see for example, Burkhauser, *et al.* (1997), Grodner (2000), Aaberge, *et al.* (2002) Deding (2002)). As far as we know this is the first study that compares the earnings mobility between immigrants and natives within and across countries. Danish and Canadian data is used for the analysis. This comparison will be very interesting due to the fact that Danish labour market is very different from most other countries in many aspects. For example, Denmark has the highest female labour force participation rate in the world, the highest replacement ratio of unemployment benefits for low-wage earners, relatively widespread eligibility for unemployment benefit (for more details, see (Eriksson and Westergård-Nielsen, 2007)). Unlike a welfare country Denmark, Canada is a capitalist country. According to Canada's Immigration Program (October 2004), Canada has the highest per capita immigration rate in the world.

Immigrants from less developed countries are over-represented in the lower part of the income distribution in both Denmark and Canada. The study by Blume and Verner (2007) for Denmark has shown that first generation immigrants, especially those from the less developed countries, were highly over-represented among the receivers of public income transfers during the period 1984-1999, while immigrants from developed countries are moderately over represented. For Canada, a recent study by Ostrousky (2008) on the dynamics of immigrants' earnings inequality reveals that the economic fortunes of immigrants in recent years have declined. The over representation of immigrants in the lower part of earning distribution can be due to short run reasons, for example, it takes time to learn local language and to obtain country specific skills[2]. However, after obtaining these skills the immigrants should move up in the income ladders. So it will be interesting to compare the mobility of immigrants with natives in the earnings distribution. As far as we know, there is no study that makes this comparison.

Denmark and Canada have very different immigration histories. Denmark was characterized by high labour demand at the end of the 1960s, which triggered labour immigration, mainly from Turkey, Pakistan and Yugoslavia. From that time until 1973, Denmark had a steady inflow of labour immigrants. After 1973, immigration in Denmark is dominated by non-labour immigrants (for example family reunification, refugees). On the other hand, Canada has a very long history of skilled immigration. In 1967, Canada introduced a point system based on the personal characteristics of the applicant to facilitate the immigration process for skilled immigrants. Recently, the Danish government has also introduced the same immigration policies as the Canadian immigration system for skilled workers[3]. So it is of great interest to compare the earnings mobility of immigrants and natives between two countries with different immigration histories.

In this paper, we confine our analysis to estimate Quartile Mobility Rates (QMR), proportions of structural and spurious state dependence, and type specific transition matrices for immigrants and natives in both countries. we estimate and analyze a dynamic multinomial logit model with random effects conditional on observable variables affecting earnings mobility process and controlling for both unobserved individual heterogeneity and endogenous initial conditions problem. We use a method of Maximum Likelihood Estimation (MLE) with factor analytic schemes for unobserved individual heterogeneity and Wooldridge's specification approach to the initial conditions problem (Wooldridge, 2005).

[2] Danish language skills are not required for obtaining Danish temporary residence permit so it very relevant. However, for Canadian immigration it is required to have certain minimum level of English language proficiency but still it may take some time to acquire higher proficiency in language and learn local labour market skills.

[3] For more information on new immigration policies in Denmark visit www.newindenmark.dk. For more information on immigration policies on Canada visit www.cic.gc.ca

This paper is organized in the following way. Section 2 explains structural and spurious state dependence. Section 3 gives background information about the immigration history of Denmark and Canada. The data is described in section 4. Section 5 presents an empirical specification of the dynamic model. We discuss the empirical results in section 6 and conclude in section 7.

2. Structural and Spurious State Dependence

Any persistence in (or transition into and out of) the lowest, middle, and uppermost parts of the earnings distribution can be a product of some measured and unmeasured variables. Exploring the main reasons for observed persistence[4] is essential to properly estimate the parameters of interest in dynamic framework models.

According to Heckman (1981a), individuals may differ in certain unobserved variables that influence their probability of experiencing the event but are not influenced by the experience of it. Heckman (1981a, p.115) argues that, "if these differences are not properly controlled, previous experience may appear to be a determinant of future experience solely because it is a proxy for temporally persistent unobservable that determine choices." Improper treatment of unobserved variables gives rise to a conditional relationship between future and past experience that is termed as spurious state dependence. Distinguishing between unobserved individual heterogeneity and structural state dependence is crucial in dynamic analysis frameworks and economic policies.

The effectiveness of public policy depends on the proportion of structural and spurious state dependence. Consider a policy change which has the effect of temporally moving non-employed workers into the employment state. If there is a positive structural state dependence in employment, the policy intervention will cause a persistent increase in employment. Consequently, the intervention is likely to reduce the number of individuals who are dependent on benefits (unemployed) or live on a low income (Prowse, 2005). In this case, changes in benefit rules or introducing labour market training programs are also more likely to meet their objectives (Hansen, *et al*. 2006). On the other hand, if the observed serial persistence in unemployment is due to permanent unobserved heterogeneity, then the policy stated above is less likely to have an effect.

3. History of the Immigration process in Denmark and Canada

As mentioned earlier, Denmark and Canada have different immigration histories. Denmark has a relatively short history of immigration, whereas a formal immigration policy in Canada started in 1947.

Until the 1950s, Denmark was a country of net emigration. Denmark was characterized by high labour demand at the end of the 1960s, which triggered labour immigration, mainly from Turkey, Pakistan and Yugoslavia. From that time until 1973, Denmark had a steady inflow of labour immigrants. Then a ban was introduced for labour market-oriented immigration from *non-European Economic Area* (EEA) nationals. Immigration continued afterward, but mainly through family reunification. Since 1979, Denmark has accepted refugees on an annual basis for humanitarian migration. In the early 1990s, the number of war refugees and asylum seekers increased from former Yugoslavia and other countries. The peak in asylum seeking was reached in 1992-1993 at the same time as the peak in the country's unemployment rate (see Liebig (2007) for more details).

[4] Observed persistence is due to unobserved individual heterogeneity, structural state dependence, and other observable covariates.

Like most other European countries, Denmark needs more immigrants in the labour market due to aging and lower population growth. Unlike the immigration policies in Canada, Australia, and other developed countries, there was no selective skilled immigration process in Denmark to facilitate skilled immigrants into the economy. Most immigrants in Denmark came through family reunification, as refugees, and asylum seekers, especially from non-western countries. Danish immigration policy is now moving towards skilled immigration since 2002. This major structural change partly is taking place with the introduction of new green card and job card schemes and partly because of the reduction of family and refugee immigrants. For example, in 2002 Green Card Scheme, like the Canadian skilled immigration system, was introduced for professionals of various fields to come and search for a job in Denmark. They are initially given a work permit for three years. Furthermore, the government has introduced laws to reduce forced marriages, which has reduced the number of family class immigrants[5].

Unlike the immigration laws of Denmark, immigration laws in Canada went through major changes many years ago[6]. In 1967, Canada introduced a point system based on the personal characteristics of the applicant to facilitate the immigration process for skilled immigrants. In 1992, the family class of immigrants was reduced and the government was committed to a stable net inflow of 1 per cent of the current population. In 2002, the immigration act of 1976 was replaced to attract young bilingual and educated workers. For example, more points were allocated to applicants with trade certificates, bilingual skills (French and English), and greater weight was placed on the first two years of experience. There are three main categories of immigrants in Canada, i.e., independent immigrants (immigrated on the basis of skills, capital and labour market abilities), family class (through family reunification), and refugees. About 56.1 per cent of the immigrants, who arrived in 2005, were skilled workers[7]. According to Canada's Immigration Program (October 2004), Canada has the highest per capita immigration rate in the world[8].

4. Data

To distinguish between true and spurious state dependence and to control for unobserved individual heterogeneity, longitudinal data with a large cross-sectional sample size is required. Our analysis is based on two longitudinal data sets taken from Denmark and Canada. For Denmark, we use the Administrative Registered Data supplied by Statistics Denmark to Labour Market Dynamic Growth (LMDG). This data set contains labour market and demographic information for all immigrants and natives aged 15 to 70 for the years 1980 to 2003. The information about income and demographic variables are reliable since they originated from the income-tax registers of the government.

For Canada, we use levels of Statistics Canada's Survey of Labour and Income Dynamics (SLID). SLID has three complete and one incomplete longitudinal data panels. Each complete panel covers six years for almost 15,000 households, which is a suitable source of data for this research.

[5] http://www.nyidanmark.dk/en-us/coming_to_dk/familyreunification/spouses/forced_marriages.htm Dated (28-10-2013) from official Danish immigration website.

[6] This information is based on a presentation by Geneviève Bouchard in her Workshop on German and European Migration and Immigration Policy from a Transatlantic Perspective: Challenge for the 21st Century. Its website: http://www.irpp.org/miscpubs/archive/$bouchard_immig.pdf

[7] It is calculated from the Annual Report to Parliament on Immigration, 2005. http://www.cic.gc.ca/english/resources/publications/annual-report2005/section3.asp dated 31-10-2013

[8] http://en.wikipedia.org/wiki/Economic_impact_of_immigration_to_Canada#cite_note-CIP-3 dated 31-10-2013

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. Income information in SLID is taken from the Longitudinal Administrative Data (LAD) and therefore is accurate. A relatively large sample size of micro data is required as it is more representative of the total population in the survey. We use annual data from the first three panels of SLID. The first panel is from December 1992 to the end of 1998, the second is from December 1995 to the end of 2001, and the third is from December 1998 to the end of 2004. The final sample for Canada consists of 12 years ranging from 1993 to 2004. All estimation results and descriptive statistics outputs for Canada are weighted by longitudinal weight variables provided by Statistics Canada. For Denmark, a random sample of 40,000 individuals per year (1994-2003) is drawn from the data.

Gross annual income (before tax) is used to rank individuals in the earning distribution. This income does not include child or housing benefits from the state. The same concept of income is used in both Denmark and Canada. The data is restricted to men aged 25 to 55. The reason for this restriction is that men are less likely to be affected by secular increase in school attendance or labour market participation than women in the same age group. Moreover, men in this age group are more likely to have full-time jobs[9]. To control for business cycle effects, the dynamic model includes aggregate unemployment rates taken from Statistics Denmark and CANSIM II (Table 282-0055)[10]. In addition to the aggregate unemployment rate, the models also control for level of education, marital status, age, levels of work experience, and country of origin[11].

For education, we use a dummy variable indicating if a person has at least a high-school degree at the time of entry into the panel[12]. Marital status is defined if a person is legally married or lives with a registered partner. Since people in different age groups have different earnings profiles (Beach and Finnie, 2001), we prefer to divide age into three groups, i.e., prime (25-35), middle (36-45), and older (46-55). Similarly, for experience, we have sets of dummy variables for people with no more than 8, between 8 and 16, and more than 16 years of experience[13]. To control for the country of origin, immigrants are divided in two main groups, i.e., immigrants from developed countries and those from the less developed countries[14]. The same data restrictions are applied to both Denmark and Canada.

[9] In this paper, self-employed workers are dropped from the sample. We only look at men who are paid-employed in their main jobs.

[10] CANSIM is Statistics Canada's key socioeconomic database.

[11] Years since immigration might be a significant factor in persistence of or transition into (and out of) any earnings quartiles. Unfortunately, The Danish administrative data set provides no information about immigrants' years of arrival. To have two models, comparable for Canada and Denmark (and the fact that this variable might have no (or low) significant effect for Canadian immigrants) we ignored the effect of this variable in our estimation.

[12] To compare two countries with different educational system, we use a dummy variable for education instead of years of schooling. We also treated education as a time-invariant variable because there is small variation in education among individuals in this selected age group.

[13] People with lower experience, are expected to have lower earnings profile; moreover, experience more than 16 years is recorded as 16 in Danish data, so we use dummy variables for experience, instead of years of experience.

[14] The List of developed countries includes high-income OECD countries plus the following relatively smaller countries: Hong Kong, Israel, Singapore, Taiwan, Andorra, Bermuda, Faroe Islands, Liechtenstein, and San Marino (World Development Indicators, 2008).

4.1 Descriptive Statistics

There are five mutually exclusive states that an individual can take (one of them) each year i.e. state zero representing unemployed or non-employed and four states representing quartile earnings distribution. Table 1 provides information on earnings[15] quartiles and mean characteristics of immigrants and natives in Denmark and Canada. Immigrants in Denmark are over represented in state zero and one compared to their Canadian counterparts. About 14.8 and 37 per cent of immigrants in Denmark are in state zero and one respectively. The equivalent figures for Canadian immigrants are 7.8% and 26.8%. Natives in both Denmark and Canada are evenly distributed in the earning distribution.

Table 1. Mean Characteristics of Male by Immigrants and Natives, Denmark and Canada

Variables		Denmark		Canada	
		Immigrants	Natives	Immigrants	Natives
Quartiles Dummies	**People not working (Quartile Zero)[1]**	0.148	0.036	0.078	0.080
	People with Earnings in First Quartile	0.370	0.235	0.268	0.207
	People with Earnings in Second Quartile	0.195	0.241	0.223	0.236
	People with Earnings in Third Quartile	0.146	0.243	0.183	0.244
	People with Earnings in Forth Quartile	0.140	0.243	0.249	0.232
Observed Characteristics	**Educated[2]**	0.681	0.760	0.803	0.770
	Married[3]	0.668	0.572	0.825	0.759
	Origin (Developed Countries)[4]	0.317	-	0.485	-
	Age between 25 - 35	0.306	0.303	0.238	0.265
	Age between 35 - 45	0.465	0.455	0.416	0.468
	Age between 45 - 55	0.229	0.242	0.349	0.266
	Experience less than 8 years	0.430	0.079	0.199	0.091
	Experience between 8 to 16 years	0.381	0.396	0.312	0.247
	Experience more than 16 years	0.189	0.525	0.491	0.661
	Aggregate Unemployment Rate	7.36	7.36	8.30	8.30
Number of Observations		13110	386890	4236	31338
Number of Individuals		1311	38689	706	5223

Data Source: For Denmark, Registered Administrative Datasets, 1994-2003, supplied by Statistics Denmark to Labor Market Dynamic Growth (LMDG). For Canada, Survey of Labor and Income Dynamics (SLID), 1993-2004, based on a sample of males aged 25 to 55. The figures for Canada are weighted with longitudinal weight variables provided by Statistics Canada. The figures are rounded to three decimal points

1- This excludes the people who are retired, getting education or on leaves.
2- Having at least 14 years of formal education.
3- Married or Registered Partner
4- If an immigrant was born in any High-Income countries i.e. OECD countries or Hong Kong, Israel, Singapore, Taiwan, Andorra, Bermuda, Faroe Islands, Liechtenstein, and San Marino (World Development Indicators, 2008).

[15] Earnings are adjusted by Consumer Price Index (CPI).

First, we compare the mean characteristics of Danish and Canadian immigrants. Table 1 shows that 68.1 per cent of Danish immigrants have at least high-school degrees. For Canadian immigrants the percentage is 80.3. The proportion of married people is much higher for Canadian immigrants. About 82.5 per cent of Canadian immigrants are married or registered partners, while the Danish equivalent figure is 66.7%. The percentage of immigrants from developed countries is higher in Canada (48.5%) than in Denmark (31.7%). The reason is that the immigration policy in Canada, before 1962, gave higher priority to immigrants from European countries[16]. The proportion of immigrants in prime and middle ages is higher in Denmark than in Canada.

Second, we compare mean characteristics of natives in two countries. Overall, natives in the two countries have very similar patterns of observed characteristics; however, compared to Canada, natives in Denmark have a lower percentage of married or registered partners.

Table 2 shows transition matrices of immigrants and natives for both countries. This table reveals several interesting relationships and patterns among immigrants and natives. We also examine the issue of state dependence in the raw data. The diagonal of these matrices represents the probability of staying in the same quartile, whereas off-diagonal elements represent the probability of moving to another quartile one year later. Elements on the diagonals of each matrix give strong evidence of state dependence in the raw data.

Table 2. Quartile Mobility Rates, Conditional Probability of Leaving Previous Year's Quartile by Immigrants and Natives

(I) Denmark

Origin Quartile	Destination Quartile					Direction		
	Q_0	Q_1	Q_2	Q_3	Q_4	Down	Stable	Up
Immigrants								
Q_0	**0.554**	0.383	0.034	0.018	0.009	0	**0.554**	0.444
Q_1	0.096	**0.726**	0.135	0.035	0.008	0.096	**0.726**	0.178
Q_2	0.036	0.195	**0.592**	0.164	0.013	0.231	**0.592**	0.177
Q_3	0.019	0.049	0.199	**0.612**	0.121	0.267	**0.612**	0.121
Q_4	0.018	0.012	0.022	0.094	**0.853**	0.146	**0.853**	0
Total	**0.152**	**0.371**	**0.192**	**0.145**	**0.140**	**0.141**	**0.674**	**0.185**
Natives								
Q_0	**0.406**	0.440	0.083	0.045	0.025	0	**0.406**	0.593
Q_1	0.047	**0.738**	0.176	0.032	0.006	0.047	**0.738**	0.214
Q_2	0.014	0.160	**0.639**	0.173	0.014	0.174	**0.639**	0.187
Q_3	0.010	0.027	0.163	**0.675**	0.125	0.200	**0.675**	0.125
Q_4	0.009	0.007	0.013	0.108	**0.863**	0.137	**0.863**	0
Total	**0.035**	**0.236**	**0.242**	**0.243**	**0.244**	**0.138**	**0.715**	**0.147**

[16] In the 1950s, 84.6 per cent of all Canadian immigrants were European by birth. The government of Canada abandoned this policy in 1962.

(II) Canada

Immigrants								
Origin Quartile	**Destination Quartile**					**Direction**		
	Q_0	**Q_1**	**Q_2**	**Q_3**	**Q_4**	**Down**	**Stable**	**Up**
Q_0	**0.848**	0.125	0.026	0.006	0	0	**0.848**	0.157
Q_1	0.030	**0.840**	0.104	0.019	0.007	0.030	**0.840**	0.130
Q_2	0.007	0.121	**0.734**	0.125	0.013	0.128	**0.734**	0.138
Q_3	0.003	0.011	0.148	**0.707**	0.129	0.162	**0.707**	0.129
Q_4	0	0.003	0.014	0.099	**0.883**	0.116	**0.883**	0
Total	**0.079**	**0.268**	**0.223**	**0.179**	**0.249**	**0.095**	**0.804**	**0.101**
Natives								
Q_0	**0.930**	0.043	0.012	0.008	0.006	0	**0.930**	0.069
Q_1	0.016	**0.843**	0.124	0.012	0.005	0.016	**0.843**	0.141
Q_2	0.005	0.106	**0.748**	0.131	0.009	0.111	**0.748**	0.140
Q_3	0.005	0.012	0.127	**0.725**	0.131	0.144	**0.725**	0.131
Q_4	0.003	0.002	0.007	0.138	**0.849**	0.150	**0.849**	0
Total	**0.080**	**0.207**	**0.236**	**0.244**	**0.232**	**0.099**	**0.800**	**0.100**

The full transition matrices show that the vast majority of movements reach adjacent quartiles for both immigrants and natives in the two countries. For example, for immigrants in Denmark, the probability of moving up to quartile two from quartile one is 13.5% higher than that of moving from quartile one to four, which is 0.8%. The equivalent figures for natives are 17.6% and 0.6%. There is a negative correlation between the initial quartile with upward mobility for immigrants and natives in Denmark. Thus the quartile and its lag are not independent, and being in one quartile one year increases the probability of being in the same quartile the year after (state dependence). Our findings confirm the finding of Brodaty (2007).

The probability of moving down to the next quartile from any of the earning quartiles is statistically higher for Danish immigrants compared to Danish natives. The one exception to this is the transition from quartile 4 to quartile 3. Whereas the probability of moving up in the next quartile from any of the earning quartile is higher for Danish natives than Danish immigrants. The difference is statistically significant for transition from quartile zero to one and from quartile one to two. For example, the probability of moving up from quartile one to quartile two is 13.5% for immigrants, whereas the equivalent figure for natives is 17.6%. Exactly the same pattern is true for Canadian immigrants and natives.

Aggregated or overall upward mobility (weighted average of all upward transitions) is higher than overall downward mobility for both immigrants and natives in the two countries. For example, overall upward mobility for Danish immigrants is 18.5% which is statistically higher than the downward mobility which is 14.1%. The comparison between Danish immigrants and natives show that Danish immigrants have statistically higher upward mobility (18.5%) compared to the over upward mobility of Danish natives (14.7%). This is quite consistent with the fact that immigrants start low but gradually move up in the income ladder. Overall downward mobility is also higher for Danish immigrants compared to Danish natives but it is not statistically significant. Immigrants in Canada also have higher upward and downward mobility compared to natives in Canada but these differences are not statistically significant.

5. Model and Empirical Specification

To analyze any movements into and out of any earnings quartiles, we choose a dynamic unordered multinomial logit model. We analyze the dynamic structure of the model as a first-order Markov process. It is assumed that individual *i* belongs to alternative *q* at time *t*. We also suppose that utility V_{iqt}^{*} is the sum of a deterministic component, U_{iqt} which depends on regressors, unknown parameters, and an unobserved random component, ε_{iqt} :

$$V_{iqt}^{*} = U_{iqt} + \varepsilon_{iqt} \tag{1}$$

This is called an Additive Random-Utility Model (ARUM). We observe the outcome $Y_{it} = q$ if alternative *q* has the highest utility of the alternatives. It follows that:

$$\Pr(Y_{it} = q) = \Pr(V_{iqt}^{*} > V_{ijt}^{*}) = \Pr(V_{ijt}^{*} - V_{iqt}^{*} \le 0), \forall j \tag{2}$$

and given (1),

$$\Pr(Y_{it} = q) = \Pr(\varepsilon_{ijt} - \varepsilon_{iqt} \le U_{iqt} - U_{ijt}) \tag{3}$$

Now assume that individuals indexed by *i (i = 1, 2,...,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)* as below:

- $q_t = 0[0]$ (Unemployed or non-employed)
- $q_t = 1(0,25]$ (Individuals with earnings in the range from minimum observed value to the 25th percentile)
- $q_t = 2(25,50]$ (Individuals with earnings between the 25th and 50th percentile)
- $q_t = 3(50,75]$ (Individuals with earnings between the 50th and 75th percentile)
- $q_t = 4(75,100]$ (Individuals with earnings between the 75th and 100th percentile)

Let the value, for individual *i*, of belonging to quartile *q* at time $t(V_{iqt}^{*})$ be specified as:

$$V_{iqt}^{*} = X_{it}\beta_q + Z_{it}\gamma_q + D_i\delta_q + \varepsilon_{iqt} \tag{4}$$

where,

$$\varepsilon_{iqt} = \mu_{iq} + \upsilon_{iqt} \tag{5}$$

X_{it} is a vector of observed variables, including age groups, marital status, experience groups, and the aggregate unemployment rate. Z_{it} is a vector of dummy variables indicating the previous earnings quartile occupied by the individual *i* (time state dependence). For Canadian immigrants, we dropped observations in extreme transitions, for example, from quartiles three and four to one, similarly from quartiles one and two to four. This is due to the fact that there are few moves in these transitions, which make it difficult to get the parameter estimates. For the usual identification purpose, we take quartile zero as the reference quartile. D_i is a vector of time-invariant variables, including dummies for education and country of origin (developed or less developed).

The assumption regarding the error term, ε_{iqt} , can be summarized as follows: ε_{iqt} is composed of two terms: ν_{iqt} and μ_{iq} . Where ν_{iqt} is assumed to be serially uncorrelated and follows a Type I extreme value distribution. μ_{iq} is an unobserved, individual specific factor and independent of X_{it} and D_i, but not Z_{it} (endogeneity problem). If μ_{iq} is treated as a parameter to

be estimated (fixed effects approach), then there is a severe incidental parameter problem (Heckman, 1981b). Following Chamberlain (1984), the consistency of the maximum likelihood estimator requires that $T \to \infty$. Most household panel data sets contain many individuals but only a small and fixed number of T. Random effects analysis in this context may therefore seem more efficient than fixed effects analysis.

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 experience. According to Chay and Hyslop (2000), 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 adopt the method suggested by Wooldridge (2005). Following him, we consider the distribution of the unobserved effects, μ_{iq}, conditional on Z_{i1} and the mean values of exogenous time-varying variables over time $\overline{X}_i$. Z_{i1} is a vector of initial earnings quartiles[17]. μ_{iq} can be written as:

$$\mu_{iq} = \overline{X}_i \lambda_q + Z_{i1}\rho_q + \nu_{iq} \tag{6}$$

Therefore V^*_{iqt} can be written as:

$$V^*_{iqt} = X_{it}\beta_q + Z_{it}\lambda_q + D_i\delta_q + \overline{X}_i\lambda_q + Z_{i1}\rho_q + \nu_{iq} + \upsilon_{iqt} \tag{7}$$

Following Mroz (1999), we assume that the probability distribution of μ_{iq} can 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 ν_{iq} is given by:

$$P\left(\nu_{iq} = \nu_q^m\right) = \pi_m, m = 1,2,...,M \tag{8}$$

where, each

$$\pi_m \geq 0 \tag{9}$$

π_m is the probability that the unobserved factor takes on the values of ν_{iq}^m. To be specific, there are m types of individuals and each individual, *i*, at any quartiles of *q* is endowed with a set of unobserved characteristics, ν_{iq}^m.

To estimate simultaneously the parameters $\beta_q, \gamma_q, \delta_q, \left(\nu_{iq}^1,...,\nu_{iq}^m\right)$, and $\left(p_1,...,p_m\right)$ we use a logistic transformation as:

$$\pi_m = \frac{\exp\left(p_m\right)}{\sum_{j=1}^{M}\exp\left(p_j\right)} \tag{10}$$

where,

$$0 < \pi_m < 1 \tag{11}$$

and

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

[17] As mentioned earlier in this paper, for the usual identification purpose, quartile zero has been taken as the reference group.

To select the number of support points, we calculate the value of the AIC (Akaike Information Criteria) and the BIC (Bayesian Information Criteria)[18] when an additional point of support is added. We stop adding more support points to the model when either values start decreasing.

The likelihood contribution for individual ***i*** with observed quartile states $q_1,...,q_T$ given all observed and unobserved effects can be written as:

$$L_i(v_i) = \prod_{t=2}^{T} P_{it}(q_t / v_i) \tag{13}$$

Where v_i is a vector of v_{iq} for $q_t = 0,1,...,4.$ $q_t = q$ if $V_{iqt}^* > V_{ilt}^*$ for $q \neq l$. This results in a five-state multinomial logit with the random effects as:

$$P_{it}(q_t = q/v_i) = \frac{\exp\left(X_{it}\beta_q + Z_{it}\gamma_q + D_i\delta_j + \overline{X}_i\lambda_q + Z_{i1}\rho_q + v_{iq}\right)}{\sum_{j=0}^{4}\exp\left(X_{it}\beta_j + Z_{it}\gamma_j + D_i\delta_j + \overline{X}_i\lambda_j + Z_{i1}\rho_j + v_{iq}\right)} \tag{14}$$

As earlier mentioned there are *m* types of individuals *i* with the set of unobserved characteristics, v_i^m that is a vector of $\left(v_{iq}^1,...,v_{iq}^m\right)$. We can write the unconditional log-likelihood function as

$$\log L_i = \log \sum_m \pi_m L_i\left(v_i^m\right) \tag{15}$$

and therefore we have

$$L_{TN} = \prod_{t=2}^{T}\prod_{i=1}^{N}\sum_{m=1}^{M}\pi_m P_{it}(q_t = q/v_i) \tag{16}$$

6. Empirical Results

In this section, we report estimation results from maximizing[19] the likelihood function[20] of the multinomial logit model controlling for the endogenous initial conditions problem and unobserved heterogeneity. To show the efficiency of the model specification, as well as to distinguish between spurious and structural state dependence, we estimate the model when there is no control for the endogenous initial conditions problem and unobserved heterogeneity factors.

We experimented with different support points to find the best fitted models. We stopped adding more support points when either AIC or BIC stopped decreasing. For both Canada and Denmark, we found that models with three and four[21] support points (unobserved types) for immigrants and natives respectively fit the data quite well.

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[18] AIC and BIC are measures of goodness of fit. In fact, they show how well the model fits the data. AIC penalizes free parameters less strongly than does BIC:

AIC = **-2*f + 2*npar** and BIC= **-2*f +** log**(n)*npar**

where, **f** is the value of the objective function, **n** is the number of individuals, and **npar** is the number of parameters.

[19] We tried with many different starting values to get the converged estimates of the parameters and to avoid multiple local optima.

[20] The likelihood function for Canadian data is weighted with weight variables provided by statistics Canada.

[21] The model with five support points for Danish natives did not converge. Hence, we stopped adding more support points after four support points.

As expected, assuming that the initial conditions are exogenous while ignoring unobserved factors generates inflated estimates of the degree of state dependence. When the model ignores the effects of unobserved factors, it erroneously assumes that the correlation between state dependence variables and time-invariant unobserved factors is zero. This invalid assumption overestimates state dependence parameters. Comparison of parameter estimates of the state dependence variables (the γ_q's) in the models with and without controlling on these factors confirms the argument. This is in line with many other studies on dynamic analysis frameworks of discrete choice modeling, see for example, Brodaty (2007), Stewart (2007), Hansen, *et al*. (2006), and Henley (2004).

In order to get the identification in the multinomial logit model, we need to drop one equation (or state), so in this paper we used unemployment /non-employment as our reference state. The models presented in this paper have 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 study focuses on the estimated transition probabilities, downward and upward mobility rates, proportion of spurious and structural state dependence, and type specific transition matrices. However, we found that all state dependence parameters and their initial values are statistically significant. For example, almost all coefficients in Table A1 (in the appendix) are positive and statistically significant; indicating that transition towards the unemployment state is less probable.

6.1 Structural Transitional Matrices

Table 3 and 4 report estimated conditional probabilities of leaving previous year's quartile with control for endogenous initial conditions problem and unobserved heterogeneity factors. First we estimated conditional probabilities without controlling for the initial condition and unobserved heterogeneity[22].

As expected, when controls for these factors are incorporated in the model, there is a reduction in estimated stability rates and an increase in the transition probabilities for all earnings quartiles. This reduction in the stability rates is due to the fact that some portion of observed persistence is attributed to unobserved serial correlations (Heckman, 1981b). For earning mobility process, Brodaty (2007) found that stability will be reduced when the model controls for these factors. This fact has been confirmed by various studies with different applications. For example, Hansen, *et al*. (2006) found this pattern in analyzing transitions into and out of social assistance in Canada. Arulampalam, *et al*. (2000) also found the same results for modeling the unemployment incidence of British men.

Table 3 reports transition matrices for Danish immigrants and natives after controlling for spurious effects, so this table can be interpreted as the structural part of the transition probabilities. Compared to Table A2 (transition matrices without controlling for initial conditions and unobserved heterogeneity), structural stability rates in table 3 are lower. For example, the stability rate in state zero for immigrants decreased from 48.6% (in Table A2) to 43.3% (in Table 3), a decline of about 10%. This reduction is due to the serial correlation of unobserved characteristics with initial observations of state dependence variables.

Structural stability rates for immigrants in Table 3 are higher in the lower and upper quartiles (quartiles one and four) compared to the middle quartiles (quartiles two and three). For example, the stability rates in quartiles one and four are 62.6 % and 68.7% respectively, whereas the equivalent figures in quartiles two and three are 40.5% and 59.7%. This is in line with Brodaty

[22] We have used bootstrap method to test the statistical difference between two probabilities.

(2007), who explain that individuals who are in the lowest quartile today could face a deterioration of their human capital (skills and abilities) that would make their rise more difficult in the future. Unlike stability rate for immigrants, the structural stability rate for natives is higher in the middle two quartiles. Another important observation about this table is that immigrants have higher stability rates in state zero compared to natives. The higher persistence of immigrants in state zero is consistent with the fact that immigrants in Denmark have a higher tendency to stay unemployed (or non-employed) possibly due to the higher unemployment or welfare benefits relative to a low wage (Pedersen and Smith, 2002).

Table 3. Structural Transition Matrix for Danish Immigrants and Natives, Estimated Conditional Probabilities of Leaving Previous Year's Quartile.
(Control for Endogenous Initial Conditions and Unobserved Heterogeneity)

Immigrants

Origin Quartile	Destination Quartile					Direction		
	Q_0	Q_1	Q_2	Q_3	Q_4	Down	Stable	Up
Q_0	**0.433**	0.490	0.045	0.017	0.011	0.000	**0.433**	0.567
Q_1	0.139	**0.626**	0.164	0.060	0.011	0.139	**0.626**	0.235
Q_2	0.078	0.304	**0.405**	0.206	0.007	0.382	**0.405**	0.213
Q_3	0.028	0.074	0.155	**0.597**	0.147	0.256	**0.597**	0.147
Q_4	0.053	0.037	0.062	0.162	**0.687**	0.313	**0.687**	0.000
Distribution	**0.100**	**0.378**	**0.199**	**0.176**	**0.147**	**0.220**	**0.566**	**0.214**

Natives

	Q_0	Q_1	Q_2	Q_3	Q_4	Down	Stable	Up
Q_0	**0.153**	0.517	0.170	0.080	0.081	0.000	**0.153**	0.847
Q_1	0.037	**0.501**	0.308	0.105	0.049	0.037	**0.501**	0.462
Q_2	0.015	0.161	**0.507**	0.257	0.061	0.175	**0.507**	0.318
Q_3	0.010	0.060	0.232	**0.542**	0.157	0.302	**0.542**	0.157
Q_4	0.041	0.062	0.104	0.327	**0.466**	0.534	**0.466**	0.000
Distribution	**0.024**	**0.225**	**0.269**	**0.253**	**0.229**	**0.254**	**0.496**	**0.249**

The probability of moving up into the next quartile from any of the earning quartiles is higher for natives compared to immigrants. We also note that all movements for both immigrants and natives have the higher probabilities of reaching the adjacent quartiles. For example, for natives the probability of moving from quartile one to quartile two is 30.8% higher than that of a transition from one to three, which is 10.5%. Overall upward mobility is higher for natives compared to immigrants. This result is opposite what we find in the raw data. It means that after controlling for observed and unobserved effects, Danish natives have overall higher upward mobility. Downward mobility is also lower for immigrants compared to natives in Denmark.

Table 4 reports the transition matrices for Canadian immigrants and natives after controlling for unobserved heterogeneity factors and endogenous initial conditions problem. The structural state dependence is lower in any earnings quartiles including state zero, compared to the equivalent figures in Table A3 in the appendix (estimated transition without controlling the effects). Structural state dependence in state zero is 15.8% for immigrants and 22.3% for natives, much lower than equivalent figures in Table A3, which are 73.4% and 84.8%. There are relatively lower proportions of structural effects in all quartiles compared to the equivalent figures we found for Denmark.

Table 4. Structural Transition Matrix for Canadian Immigrants and Natives, Estimated Conditional Probabilities of Leaving Previous Year's Quartile
(Control for Endogenous Initial Conditions and Unobserved Heterogeneity)

Immigrants								
Origin Quartile	**Destination Quartile**					**Direction**		
	Q_0	**Q_1**	**Q_2**	**Q_3**	**Q_4**	**Down**	**Stable**	**Up**
Q_0	**0.158**	0.382	0.375	0.085	0.000	0.000	**0.158**	0.842
Q_1	0.034	**0.424**	0.439	0.102	0.000	0.034	**0.424**	0.541
Q_2	0.047	0.197	**0.509**	0.248	0.000	0.243	**0.509**	0.248
Q_3	0.000	0.000	0.211	**0.491**	0.298	0.211	**0.491**	0.298
Q_4	0.000	0.000	0.041	0.414	**0.545**	0.456	**0.545**	0.000
Distribution	**0.044**	**0.234**	**0.235**	**0.216**	**0.271**	**0.234**	**0.479**	**0.286**
Natives								
	Q_0	**Q_1**	**Q_2**	**Q_3**	**Q_4**	**Down**	**Stable**	**Up**
Q_0	**0.223**	0.263	0.200	0.153	0.161	0.000	**0.223**	0.777
Q_1	0.082	**0.400**	0.292	0.122	0.104	0.082	**0.400**	0.518
Q_2	0.070	0.181	**0.415**	0.224	0.110	0.250	**0.415**	0.335
Q_3	0.065	0.119	0.219	**0.426**	0.171	0.403	**0.426**	0.171
Q_4	0.068	0.105	0.132	0.407	**0.289**	0.711	**0.289**	0.000
Distribution	**0.074**	**0.224**	**0.242**	**0.252**	**0.207**	**0.328**	**0.374**	**0.298**

Like the structural stability rates for Danish natives, the structural stability rates for Canadian natives are lower in the upper and lower quartiles than in the middle part. One reason for this pattern is the higher upward and downward movements in quartile one and four. Workers in the middle of the distribution appear to have relatively stable earnings and hence more persistence. Overall stability rates are slightly higher for immigrants than for natives in every quartile.

The overall upward mobility rate for Canadian immigrants (28.6%) is higher than the downward mobility rate (23.4%). Natives have a higher downward mobility rate (32.8%) than the upward one (29.8%). Immigrants in any earnings quartile have more chances to move up to the next

quartiles, compared to the natives. For example, the probability of moving up from quartile one to quartile two for immigrants is 43.9% whereas the equivalent figure for natives is 29.2%.

The above discussion about transitional matrices can be summarized as follows:

- Natives in both countries have slightly higher upward and downward mobility compared to immigrants in the respective country.
- Natives in both countries have higher stability in the middle parts (quartiles two and three) compared to lower and upper parts (quartiles one and four) of the earnings distribution, which is opposite what we found in the observed transition matrices for the two countries.
- The probability of moving up into the next quartile from any of the earning quartile is higher for Danes compared to immigrants in Denmark. The opposite is true for Canadian natives and immigrants.
- Canadian Immigrants and Natives have a higher proportion of spurious effects compared to Danish immigrants and natives.

6.2 Structural and Spurious Effects

Distinction between structural and spurious effects is crucial for economic policy making. Therefore, to find the proportion of structural effects in the observed persistence, we decompose stability rates into two parts, i.e., structural and spurious. Structural effects are the ratio of state dependence probabilities with and without controlling for unobserved effects. Table 5 reports the percentage of structural and spurious state dependence.

Table 5. Percentage of Structural and Spurious State Dependence in Earnings Quartiles

		Not Working		**Q_1**		**Q_2**		**Q_3**		**Q_4**	
		Structural	**Spurious**	**Structural**	**Spurious**	**Structural**	**Spurious**	**Structural**	**Spurious**	**Structural**	**Spurious**
Denmark	**Immigrants**	**89.1**	10.9	**84.0**	16.0	**66.6**	33.4	**89.5**	10.5	**78.7**	21.3
	Natives	**58.8**	41.2	**65.4**	34.6	**75.8**	24.2	**76.2**	23.8	**53.0**	47.0
Canada	**Immigrants**	**21.5**	78.5	**50.5**	49.5	**69.6**	30.4	**68.8**	31.2	**61.6**	38.4
	Natives	**26.3**	73.7	**48.1**	51.9	**55.4**	44.6	**58.3**	41.7	**34.6**	65.4

As shown in Table 5, structural state dependence for immigrants in Denmark is quite high compared to natives in every earnings quartile except quartile two. Immigrants and natives in Canada have a very low structural state dependence in quartile zero compared to their Danish counterparts. The difference is higher among immigrants. For example, structural state dependence for Danish immigrants in quartile zero is 89.1%, whereas the same figure for Canadians is 21.5%.

In Denmark, we note that the immigrant-native differences in proportion of structural and spurious state dependence are more prominent in the state of unemployment and lower part of the earning distribution. One reason for such differences can be that immigrants in Denmark mostly immigration for the reasons other than working. In order to reduce these differences, the Danish government should continue facilitating skilled immigrants to the labour market, which will reduce the proportion of non-skilled immigrants in Denmark.

7. Summary and Conclusions

This paper analyzes transitions into and out of any of the four earnings quartiles, and quartile zero (accounting for unemployment and non-employment state). We analyze the dynamic structure of the model as a first-order Markov process. To take into account the effect of the endogenous initial conditions problem and unobserved heterogeneity factors, we use administrative registered data for Denmark (1994-2003) and longitudinal levels of SLID data for Canada (1993-2004). The model is a dynamic multinomial logit model with discrete factor approximation for the specification of unobserved individual heterogeneity and Wooldridge's approach for controlling initial conditions problem. To avoid the effect of secular increase in labour market participation or school attendance, the data is restricted to males aged 25 to 55 years old. For Denmark, a random sample of 40,000 individuals is used for the analysis. For Canada all estimation results and descriptive statistics are weighted with the weight variables provided by Statistics Canada.

The estimation results show that the extent of state dependence (mobility) is overestimated (underestimated) if the model does not control for endogenous initial condition and unobserved heterogeneity. For identification purposes, we used state zero as a reference state[23]. Almost all state dependence parameters are positive and statistically significant, indicating transition towards state zero is less probable. Immigrants in Denmark have very high structural state dependence in unemployment compared to natives. Unlike in Denmark, immigrants and natives in Canada have very similar pattern of structural and spurious state dependence.

Sources of spurious state dependence are due to some unobserved heterogeneity factors that are different between immigrants and natives in either country. Some portions of these spurious effects can be due to the labour market preferences, labour market discrimination, cultural attitudes, and abilities which are not observed in the data. Our results show that immigrant-native differences in proportion of structural and spurious state dependence, as well as upward and downward mobility rates are more prominent in Denmark than in Canada. One reason for such differences can be that immigrants in Denmark mostly come for non-work related reasons. The current Danish government policy to increase skilled immigrants will help to reduce differences between immigrants and natives.

In Canada, the huge portion of observed persistence in the state of being unemployed (or non-employed) is because of the factors which are not observed. Labour market policies which improve unobserved heterogeneity factors may lead unemployed people into employment. Sources of spurious effects can be different between immigrants and natives and can be difficult to be identified. For immigrants, some portion of this effect can be caused by lack of information on behalf of employers (statistical discrimination), language skills. Canadian immigrants have a higher structural state dependence in the uppermost part of the earnings quartiles compared to natives. This makes immigrants be more affected by economic policy reforms.

To improve overall mobility, active labour market programs such as on-job training, apprenticeships, education, labour market information, mobility, and credential recognition could enable individual to move from low-wage jobs into higher paying jobs. This is in contrast to passive income maintenance programs like unemployment insurance, which discourage such mobility and encourage people to stay unemployed (Gunderson, 2007). The effectiveness of these policies is not addressed in this paper, but is of great interest for future research.

According to Brodaty (2007), public policies should act on both dimensions (structural and spurious) of the earnings mobility process to reduce income inequality. For example, human capital policies can be implemented to improve the unobserved heterogeneity of the individuals who are

[23] In total we have 5 states including state zero. The state zero is defined as unemployed or non-employed.

unemployed or attracted towards the lower part of the earnings distribution. Contrarily, it could be desirable to act on structural state dependence in order to make it more mobile, but this requires for it to give an economic meaning to state dependence in earnings mobility.

Acknowledgments: We would like to thank Professors Michael Svarer and Henning Bunzel for helping us to get access to administrative registered data of Denmark. We wish to acknowledge the support of the Quebec Inter-University Centre for Social Statistics (*QICSS)* for allowing us to access the confidential data of SLID as well. We would also like to thank seminar participants at Brownbag Lunch Workshop at school of economics and management Aarhus University and departmental seminar at department of economics Concordia University for useful comments.

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Appendix

Table A1. Estimated Coefficients of State Dependence with and without Control on Endogenous Initial condition and Unobserved heterogeneity

	Without Control				With Control			
Danish Immigrants								
	Q_1	Q_2	Q_3	Q_4	Q_1	Q_2	Q_3	Q_4
$Q_{1(t-1)}$	**2.263** (0.077)**	**3.221** (0.189)**	**2.608** (0.288)**	**1.613** (0.469)**	**1.558** (0.098)**	**2.788** (0.208) **	**2.597** (0.330) **	**1.015** (0.489) **
$Q_{2(t-1)}$	**1.912** (0.164)**	**5.759** (0.230)**	**5.252** (0.311)**	**1.879** (0.680)**	**1.399** (0.190) **	**4.562** (0.259) **	**4.697** (0.352) **	**1.408** (0.771)
$Q_{3(t-1)}$	**0.868** (0.292)**	**5.188** (0.310)**	**7.426** (0.365)**	**6.507** (0.481)**	**1.001** (0.350) **	**4.681** (0.372) **	**7.093** (0.418) **	**6.333** (0.483) **
$Q_{4(t-1)}$	**-0.611** (0.412)**	**2.408** (0.420)**	**5.100** (0.391)**	**8.663** (0.483)**	**-0.509** (0.485)	**2.779** (0.452) **	**5.094** (0.428) **	**7.535** (0.464) **

Danish Natives								
$Q_{1(t-1)}$	**2.408** (0.031) **	**3.062** (0.057) **	**2.026** (0.090) **	**0.472** (0.121) **	**1.588** (0.039)**	**2.356** (0.065)**	**1.930** (0.093)**	**0.856** (0.134)**
$Q_{2(t-1)}$	**2.216** (0.051) **	**5.836** (0.069) **	**5.537** (0.096) **	**2.856** (0.116) **	**1.343** (0.060)**	**4.120** (0.079)**	**4.347** (0.100)**	**2.698** (0.128)**
$Q_{3(t-1)}$	**0.653** (0.077) **	**5.094** (0.086)v	**7.774** (0.107) **	**6.440** (0.119) **	**0.489** (0.082)**	**3.717** (0.093)**	**6.036** (0.110)**	**5.320** (0.131)**
$Q_{4(t-1)}$	**-1.299** (0.091) **	**1.526** (0.091) **	**5.486** (0.103) **	**8.150** (0.113) **	**-1.102** (0.110)**	**1.292** (0.109)**	**4.180** (0.116)**	**5.999** (0.130)**
Canadian Immigrants								
$Q_{1(t-1)}$	**5.144** (0.284)**	**5.268** (0.601)**	**4.085** (0.853)**	-	**2.740** (0.450)**	**2.909** (0.789)**	**2.915** (1.066)**	-
$Q_{2(t-1)}$	**4.975** (0.614)**	**8.983** (0.798)**	**7.976** (0.977)**	-	**1.161** (0.790)**	**3.337** (0.930)**	**4.127** (1.217)**	-
$Q_{3(t-1)}$	-	**10.092** (2.579)**	**12.349** (2.626)**	**13.433** (4.000)**	-	**7.737** (6.853)	**10.316** (6.888)*	**19.141** (8.365)**
$Q_{4(t-1)}$	-	**8.363** (3.677)**	**11.271** (3.712)**	**16.447** (4.563)**	-	**5.665** (11.533)	**10.115** (11.544)	**20.946** (12.271)*
Canadian Natives								
$Q_{1(t-1)}$	**6.581** (0.163)**	**5.893** (0.256)**	**4.241** (0.375)**	**2.991** (0.376)**	**3.713** (0.239)**	**3.556** (0.299)**	**2.472** (0.373)**	**1.393** (0.549)**
$Q_{2(t-1)}$	**5.967** (0.253)**	**9.116** (0.314)**	**8.155** (0.400)**	**5.083** (0.389)**	**3.519** (0.296)**	**5.497** (0.345)**	**4.846** (0.385)**	**2.958** (0.502)**
$Q_{3(t-1)}$	**3.725** (0.280)**	**7.373** (0.318)**	**9.902** (0.398)**	**7.816** (0.367)**	**2.649** (0.347)**	**4.895** (0.371)**	**6.387** (0.395)**	**5.150** (0.460)**
$Q_{4(t-1)}$	**2.351** (0.408)**	**4.653** (0.382)**	**8.519** (0.425)**	**9.953** (0.391)**	**1.894** (0.538)**	**3.858** (0.500)**	**6.139** (0.481)**	**6.500** (0.480)**

Note: Figures inside the parentheses are the Standard errors of estimated parameters.
Double asterisks (**) indicate parameter estimate is significant at the level of at least 5%.

Table A2. Transition Matrix for Danish Immigrants and Natives, Estimated Conditional Probabilities of Leaving Previous Year's Quartile
(No Control for Endogenous Initial Conditions and Unobserved Heterogeneity)

Immigrants								
Origin Quartile	**Destination Quartile**					**Direction**		
	Q_0	**Q_1**	**Q_2**	**Q_3**	**Q_4**	**Down**	**Stable**	**Up**
Q_0	**0.486**	0.459	0.034	0.015	0.006	0.000	**0.486**	0.514
Q_1	0.087	**0.745**	0.132	0.031	0.005	0.087	**0.745**	0.168
Q_2	0.035	0.197	**0.608**	0.158	0.003	0.232	**0.608**	0.161
Q_3	0.020	0.035	0.178	**0.667**	0.100	0.233	**0.667**	0.100
Q_4	0.023	0.011	0.015	0.077	**0.874**	0.126	**0.874**	0.000

Distribution	**0.078**	**0.367**	**0.242**	**0.164**	**0.149**	**0.145**	**0.698**	**0.157**

Natives

	Q_0	Q_1	Q_2	Q_3	Q_4	Down	Stable	Up
Q_0	**0.260**	0.622	0.077	0.025	0.016	0.000	**0.260**	0.740
Q_1	0.031	**0.767**	0.178	0.021	0.003	0.031	**0.767**	0.202
Q_2	0.008	0.153	**0.669**	0.163	0.007	0.162	**0.669**	0.170
Q_3	0.004	0.016	0.153	**0.711**	0.116	0.173	**0.711**	0.116
Q_4	0.006	0.004	0.007	0.105	**0.879**	0.121	**0.879**	0.000
Distribution	**0.023**	**0.246**	**0.245**	**0.242**	**0.244**	**0.119**	**0.745**	**0.136**

Table A3. Transition Matrix for Canadian Immigrants and Natives, Estimated Conditional Probabilities of Leaving Previous Year's Quartile
(No Control for Endogenous Initial Conditions and Unobserved Heterogeneity)

Immigrants

Origin Quartile	Destination Quartile					Direction		
	Q_0	Q_1	Q_2	Q_3	Q_4	Down	Stable	Up
Q_0	**0.734**	0.210	0.028	0.016	0.011	0.000	**0.734**	0.266
Q_1	0.025	**0.840**	0.116	0.019	0.000	0.025	**0.840**	0.135
Q_2	0.005	0.119	**0.731**	0.144	0.000	0.124	**0.731**	0.144
Q_3	0.003	0.000	0.157	**0.714**	0.126	0.160	**0.714**	0.126
Q_4	0.005	0.000	0.013	0.098	**0.884**	0.116	**0.884**	0.000
Distribution	**0.045**	**0.248**	**0.205**	**0.235**	**0.268**	**0.100**	**0.796**	**0.105**

Natives

	Q_0	Q_1	Q_2	Q_3	Q_4	Down	Stable	Up
Q_0	**0.848**	0.086	0.031	0.014	0.021	0.000	**0.848**	0.152
Q_1	0.017	**0.832**	0.134	0.012	0.005	0.017	**0.832**	0.151
Q_2	0.005	0.106	**0.749**	0.132	0.009	0.111	**0.749**	0.141
Q_3	0.005	0.011	0.129	**0.730**	0.125	0.145	**0.730**	0.125
Q_4	0.005	0.003	0.007	0.152	**0.834**	0.167	**0.834**	0.000
Distribution	**0.077**	**0.227**	**0.241**	**0.239**	**0.216**	**0.101**	**0.789**	**0.110**