

Social Policy and Income Mobility: An Interprovincial Perspective

Guy Lacroix

Université Laval
Industrial Alliance Research Chair on the
Economics of Demographic Changes

June 1 2018

Motivation

Québec introduced sweeping reforms during the mid-1990s

- Bill n°35 : Pay Equity Act (1996)
- Bill n°144 : An Act Respecting Family Benefits (1997)
- Bill n°145 : An Act respecting the Ministère de la Famille et de l'Enfance and amending the Act respecting child day care (1997)
- Bill n°69 : An Act to amend the Act respecting prescription drug insurance (1999)
- Bill n°108 : An Act to amend the Act respecting parental insurance and other legislative provisions (2006)

Motivation

Québec introduced sweeping reforms during the mid-1990s

- Bill n°35 : Pay Equity Act (1996)
- Bill n°144 : An Act Respecting Family Benefits (1997)
- Bill n°145 : An Act respecting the Ministère de la Famille et de l'Enfance and amending the Act respecting child day care (1997)
- Bill n°69 : An Act to amend the Act respecting prescription drug insurance (1999)
- Bill n°108 : An Act to amend the Act respecting parental insurance and other legislative provisions (2006)

Bills n°144 & n°145 : Financial Incentives to Work

- 5\$/day/child, regardless of income
- Child had to be 4 years old by September 30
- 77,000 available daycare slots
- September 2000 : Every child under 5 years old eligible
- End of 2002 : 163,000 available slots

Motivation

Bills n°144 & n°145 : Financial Incentives to Work

- 5\$ /day/child, regardless of income
- Child had to be 4 years old by September 30
- 77,000 available daycare slots
- September 2000 : Every child under 5 years old eligible
- End of 2002 : 163,000 available slots

Federal Programs

- 1993 : Child Tax Benefit (CTB) and Working Income Supplement (WIS)
- 1998 : The CTB was replaced by the Canada Child Tax Benefit (CCTB).
- 1998 : The National Child Benefit (NCB) Supplement replaced the WIS

Impact of Québec Child Day Care

Lefebvre & Merrigan (2005), (2008) and (2009)

- Use NLSCY (2005) and SLID (2008 and 2009)
- Women labour Supply :
 - ▶ Increase participation by 8 to 10%
 - ▶ Increase weeks worked by 5 to 7 weeks
 - ▶ Mostly driven by changes in the labour supply of less educated mothers

Impact of Québec Child Day Care

Lefebvre & Merrigan (2005), (2008) and (2009)

- Use NLSCY (2005) and SLID (2008 and 2009)
- Women labour Supply :
 - ▶ Increase participation by 8 to 10%
 - ▶ Increase weeks worked by 5 to 7 weeks
 - ▶ Mostly driven by changes in the labour supply of less educated mothers

Baker, Gruber and Milligan (2008)

- Using NLSCY
- Women labour Supply :
 - ▶ Increase employment by almost 8% (for two-parent families)
- Children well-being :
 - ▶ Increase in aggression and illness
 - ▶ Decrease in motor and social skills

Impact of Québec Child Day Care

Baker, Gruber and Milligan (2008)

- Using NLSCY
- Women labour Supply :
 - ▶ Increase employment by almost 8% (for two-parent families)
- Children well-being :
 - ▶ Increase in aggression and illness
 - ▶ Decrease in motor and social skills

Blau & Van der Klaauw (2013)

- Use NLSY
- Family Structure :
 - ▶ Male and female wages have substantial effects on family structure for children of black and hispanic mothers
 - ▶ The tax treatment of children also affects family structure
 - ▶ Welfare benefits and welfare reform and unilateral divorce have much smaller effects on family structure
 - ▶ Impacts differ by age and race

Two Approaches to Analyse the Income Dynamics

1-Competing Risks Model

- Factors contributing to transitions in and out of poverty
- How far transitions are made in and out of poverty
- Differences between Quebec and Ontario
- Impact of the 1997 Reforms in Quebec

Two Approaches to Analyse the Income Dynamics

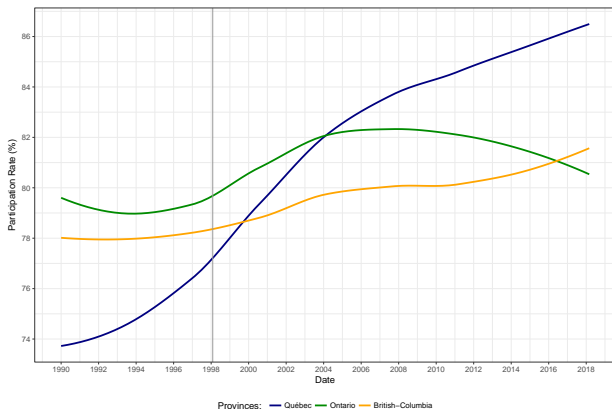
1-Competing Risks Model

- Factors contributing to transitions in and out of poverty
- How far transitions are made in and out of poverty
- Differences between Quebec and Ontario
- Impact of the 1997 Reforms in Quebec

2-Decomposition of Transition Matrices

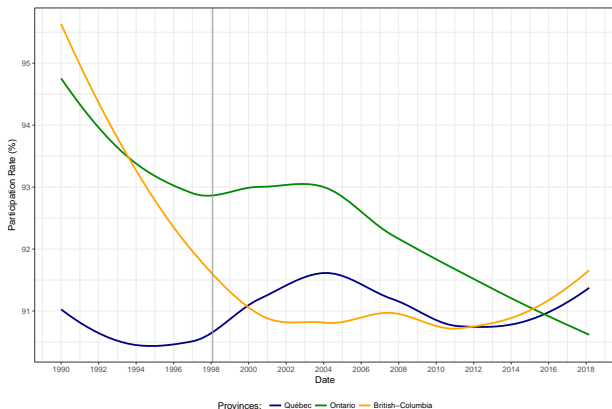
- Differences in observed characteristics versus differences in returns to characteristics
- Difference between Québec, Ontario and British-Columbia

FIGURE 1 – Monthly Labour Force Participation, 1990-2018, Women 25-44



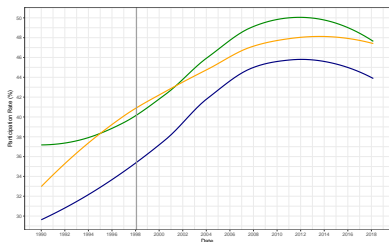
Source: Cansim, Labour Force Surveys

FIGURE 1 – Monthly Labour Force Participation, 1990-2018, Men 25-44



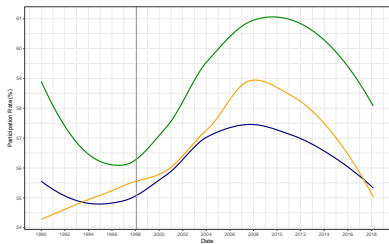
Source: Cansim, Labour Force Surveys

FIGURE 1 – Monthly Labour Force Participation, 1990-2018, Women, Men 45+



Provinces: — Quebec — Ontario — British-Columbia

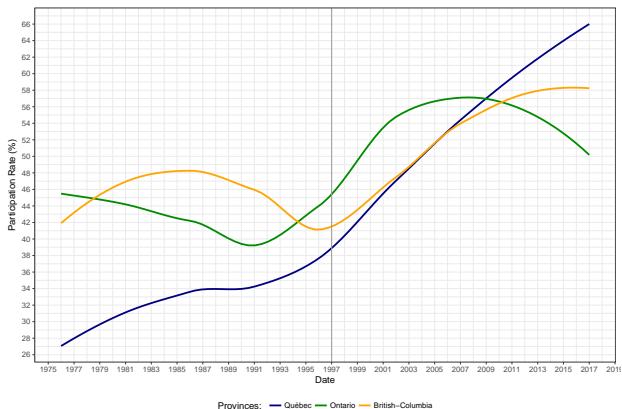
Source: Canada Labour Force Surveys



Provinces: — Quebec — Ontario — British-Columbia

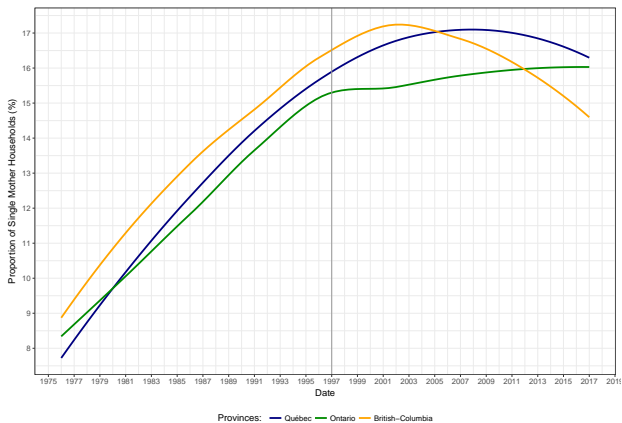
Source: Canada Labour Force Surveys

FIGURE 1 – Yearly Labour Force Participation, 1976-2017, Single Mothers, Youngest Child < 3



Source: Cansim, Labour Force Surveys

FIGURE 1 – Proportion of Single Mother Households, 1976-2017



LISA : Longitudinal and International Study of Adults

LISA is a study that attempts to track, over time, the relationships between people's education, working lives and overall well-being. Survey data are linked to the T1 Personal Master File, T4 Summary and Supplementary Files, Pension Plan in Canada Files, the T1 Family File, and the Immigration Database.

LISA 2013 Sample

- Individuals living in the BC, Ontario and Québec
- 1983 to 2013
- Individuals aged 25 or older, not full-time student, not retired and not self-employed
- Variable of interest : total family income (after transfers and before taxes)

Descriptive statistics

TABLE 1 – Sample characteristics in 2013 : Population aged 15 or older

Characteristics	Québec	Ontario	BC
Male	49.6 (1.0)	48.9 (1.0)	49.3 (1.4)
Married	37.7 (0.9)	51.2 (1.0)	53.3 (1.4)
Age	46.5 (0.4)	45.8 (0.4)	46.5 (0.5)
High School	34.6 (0.9)	30.8 (0.9)	37.2 (1.3)
Post-Secondary	17.8 (0.8)	20.9 (0.8)	16.2 (0.9)
University	27.8 (0.9)	31.1 (0.9)	31.8 (1.3)
Total family income	85,187 (1493.4)	112,067 (8045.8)	99,391 (2881.9)

1 - Competing Risks Model

Poverty : Province-specific Low-Income Measure (LIM) ¹

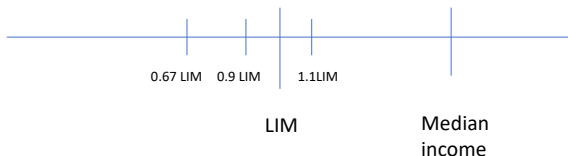
■ Exits from poverty

- 1 LIM - 1.1 LIM
- 1.1 LIM - 2 LIM
- 2 LIM +

■ Entry into poverty

- 1 LIM - 0.9 LIM
- 0.9 LIM - 0.67 LIM
- 0.67 LIM

FIGURE 2 – Risk sets

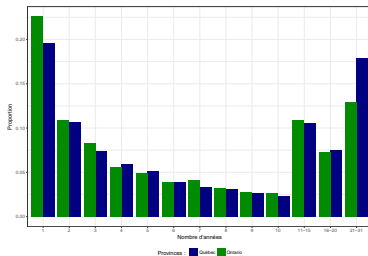
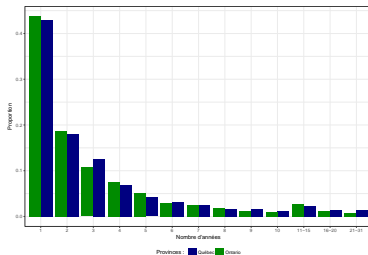


1. 50% of median adjusted household income

TABLE 2 – Sample characteristic : Entry and Exits from Poverty

	Exit		Entry	
	Québec	Ontario	Québec	Ontario
Men (%)	34,1	32,2	37,7	36,2
Couples (%)	67,3	71,6	78,3	78,8
High-School (%)	39,9	35,4	38,6	32,7
Post-Secondary(%)	14,6	19,2	16,5	22,0
University(%)	14,2	22,7	23,2	30,1
Immigrants(%)	19,7	43,7	14,8	35,8
Age	42,3	42,3	45,5	45,4
Single Parent(%)	14,7	13,7	6,6	6,2
Households with Children (%)	35,3	37,4	33,2	33,4

FIGURE 3 – Time to Exit and to Enter Into Poverty



Exit from Poverty		
Destinations	Québec	Ontario
No exit	31,39	33,9
1 LIM – 1.1 LIM	16,18	16,19
1.1 LIM – 2 LIM	41,94	39,41
2 LIM +	10,49	10,5

Entry in Poverty		
Destinations	Québec	Ontario
No entry	61,27	63,31
1 LIM – 0.9 LIM	12,47	11,09
0.9 LIM – 0.67 LIM	14,22	13,27
-0,67 LIM	12,04	12,32

Competing Risks Model : Exits from Poverty

Variable	1 LIM – 1.1 LIM		1.1 LIM – 2 LIM		2 LIM +	
	Odd Ratio	Std.Err	Odd Ratio	Std.Err	Odd Ratio	Std.Err
Men	0.947	0.069	1.076	0.046	0.864*	0.087
Couple	1.523***	0.073	1.816***	0.051	2.189***	0.096
High-School	1.017	0.077	1.256***	0.055	1.765***	0.115
Post-Secondary	1.173	0.097	1.503***	0.068	2.495***	0.132
University	1.092	0.105	1.841***	0.069	4.025***	0.129
Quebec	1.040	0.148	1.083	0.104	1.093	0.190
Mother tongue	0.959	0.108	1.048	0.074	0.859	0.147
Immigrant	0.987	0.103	0.904	0.071	0.569***	0.137
Age	0.994*	0.003	0.985***	0.002	0.999	0.004
Single Parent	0.884	0.092	0.923	0.063	1.449***	0.107
Children	1.486***	0.077	1.232***	0.052	0.926	0.096
Children × Qc × 1997	1.087	0.128	1.198**	0.088	1.169	0.172
Employed Previous Year	1.490***	0.069	1.377***	0.047	1.601***	0.092
Cumulative Years Poor	0.975*	0.015	0.971***	0.011	0.954**	0.023
# Poverty Spells	1.002	0.049	1.069*	0.034	0.987	0.070
2 years	0.831**	0.088	0.688***	0.059	0.627***	0.106
3 years	0.776**	0.107	0.671***	0.072	0.504***	0.142
4 years	0.837	0.125	0.527***	0.093	0.339***	0.198
5 years	0.739**	0.153	0.468***	0.115	0.358***	0.240
6–9 years	0.567***	0.147	0.395***	0.107	0.272***	0.233
10 years +	0.292***	0.257	0.251***	0.186	0.160***	0.435

Note : Includes year dummies. Number of observations = 21,835

Competing Risks Model : Entry into Poverty

Variable	1 LIM – 0.9 LIM		0.9 LIM – 0.67 LIM		-0.67LIM	
	Odd Ratio	Std.Err	Odd Ratio	Std.Err	Odd Ratio	Std.Err
Men	0.959	0.059	0.851***	0.055	0.661***	0.063
Couple	0.608***	0.069	0.519***	0.061	0.438***	0.063
High-School	0.636***	0.070	0.639***	0.066	0.615***	0.070
Post-Secondary	0.463***	0.087	0.467***	0.081	0.389***	0.090
University	0.229***	0.096	0.253***	0.086	0.340***	0.087
Quebec	1.171	0.127	1.130	0.123	0.841	0.135
Mother Tongue	1.280**	0.099	1.394***	0.090	1.117	0.098
Immigrant	1.057	0.094	1.072	0.086	1.041	0.092
Age	1.003	0.004	1.004	0.003	0.994	0.004
Single Parent	2.153***	0.096	1.439***	0.098	1.923***	0.093
Children	0.780***	0.073	0.860**	0.065	0.907	0.067
Children × Qc × 1997	0.943	0.115	0.843	0.108	0.751**	0.120
Employed Previous Year	0.707***	0.069	0.723***	0.063	0.437***	0.061
Cumulative Years Poor	0.927***	0.006	0.895***	0.006	0.889***	0.006
# Poverty Spells	1.510***	0.028	1.495***	0.027	1.561***	0.029
2 years	1.109	0.087	0.755***	0.081	0.683***	0.085
3 years	0.776**	0.104	0.604***	0.095	0.545***	0.101
4 years	0.620***	0.121	0.573***	0.105	0.409***	0.123
5 years	0.664***	0.125	0.500***	0.120	0.533***	0.124
6–9 years	0.503***	0.092	0.413***	0.086	0.426***	0.092
10 years +	0.526**	0.196	0.371***	0.209	0.494***	0.203

Note : Includes year dummies. Number of observations = 105,518

2 - Decomposition of Transition Matrices

Transition Matrices

Intertemporal transition matrices can be defined as follows :

Period	t+k : Qu.1	t+k : Qu.2	t+k : Qu.3	t+k : Qu.4	t+k : Qu.5
t : Qu.1	[1,1]				[1,5]
t : Qu.2		[2, 2]			
t : Qu.3			[3, 3]		
t : Qu.4				[4, 4]	
t : Qu.5	[5,1]				[5, 5]

$$M_{5,5} = \begin{pmatrix} m_{1,1} & m_{1,2} & \cdots & m_{1,5} \\ m_{2,1} & m_{2,2} & \cdots & m_{2,5} \\ \vdots & \vdots & \ddots & \vdots \\ m_{5,1} & m_{5,2} & \cdots & m_{5,5} \end{pmatrix}$$

2 - Decomposition of Transition Matrices

Mobility Indices

$$IR = \frac{Tr(M)}{N},$$

$$Tr(M) = \sum_{i=1}^5 m_{i,i} \quad \text{and} \quad N = \sum_{j=1}^5 \sum_{i=1}^5 m_{i,j}$$

$$\text{Let } MR = 1 - IR$$

2 - Decomposition of Transition Matrices

Mobility Indices

$$IR = \frac{Tr(M)}{N},$$

$$Tr(M) = \sum_{i=1}^5 m_{i,i} \quad \text{and} \quad N = \sum_{j=1}^5 \sum_{i=1}^5 m_{i,j}$$

$$\text{Let } MR = 1 - IR$$

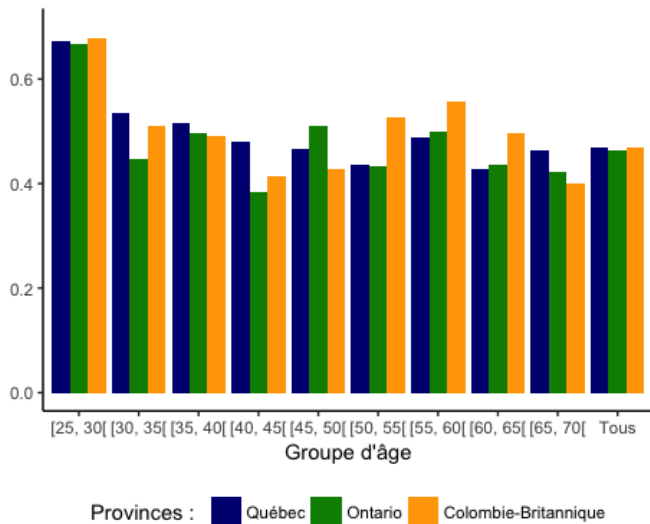
Mobility Indices

$$UM = \frac{\sum_{j=1}^5 \sum_{i=1}^5 m_{i,j}}{N} \quad \forall i < j$$

$$DM = \frac{\sum_{j=1}^5 \sum_{i=1}^5 m_{i,j}}{N} \quad \forall i > j$$

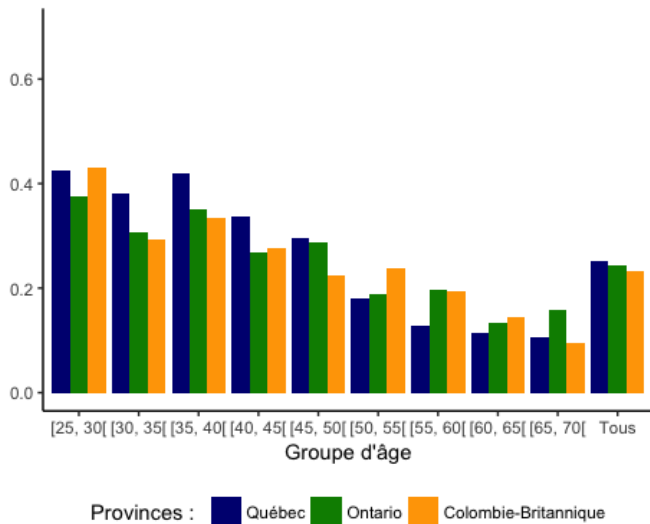
Mobility Indices, by Age Group

FIGURE 4 – Total Mobility : 2008-2013



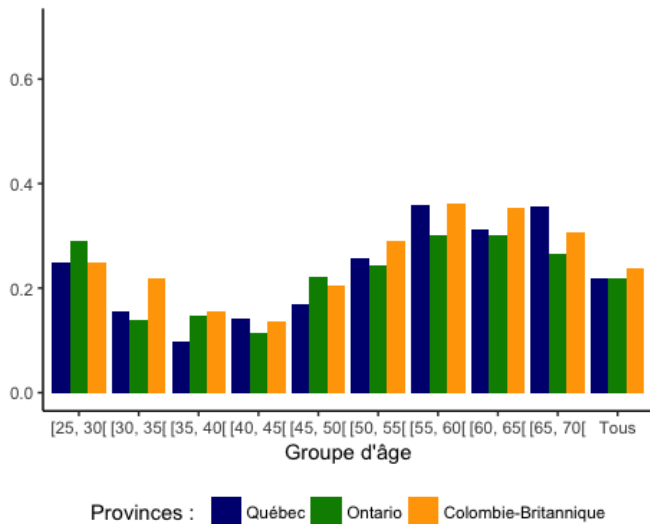
Mobility Indices, by Age Group

FIGURE 4 – Upward Mobility : 2008-2013



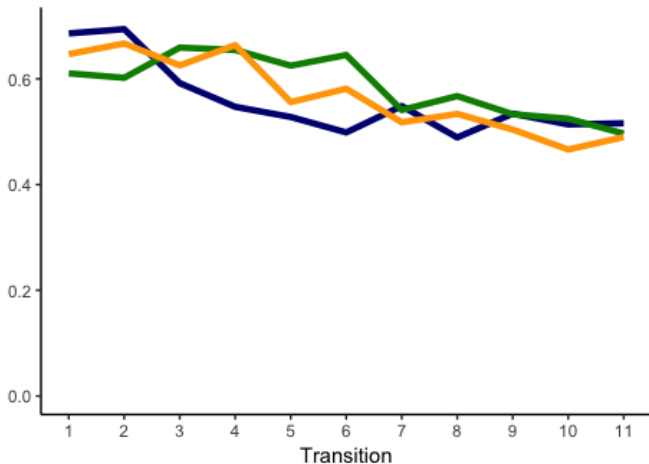
Mobility Indices, by Age Group

FIGURE 4 – Downward Mobility : 2008-2013



Mobility Indices : 1998-2003 Cohort (Age 25-30)

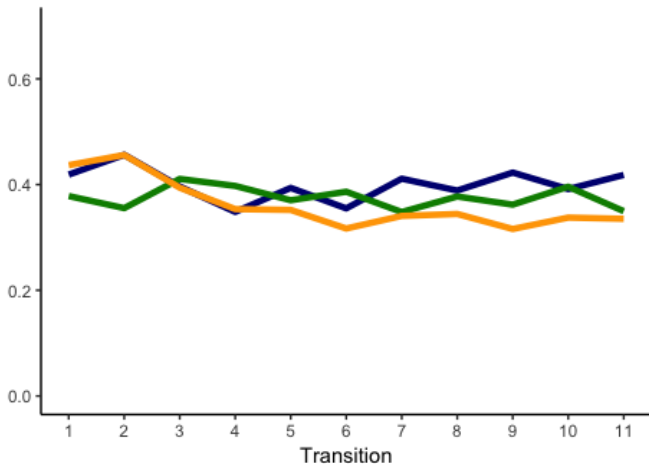
FIGURE 5 – Mobility



Provinces : Québec Ontario Colombie-Britannique

Mobility Indices : 1998-2003 Cohort (Age 25-30)

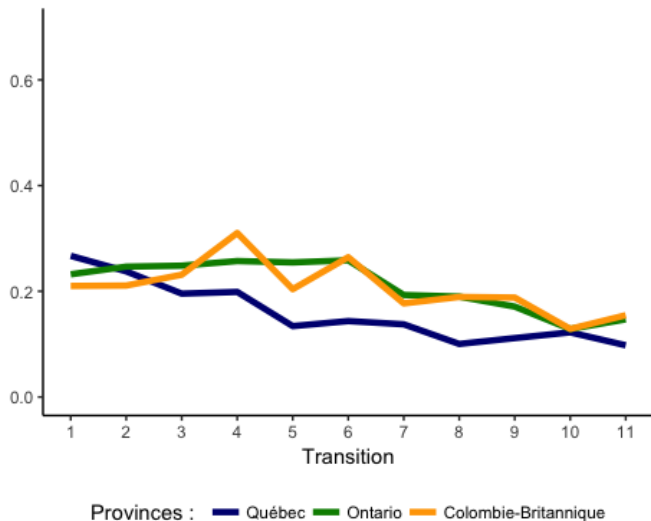
FIGURE 5 – Upward Mobility



Provinces : Québec Ontario Colombie-Britannique

Mobility Indices : 1998-2003 Cohort (Age 25-30)

FIGURE 5 – Downward Mobility



Motivation

- 1 Compare observed mobility with benchmark mobility
- 2 Oaxaca-like decomposition : Separate the contribution of heterogeneous individual characteristics from their impact (returns) on earnings

Motivation

- 1 Compare observed mobility with benchmark mobility
- 2 Oaxaca-like decomposition : Separate the contribution of heterogeneous individual characteristics from their impact (returns) on earnings

Empirical Approach

- Let $g \in \{1, 2, 3, 4, 5\}$ be five non-overlapping groups, *i.e.* individuals in each quintile at T_0
- Let Y^g and X^g be the observed income and characteristics of individuals in group g , with F_Y^g and F_X^g and (CDF) $F_{Y|X}^g$ (regression) at T_1
- Let $\nu(F_Y^1, F_Y^2 \dots F_Y^5)$ and $\nu(F_Y^B, F_Y^B \dots F_Y^B)$ be functions of the empirical transition matrix and a given “baseline” matrix, respectively, with $\nu \in \{\text{MR, UM and DM}\}$

Empirical Approach

- Let the Mobility Gap be defined as

$$\begin{aligned}\Delta_O &= v(F_Y^1, F_Y^2 \dots F_Y^5) - v(F_Y^B, F_Y^B \dots F_Y^B) \\ &= \Delta_S + \Delta_X,\end{aligned}$$

- Where

$$\begin{aligned}\Delta_X &= v(F_Y^1, F_Y^2 \dots F_Y^5) - v(F_Y^{1|B}, F_Y^{2|B} \dots F_Y^{5|B}) \\ \Delta_S &= v(F_Y^{1|B}, F_Y^{2|B} \dots F_Y^{5|B}) - v(F_Y^B, F_Y^B \dots F_Y^B)\end{aligned}$$

- The contribution of individual characteristics, X_k^g , can also be isolated.
- In our paper, we set $F_X^B = F_X^5$

Example

$$M_{4,4}^I = \begin{pmatrix} .25 & .25 & .25 & .25 \\ .25 & .25 & .25 & .25 \\ .25 & .25 & .25 & .25 \\ .25 & .25 & .25 & .25 \end{pmatrix}$$

$$M_{4,4} = \begin{pmatrix} .41 & .27 & .19 & .12 \\ .28 & .24 & .26 & .20 \\ .17 & .28 & .29 & .25 \\ .13 & .20 & .25 & .41 \end{pmatrix}$$

$$M_{4,4}^* = \begin{pmatrix} .32 & .25 & .20 & .21 \\ .27 & .24 & .28 & .20 \\ .21 & .26 & .29 & .23 \\ .19 & .22 & .23 & .35 \end{pmatrix}$$

$$\Delta_O = \text{MR}(M_{4,4}) - \text{MR}(M_{4,4}^I) = 0.65 - 0.75 = -0.10$$

$$\Delta_X = \text{MR}(M_{4,4}) - \text{MR}(M_{4,4}^*) = 0.65 - 0.69 = -0.04$$

$$\Delta_S = \text{MR}(M_{4,4}^*) - \text{MR}(M_{4,4}^I) = 0.69 - 0.75 = -0.06$$

Simulating the Counterfactuals

For each province :

- 1 Marginal distributions of the X' 's : $\hat{F}(x_{kg}) = \frac{1}{n} \sum_{i=1}^n 1(x_{ikg} \leq c_k)$
- 2 Estimate the following copula :

$$F_X^g \equiv C^g(F_{X_1^g}, \dots, F_{X_d^g}), g \in [1, 2, 3, 4, 5]$$

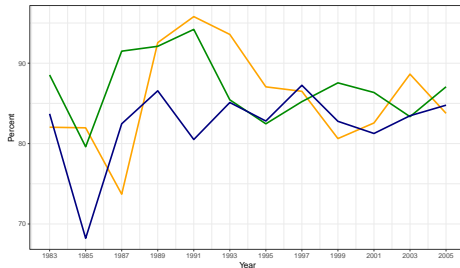
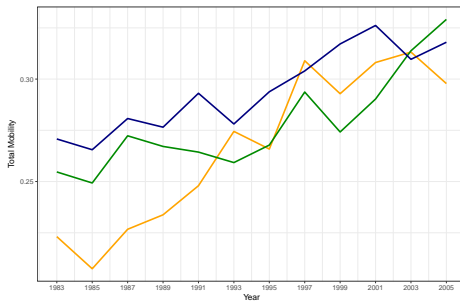
The copula is a joint CDF that captures the dependence between the X' 's

- 3 $\hat{F}(y_g|X)$ estimated by the distributional regression approach, *i.e.*

$$P(y_i \leq \tilde{y}|x_i) = \Phi(x\beta_{\tilde{y}}), \tilde{y} \in [y_1, \dots, y_{100}], g \in [1, 2, 3, 4, 5]$$

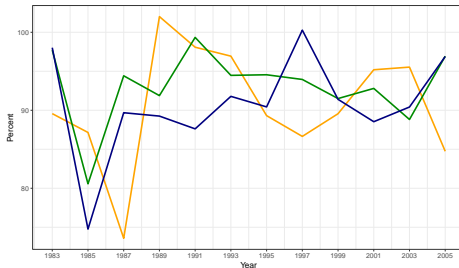
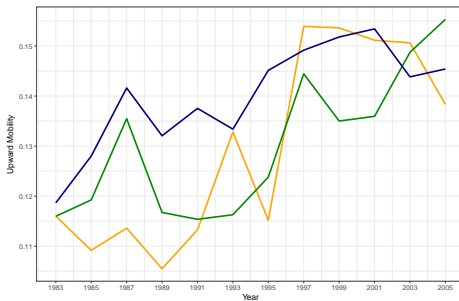
- 4 Draw $N = 50,000$ observations and compute $M_{5,5}^*$
- 5 Bootstrap $B = 250$ replications to compute the standard errors.

Mobility Gap, Share of Structural Component, by Province



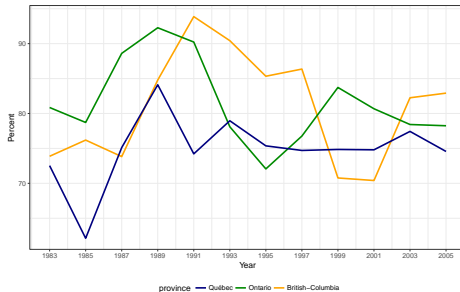
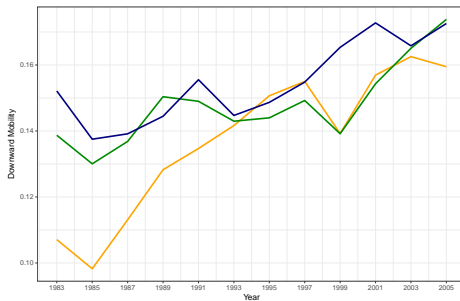
province — Quebec — Ontario — British-Columbia

Upward Mobility Gap, Share of Structural Component, by Province



province — Quebec — Ontario — British-Columbia

Downward Mobility Gap, Share of Structural Component, by Province



Individual Characteristics : Δ_X

■ Québec :

Characteristic	Mobility Ratio	Downward Mobility	Upward Mobility
Age			
Couple	•	•	•
Post-Secondary			
University	•	•	•
Immigrant		•	
French			
# Kids			

Composition Effect

Individual Characteristics : Δ_X

■ Québec :

Characteristic	Mobility Ratio	Downward Mobility	Upward Mobility
Age			
Couple	•	•	•
Post-Secondary			
University	•	•	•
Immigrant		•	
French			
# Kids			

■ Ontario :

Characteristic	Mobility Ratio	Downward Mobility	Upward Mobility
Age			
Couple	•	•	•
Post-Secondary	•	•	
University	•	•	
Immigrant	•		•
English			
# Kids			

Composition Effect

Individual Characteristics : Δ_X

■ Ontario :

Characteristic	Mobility Ratio	Downward Mobility	Upward Mobility
Age			
Couple	•	•	•
Post-Secondary	•	•	
University	•	•	
Immigrant	•		•
English			
# Kids			

■ British-Columbia :

Characteristic	Mobility Ratio	Downward Mobility	Upward Mobility
Age	•	•	•
Couple	•	•	•
Post-Secondary			
University	•	•	•
Immigrant		•	
English		•	
# Kids	•	•	•

Part 1 : Québec vs Ontario

- 1 Education is an important determinant of the entry into, and exit from, poverty
- 2 Women are more at risk of entering deep poverty
- 3 There are no provincial fixed effects, but :
- 4 Households in Québec with children in the post-1997 period are more likely to exit poverty and much less likely to enter deep poverty

Conclusion

Part 1 : Québec vs Ontario

- 1 Education is an important determinant of the entry into, and exit from, poverty
- 2 Women are more at risk of entering deep poverty
- 3 There are no provincial fixed effects, but :
- 4 Households in Québec with children in the post-1997 period are more likely to exit poverty and much less likely to enter deep poverty

Part 2 : Québec vs Ontario vs British-Columbia

- 1 Ontario and BC have similar income dynamics
- 2 Québec is less mobile both upwards and downwards
- 3 The structural component of the mobility gap is lesser in Québec

Gini Coefficients

Gini Coefficients Canada

	1983	1988	1993	1998	2003	2008	2013
Cohorte 1	0.60041 (25-30 ans)	0.31593 (30-35 ans)	0.33742 (35-40 ans)	0.35636 (40-45 ans)	0.37745 (45-50 ans)	0.40287 (50-55 ans)	0.43217 (55-60 ans)
Cohorte 2	0.72116 (20-25 ans)	0.33792 (25-30 ans)	0.32769 (30-35 ans)	0.35963 (35-40 ans)	0.36583 (40-45 ans)	0.39057 (45-50 ans)	0.39119 (50-55 ans)
Cohorte 3	0.79390 (15-20 ans)	0.46221 (20-25 ans)	0.39138 (25-30 ans)	0.35435 (30-35 ans)	0.36418 (35-40 ans)	0.39442 (40-45 ans)	0.41720 (45-50 ans)
Cohorte 4	.	0.47809 (15-20 ans)	0.47697 (20-25 ans)	0.35209 (25-30 ans)	0.34802 (30-35 ans)	0.35537 (35-40 ans)	0.37719 (40-45 ans)
Cohorte 5	.	.	0.47941 (15-20 ans)	0.47258 (20-25 ans)	0.35719 (25-30 ans)	0.33346 (30-35 ans)	0.34299 (35-40 ans)
Cohorte 6	.	.	.	0.47665 (15-20 ans)	0.46846 (20-25 ans)	0.37662 (25-30 ans)	0.32464 (30-35 ans)

Québec

	1983	1988	1993	1998	2003	2008	2013
Cohorte 1	0.32197 (25-30 ans)	0.31635 (30-35 ans)	0.35430 (35-40 ans)	0.37499 (40-45 ans)	0.41927 (45-50 ans)	0.41966 (50-55 ans)	0.41462 (55-60 ans)
Cohorte 2	0.42322 (20-25 ans)	0.36357 (25-30 ans)	0.34060 (30-35 ans)	0.36157 (35-40 ans)	0.37322 (40-45 ans)	0.38085 (45-50 ans)	0.37379 (50-55 ans)
Cohorte 3	0.48596 (15-20 ans)	0.44747 (20-25 ans)	0.33962 (25-30 ans)	0.31914 (30-35 ans)	0.32327 (35-40 ans)	0.35533 (40-45 ans)	0.33221 (45-50 ans)
Cohorte 4	.	0.42779 (15-20 ans)	0.46022 (20-25 ans)	0.33263 (25-30 ans)	0.31130 (30-35 ans)	0.32366 (35-40 ans)	0.31865 (40-45 ans)
Cohorte 5	.	.	0.47777 (15-20 ans)	0.45816 (20-25 ans)	0.35878 (25-30 ans)	0.32234 (30-35 ans)	0.32242 (35-40 ans)
Cohorte 6	.	.	.	0.46422 (15-20 ans)	0.43385 (20-25 ans)	0.40830 (25-30 ans)	0.29545 (30-35 ans)