Educational Attainment of Second-Generation Immigrants: A U.S.-Canada Comparison

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Motivation

- Complement the existing literature on education of second-generation immigrants
- Focus on a comparison between Canada and the U.S.
  - Difference in Immigration Policies
- Formulate a dynamic structural model of schooling choices which will help to determine the roles of family environment and cognitive abilities in the educational decision-making process
- Evaluate the impacts of alternative policies on school decisions of children of immigrants

Main Contributions

- Develops a methodology that can be applied to analyze educational attainment
- Determines the compensation required to keep high-school drop-outs in school (or college attendees to graduate from college)
- Provides a Canada-U.S. comparison of educational attainment
- Extends the literature on performance of second-generation immigrants

Brief Literature Review

- Current studies have generally been descriptive (an exception is Campuzano, 2005)
- Aydemir and Sweetman, 2006; Aydemir, Chen and Corak, 2008 (U.S and Canada data)
- Van Ours and Veenman, 2002, 2003; Riphahn, 2003, 2004; Coding, Husted and Hummelgaard, 2009 (European data)
- I expand this literature by utilizing a structural Dynamic Programming Model

Structural Model

- Follows Belzil and Hansen (2002, 2007)
- Forward looking young agents optimally decide years of schooling by considering expectations about future labor market outcomes
- Finite horizon with two choices each academic year
- Maximize life-time utilities until age 65
- Decisions start at age 16 (heterogeneous years of schooling)
- Wage information is obtained from Census

Utility of School

$$U_{it}^{hs} = \ln(C_{it}^{hs}) = A^h(X_{it}) + Grd_j + \alpha_0^k S_{i0} + as^k + uh^h + \varepsilon_{it}^{hs}$$

$$j = 9,10,...,19$$

- Specifically:

$$A^h(X_{it}) = (\beta_1 + \beta_{1s} * \sec gen_i) * fed1_i + (\beta_2 + \beta_{2s} * \sec gen_i) * fed2_i$$
$$+(\beta_3 + \beta_{3s} * \sec gen_i) * med1_i + (\beta_4 + \beta_{4s} * \sec gen_i) * med2_i +$$
$$(\beta_5 + \beta_{5s} * \sec gen_i) * PI_i + \beta_6 * nsib_i + \beta_7 * nuclear_i +$$
$$+(\beta_8 + \beta_{8s} * \sec gen_i) * test_i$$

Utility of Working

$$U_{it}^{w} = \ln(w_{it}) = \beta^{w} + retedu^{w} * S_{it} + retxp^{w} * Exper_{it} + retxp^{w2} * Exper_{it}^{2} + \varepsilon_{it}^{w}$$

- Wage parameters are recovered by using Censuses in both countries in the year of 2000.
- Youths in the Dynamic Programming model will form their expectations about the labour market by looking at the Census

Value Functions

- Value of School:

$$V_t^{hs}(S_t,\Omega_t) = A^h(X) + Grd_j + \alpha_0^k S_0 + as^k + uh^h + \varepsilon_t^{hs}$$

$$+\beta\{EMAX[V_{t+1}^{hs}(S_{t+1},\Omega_{t+1}),V_{t+1}^{hw}(S_{t+1})]\}$$

- Value of Work:

$$V_t^w(S_t) = \ln(W_t) + \beta E[V_{t+1}^w(S_{t+1}) \mid d_t = 0]$$

- Stay in school $(d_t = 1)$ if:

$$V_t^{hs}(S_t,\Omega_t) > V_t^w(S_t)$$

Data

- Two comprehensive (and similarly designed) micro-level surveys in Canada and the U.S.
- Youth in Transition Survey (YITS/reading cohort):

  age 15 in 1999, 5 cycles until 2007, includes PISA scores
- National Longitudinal Survey of Youth (NLSY97):

  age 12-16 in 1996, 11 waves until 2007
- Sample sizes: 1,348 White males for NLSY97

  4,731 White males for YITS

AFQT and PISA

- I choose a common testing area in both systems:
  - Reading skills
- Both tests were taken at an early age and serve as proxies for cognitive abilities
- Respondents had different educational attainment at the time of the tests – Need to adjust the test scores for this
  - Regress test scores at the time of the test on years of schooling and use the residuals in the structural model

Descriptive Statistics

Mean Statistics of Family Background Variables

Variable	NLSY97		YITS	
	Secgen	Native	Secgen	Native
Initial Education	9.63	9.41	10.34	10.26
Number of Siblings	2.35	2.29	1.44	1.40
Nuclear Family	0.81	0.68	0.91	0.86
Parental Income	76.45	61.70	77.45	67.30
PISA_VERBAL	-	-	5.09	5.08
ASVAB_VERBAL	67.51	57.22	-	-
Father Education Higher Than High school	11%	13%	11%	20%
Father Education High school	21%	37%	20%	24%
Father Education Higher Than High school	68%	50%	69%	56%

Descriptive Statistics

Mean Statistics of Family Background Variables (Continued)

Variable	NLSY97		YITS	
	Secgen	Native	Secgen	Native
Mother Education Less than High school	1%	10%	8%	13%
Mother Education High School	25%	37%	24%	30%
Mother Education Higher Than High school	73%	53%	68%	57%
Accumulated Education	13.53	13.00	13.44	13.41
Second Generation Dummy	5.56%		10.76%	

Observed Education Distributions

Education Level	NLSY97		YITS	
	Secgen	Native	Secgen	Native
Less than High school	12.01%	19.72%	20.82%	19.24%
High school Graduate	37.33%	39.59%	27.50%	30.60%
Some College	21.33%	17.05%	27.51%	26.46%
University and above	29.33%	23.64%	24.17%	23.70%

Estimation

- The dynamic model is solved recursively

- Maximum likelihood techniques are used to estimate the model

Estimation continued

- The likelihood function contains two parts
  - The probability of observing a particular sequence of schooling histories:

$$L_1(k) = \Pr\{[d_0(k)],[d_1(k)],\ldots,[d_\tau(k)]\}$$

  - The probability of having completed S years of schooling at age 16:

$$L_2(k) = \Pr(S_{i0} = s)$$
$$s \in \{7,8,9,10,11\}$$

Estimation continued

- Control for unobserved heterogeneity
  - Assume a fixed number (K) of "types" among individuals
  - Probability of belonging to a specific type k:

$$p_k = \frac{\exp(q_k)}{\sum_{j=1}^{2} \exp(q_j)}$$

$$q_2 = 0, k = 1, 2$$

Estimation continued

- Complete Maximum Likelihood function reads:

$$\ln(L_i) = \ln \sum_{k=1}^{K} p_k * L_i(k)$$

$$L_i(k) = L_1(k) * L_2(k)$$

Estimation Results

- Interpretation of the DP model estimators is hard
- However, family background variables generally show expected signs in terms of affecting the instantaneous utility of school, most of them are significant for both countries

Estimation Results continued

- In the U.S.:
- Father's education (higher than high school) as well as mother's education (high school and higher than high school) help to increase the instant utility of school
- Parental income, nuclear family and test scores also help to increase the instant utility of school
  - But with smaller magnitudes than parental education

Estimation Results continued

- For Canada:
- Mother's education (higher than high school) help to increase the instant utility of school
- Parental income and nuclear family also help to increase the instant utility of school
  - Again with smaller magnitudes than mother's education

Estimation Results continued

- Grade specific cost parameters are almost all significant in both countries
  - The magnitudes of these parameters are also larger than those of family background parameters

- Interestingly It shows higher utility of school (lower psychic costs) at grade 12 and 16 for both the U.S. and Canada, which is consistent with the structure of the school systems
- Ability scores play a major role in the U.S. data but not in Canadian data

Model Fit

Education Level	NLSY97		YITS	
	Observed	Model	Observed	Model
Less than High school	19.27%	23.81%	19.41%	18.15%
High school Graduate	39.47%	42.95%	30.27%	32.64%
Some College	17.29%	16.10%	26.57%	25.86%
University and above	23.97%	17.14%	23.75%	23.35%

Counterfactual Simulations

- Skilled immigration

- Compensation required to keep youths in school
  - High school drop-outs
  - College/University drop-outs

Simulation: Skilled Immigrants

- Introduce higher educated as well as richer parents
- Second-generation immigrants' responses are slightly different than natives to such policies according to the preferred model
- Policies such as to bring in even better educated immigrants will have only limited effects on the next generation's educational attainment

Simulation: Skilled Immigrants

Simulation 3

Increase those parental education below high school to high school graduate and increase parental income accordingly

	NLSY97		YITS	
	Secgen	Native	Secgen	Native
Control HS Drop-outs	18.67%	24.11%	18.86%	18.08%
Treatment HS Drop-outs	18.67%	22.70%	18.67%	17.77%
% Changes	0.00	-1.41	-0.19	-0.31
Control College Graduates	19.99%	16.97%	20.30%	23.73%
Treatment College Graduates	19.99%	17.68%	21.01%	24.34%
% Changes	0.00	0.71	0.71	0.61

Simulation: Skilled Immigrants cont

Simulation 4

Increase those parental education below or equivalent to high school to above high school and increase parental income accordingly

	NLSY97		YITS	
	Secgen	Native	Secgen	Native
Control HS Drop-outs	18.67%	24.11%	18.86%	18.08%
Treatment HS Drop-outs	12%	21.60%	16.90%	16.76%
% Changes	-6.67	-2.51	-1.96	-1.32
Control College Graduates	19.99%	16.97%	20.30%	23.73%
Treatment College Graduates	24%	18.00%	24.36%	26.53%
% Changes	4.01	1.03	4.06	2.8

Simulation: High-school Subsidy

Annual Dollar Amount Subsidies	NLSY97 N	NLSY97 Mean	YITS N	YITS Mean
Children of Immigrants				
High School Total	14	5286 US$	96	2389 US$
Grade 10	7	1662 US$	6	238 US$
Grade 11	14	2116 US$	57	565 US$
Grade 12	14	2339 US$	96	2038 US$

Annual Dollar Amount Subsidies	NLSY97 N	NLSY97 Mean	YITS N	YITS Mean
Children of Natives				
High School Total	307	5700 US$	763	2566 US$
Grade 10	222	2304 US$	70	296 US$
Grade 11	301	1569 US$	504	741 US$
Grade 12	307	1894 US$	763	2041 US$

Simulation: University Subsidy

Annual Dollar Amount Subsidies	NLSY97 N	NLSY97 Mean	YITS N	YITS Mean
Children of Immigrants				
University Total	46	9248 US$	310	4250 US$
Grade 13	46	5259 US$	310	1827 US$
Grade 14	46	2245 US$	310	1139 US$
Grade 15	46	995 US$	310	652 US$
Grade 16	46	749 US$	310	631 US$

Annual Dollar Amount Subsidies	NLSY97 N	NLSY97 Mean	YITS N	YITS Mean
Children of Natives				
University Total	750	9037 US$	2457	4479 US$
Grade 13	750	4847 US$	2457	1890 US$
Grade 14	750	1594 US$	2457	1034 US$
Grade 15	750	1135 US$	2457	668 US$
Grade 16	750	1461 US$	2457	886 US$

Summary

- Parents of children of immigrants are better educated than native children's parents
- This may be due to self-selection of high-ability immigrants
- Parental education and income influence educational attainment in both countries
- The influence is stronger for second-generation immigrants than natives
- Cognitive abilities help increase educational attainment of children of immigrants, especially in the U.S.

Summary, continued

- High school subsidy level is generally higher in the U.S. than in Canada
- Higher subsidies are required to induce youths to graduate from university in the U.S. than in Canada
- No major differences in subsidy levels between natives and second-generation immigrants (slightly lower high school subsidy for secgen in Canada)

THANK YOU