New opportunities for research on inequalities in higher education using integrated data from the Longitudinal and International Study of Adults

Ontario Institute for Studies in Education – Data, Equity, and Policy in Education Lab Speaker Series
March 11, 2020

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Statistics Canada

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Statistics Canada

Delivering insight through data for a better Canada
The Longitudinal and International Study of Adults
Introduction

- A Canadian socio-economic panel survey integrated with administrative data;

- Sponsored by Employment and Social Development Canada (ESDC);

- Developed to provide longitudinal information on labour market, education, training/skills, health, and family experiences;

- Initial sample included 34,000 individuals from 11,000 households, in Canada’s ten provinces;
  - Children born/adopted to the Wave 1 (longitudinal) sample are added each wave;
  - Other new household members are added/interviewed (temporary sample members).

- Two year reference period, beginning in 2012;

- Available in Research Data Centres;
  - LISA 2012, LISA 2014, LISA 2016;
  - LISA 2018 (to be released April 27, 2020);
  - LISA 2020 (currently in collection, to be released in 2022).
### The Longitudinal and International Study of Adults
Survey Content – Theme/Rotating content

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<td>• Skills Used at Work (General)</td>
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The Longitudinal and International Study of Adults
Integration of survey data with administrative data

Each wave, additional linkage years are added to the cumulative linkages.
The Longitudinal and International Study of Adults
Administrative data – Family Linkage
The Longitudinal and International Study of Adults
Opportunities for the study of inequalities in higher education

Core Content

- **Highest level of education**, and all PSE completed since Jan. 2012:
  - Level and Field of study (CIP)
  - Year completed
  - Country of completion
  - Institution (for PSE completed since 2012)
  - Duration to complete (normally)

- Highest level expected to complete (respondents age 15-24)

- Source(s) of PSE funding

- Children’s PSE Planning

- Monthly education enrollment vector

LISA 2016 Survey

- **Post-secondary Education History**
  - Number of Registered Apprenticeships, diplomas (college, CEGEP, non-university) and university degrees completed

- **4 highest PSE diplomas/degrees completed**:
  - Level and Field of study (CIP)
  - Year started/completed
  - Country of completion
  - Institution
  - Duration to complete (normally)

Admin data

For LISA sample members and all people they have lived with (e.g., spouses, parents/children, siblings) since 1982:

  - Includes intergenerational links

- IMDB: Immigrant characteristics at the time of landing in Canada (1952-2018)

- Pension (PPIC), T4 (2000-2017)
The Longitudinal and International Study of Adults
Opportunities for the study of inequalities in higher education

Core Content

- **Source(s) of PSE funding** (all respondents)
  - Loans (gov./bank/family);
  - Grants, bursaries, scholarships (gov./non-gov.);
  - Gifts, inheritances; RESP;
  - Employment earnings; Employer;
  - Debt dollar amounts (reference period and total), debt dollar amounts from government student loans.

- **Children’s PSE Planning** (parent of children aged 0-17):
  - Currently saving, or intending to save;
  - Reason(s) for not saving;
  - Current savings methods (RESP, TFSA, savings account, investments, other);
    - RESP value;
    - Expectation of RESP to cover…?
    - Total savings value;
    - Expectation of savings to cover…?
    - Expectation of child(ren) to pay any part of costs?
The results presented in the following slides are based on the paper:

**An exploration of the role of education in intergenerational income mobility in Canada**

Gaëlle Simard-Duplain

and

Xavier St-Denis
Research questions

• Intergenerational transmission of (dis)advantage in Canada: a 10% increase in a father’s income is associated with a 2.3 to 3.8% increase in their son’s adult income, and with a 1.9 to 2.9% increase in their daughter’s income (Chen et al. 2017).
  ➢ Half as much as in the United States, but 30% higher than in Finland, Norway or Denmark (Corak, 2013).

• Research on intergenerational mobility in the social sciences:
  1. Measurement of mobility and methods (measurement of [permanent] socioeconomic status, data limitations, estimation of change over time and cross-country variations, measures of association, …);
  2. Mechanisms that underlie mobility dynamics (socialization, abilities, attitudes, family environment in childhood, education, networks, policies, …).

To what extent do education and job characteristics account for the intergenerational transmission of income in Canada?
Existing literature on intergenerational mobility: educational attainment gap

• Gaps between low-income and high-income families in their level of parental expenditures in child education and related resources (Bray, 1999; Corak, 2013; Duncan and Murnane, 2011; Frenette, 2017; Kaushal et al., 2011; Kornrich and Furstenberg, 2013; Milligan, 2004; Ramey and Ramey, 2010; Schneider et al., 2018);

• Educational attainment and skills gap by parental income (Bailey & Dynarski, 2011; Belley & Lochner, 2007; Blau and Duncan 1967; Cunha & Heckman, 2007; Knudsen et al., 2006; Shavit and Blossfeld 1993; Waldfogel & Washbrook, 2011);

• Education accounts for:
  • Approximately 40 to 50% of the intergenerational association between parental and child occupation in Canada (Ornstein 1981; Wanner 2005);
  • Approximately 50% of the intergenerational association between parental and child income in the US (Bowles and Gintis, 2002) and the UK (Blanden et al., 2007).
Existing literature: higher education as a great equalizer

• The equalizing effect of a college degree: the association between parental and child socioeconomic status is small or null among Bachelor graduates (Hout 1988; Wanner and Hayes 1996; Torche 2011);

• Recent contributions:
  • Horizontal and vertical stratification (Lucas 2001; Torche 2011; Goyette and Mullen 2003; Zarifa 2012a);
  • Selection into higher education (Zhou, 2019) and homogeneity of university graduates at entry;
  • Uneven equalizing effect depending college selectivity and rank in the US (Chetty et al. 2018; Zhou, 2019).
Existing literature: labour market

- Labour market outcomes after graduation relates to parental income, except possibly among college graduates (for recent US evidence, see Torche 2011);

- Occupational sorting and within-occupation earnings differences by parental income, either directly or indirectly (Torche 2011; Ornstein 1981);

- Possible mechanisms for “direct” effect of parental socioeconomic status on child outcomes net of education:
  - Job characteristics (job skills, correlates of socioeconomic status such as employment contract and authority);
  - Family networks (Corak & Piraino 2011, Kramarz and Nordström Skans, 2014)
  - Cultural “fit” (Rivera 2015; Friedman and Laurison 2019).
Data

- Second wave of the Longitudinal and International Study of Adults (LISA 2014):
  - Collected from January 2014 to June 2014.

- Integrated with a rich set of administrative data:
  - Detailed income data for both respondents and their parents, from 1982 to 2013.
  - Sample: 3785 child-parent pairs

- Measure of income: permanent income rank (percentile rank of average income over five years in adulthood):
  - Diminishes error in measurement of socioeconomic status based on a single year of income (Atkinson et al. 1983; Solon 1992);
  - More detailed than occupation-based groupings (Torche 2011; Blanden et al. 2013);
  - Family income: allows to account for assortative mating and for non-employed spouses (Torche 2011);
  - Percentile rank less sensitive to life course bias (Chetty et al. 2014; Connolly et al. 2018) and allows relative mobility estimation (Zhou 2019).
Identification of child-parent pairs

Parent’s T1s

Parent’s T1 in year y

Parent child link established if same Family Identification Number (same address)

Respondent’s T1s

Child’s T1 in year y

Parent and child filing on same year

Record linkage to last two fiscal years

Survey data

Respondent T1s

LISA Wave 1

LISA Wave 2

1982 ... y - 1 y y + 1 ... 2010 2011 2012 2013 2014
Methods: path analysis

Rank-rank regression (bivariate)
\[ y_{i,c} = \alpha + \rho y_{i,p} + \epsilon_{i,c} \]  \hspace{1cm} (1)

The status attainment model (OE and ED)
\[ H_{i,c} = \pi_0 + \pi_1 y_{i,p} + \nu_{i,c} \] \hspace{1cm} (2)
\[ y_{i,c} = \beta_0 + \beta_1 H_{i,c} + \nu_{i,c} \] \hspace{1cm} (3)

Decomposition of the relative mobility coefficient into the explained (OED) and unexplained (OD) components

\[
\rho = \frac{\text{Cov}(y_{i,c}, y_{i,p})}{\text{Var}(y_{i,p})} \\
= \frac{\text{Cov}(\beta_0 + \beta_1 H_{i,c} + \nu_{i,c}, y_{i,p})}{\text{Var}(y_{i,p})} \\
= \frac{\beta_1 \text{Cov}(H_{i,c}, y_{i,p}) + \text{Cov}(\nu_{i,c}, y_{i,p})}{\text{Var}(y_{i,p})} \\
= \beta_1 \pi_1 + \mu
\]  \hspace{1cm} (4)
Methods: rank projection (Blanden et al., 2013; Rothstein, 2019)

Child income rank predicted from education

\[ y_{i,c} = \hat{\beta}_0 + \hat{\beta}_1 H_{i,c} + \hat{\nu}_{i,c} = \tilde{y}^{ed}_{i,c} + \hat{\nu}_{i,c} \quad (5) \]

Decomposition of the relative mobility coefficient into the explained and unexplained components

\[
\rho = \frac{\text{Cov}(y_{i,c}, y_{i,p})}{\text{Var}(y_{i,p})} = \frac{\text{Cov}(\tilde{y}^{ed}_{i,c}, y_{i,p})}{\text{Var}(y_{i,p})} = \frac{\text{Cov}(\tilde{y}^{ed}_{i,c}, y_{i,p}) + \text{Cov}(\hat{\nu}_{i,c}, y_{i,p})}{\text{Var}(y_{i,p})} = \lambda_1 + \eta \quad (6)
\]

Correlation of the rank projection and parental income

\[ \tilde{y}^{ed}_{i,c} = \lambda_0 + \lambda_1 y_{i,p} + \varepsilon_{i,c} \quad (7) \]
Results: the role of education (1)

Path analysis decomposition of total income relative mobility (years of education)

<table>
<thead>
<tr>
<th>Income definition</th>
<th>$\rho$</th>
<th>$\pi$</th>
<th>$\beta$</th>
<th>$\pi\beta$</th>
<th>$\pi\beta/\rho$ (%)</th>
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<tbody>
<tr>
<td><strong>Both genders</strong></td>
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<tr>
<td>Family</td>
<td>0.273 (0.243, 0.308)</td>
<td>0.0041 (0.0034, 0.0046)</td>
<td>19.8 (18.2, 22.3)</td>
<td>0.081</td>
<td>29.7</td>
</tr>
<tr>
<td>Family (parent) and individual (child)</td>
<td>0.229 (0.202, 0.266)</td>
<td>0.0041 (0.0034, 0.0046)</td>
<td>20.1 (18.8, 22.3)</td>
<td>0.082</td>
<td>36.1</td>
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<td><strong>Daughters</strong></td>
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<tr>
<td>Family</td>
<td>0.255 (0.207, 0.289)</td>
<td>0.0042 (0.0032, 0.0048)</td>
<td>20.4 (18.1, 23.5)</td>
<td>0.086</td>
<td>33.9</td>
</tr>
<tr>
<td>Family (parent) and individual (child)</td>
<td>0.189 (0.144, 0.229)</td>
<td>0.0042 (0.0032, 0.0048)</td>
<td>22.8 (20.7, 25.7)</td>
<td>0.097</td>
<td>51.2</td>
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<tr>
<td><strong>Sons</strong></td>
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<tr>
<td>Family</td>
<td>0.287 (0.253, 0.345)</td>
<td>0.0037 (0.0030, 0.0045)</td>
<td>19.3 (16.7, 22.4)</td>
<td>0.072</td>
<td>25.0</td>
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<tr>
<td>Family (parent) and individual (child)</td>
<td>0.283 (0.245, 0.335)</td>
<td>0.0037 (0.0030, 0.0045)</td>
<td>20.8 (18.0, 23.7)</td>
<td>0.078</td>
<td>27.4</td>
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</table>

Source: Longitudinal and International Study of Adults, 2014, and T1 Family File, 1982-2013. Bootstrapped confidence intervals (95%) are in parentheses.
Results: the role of education (2)

**Decomposition of total income relative mobility by rank projection method**

<table>
<thead>
<tr>
<th>Income definition</th>
<th>Parent</th>
<th>Child</th>
<th>$\rho$</th>
<th>Bachelor Degree</th>
<th>Highest degree</th>
<th>$\lambda$</th>
<th>$\frac{\lambda}{\rho} \times 100$</th>
<th>$\lambda$</th>
<th>$\frac{\lambda}{\rho} \times 100$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Family</td>
<td>Family</td>
<td>0.273</td>
<td>0.081</td>
<td>29.7</td>
<td>0.111</td>
<td>40.5</td>
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<tr>
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<td>Family</td>
<td>Individual</td>
<td>0.228</td>
<td>0.082</td>
<td>36.1</td>
<td>0.110</td>
<td>48.1</td>
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Results: the role of education, by region

Path analysis decomposition of total income relative mobility (Bachelor graduation), by region


Note: Total family income is used for both parents and children. Completion of a Bachelor degree or more is used as the measure of education.
## Results: is college the great equalizer?

### Decomposition of total income relative mobility among university graduates

<table>
<thead>
<tr>
<th>Income definition</th>
<th>Bachelor and above</th>
<th>Bachelor degree</th>
<th>Graduate degree</th>
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<tr>
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<td>Percent explained</td>
<td>Percent explained</td>
<td>Percent explained</td>
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<tr>
<td>Parent Child</td>
<td>Degree type and FoS</td>
<td>Degree type and FoS</td>
<td>Degree type and FoS</td>
</tr>
<tr>
<td>Family Family</td>
<td>0.230 4.8 7.7</td>
<td>0.196 5.4</td>
<td>0.275 2.5 14.5</td>
</tr>
<tr>
<td>Family Individual</td>
<td>0.142 7.7 11.2</td>
<td>0.130 4.3</td>
<td>0.145 5.6 27.6</td>
</tr>
</tbody>
</table>

Analytical framework

Parental income  →  Child education  →  Child job characteristics  →  Child income

Path 1

Path 2

Path 3

Path 4
Methods: decomposition (education and job characteristics) by rank projection

Child income rank predicted from education and job characteristics

\[ y_{i,c} = \zeta + S_i \delta + Q_i \theta + \vartheta_{i,c} \]  \hspace{1cm} (8)

\[ \hat{y}_{i,c}^S = \gamma^S_0 + \gamma^S_1 H_i + \psi^S_{i,c} \]  \hspace{1cm} (10)

\[ \hat{y}_{i,c}^Q = \gamma^Q_0 + \gamma^Q_1 H_i + \psi^Q_{i,c} \]  \hspace{1cm} (11)

\[ \hat{\vartheta}_{i,c} = \gamma^\vartheta_0 + \gamma^\vartheta_1 H_i + \psi^\vartheta_{i,c} \]  \hspace{1cm} (12)

Decomposition of the relative mobility coefficient into the explained components and unexplained component

\[ \rho = \frac{\text{Cov}(\hat{y}_{i,c}^S, y_{i,p})}{\text{Var}(y_{i,p})} + \frac{\text{Cov}(\hat{y}_{i,c}^Q, y_{i,p})}{\text{Var}(y_{i,p})} + \frac{\text{Cov}(\hat{\vartheta}_{i,c}, y_{i,p})}{\text{Var}(y_{i,p})} + \frac{\text{Cov}(\hat{\vartheta}_{i,c}, y_{i,p})}{\text{Var}(y_{i,p})} \]  \hspace{1cm} (13)
Descriptive results (1)

Child education by parental family total income quintile

Descriptive results (2)

Descriptive results (3)

Job quality by parental employment income, employed respondents

Delivering insight through data for a better Canada

The role of occupations in the decomposition of relative mobility in individual employment income, employed respondents

<table>
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<tr>
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<th>Job skill intensity and quality</th>
<th>Occupation and job skill intensity and quality</th>
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<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>%</td>
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<tr>
<td>Total effect</td>
<td>0.132</td>
<td>100.0</td>
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<tr>
<td>Explained</td>
<td>0.083</td>
<td>63.1</td>
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<tr>
<td>Education, total</td>
<td>0.067</td>
<td>51.1</td>
</tr>
<tr>
<td>Education, through job characteristics</td>
<td>0.032</td>
<td>24.1</td>
</tr>
<tr>
<td>Education, net</td>
<td>0.036</td>
<td>27.0</td>
</tr>
<tr>
<td>Job characteristics, uncorrelated with education, total</td>
<td>0.016</td>
<td>12.0</td>
</tr>
<tr>
<td>Unexplained</td>
<td>0.049</td>
<td>36.9</td>
</tr>
</tbody>
</table>


Note: estimates are for specifications using the individual income of the main parent and of the child.
Conclusion

• The role of education in Canada is similar to the US and UK:
  • Educational attainment accounts for up to 50% of the association between parental and child income percentile rank;
  • The association between parental income and child education and the association between education and child income is lower than in the US.

• Intra-national heterogeneity

• Limited role for field of study and degree type among university graduates

• The role of labour market dynamics:
  • Almost half of the portion of intergenerational mobility associated with education is itself correlated with job skills;
  • Very little of the role played by education has to do with selection into higher-quality jobs, net of job skills;
  • Job characteristics associated with 16.5 to 27.5% of the portion of intergenerational mobility not correlated with education.
Thank you!