Student Retention, Student Pathways, and Post-Schooling Labour Market Outcomes: New Data Linkage Approaches

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I. What are these new data sources and why are they so important?
Focus Here on PSE Administrative Data

• Defn: Collected for administrative purposes

• Think of all the data gathered on students...
  
  • Individual institutions

  • Other organisations: application centres, loan systems, etc.

• Plus non-student/more general data – e.g., tax data, EI, SA
Huge Benefits of These New Data Sources

• Low cost – the data already exist

• Often very up-to-date – sometimes in real time

• Full samples/populations

• Often longitudinal

• Can link to other data
How Can We Use These Data?

• To better understand and ultimately improve student experiences and outcomes

• Multiple Stakeholders
  • Students
  • Institutions
  • Policy makers at all levels
  • General population
  • Industry/employer organisations and associations
II: Student Retention - Work with Mohawk College
Mohawk-EPRI Partnership: Objectives

1. Better understand student retention
   • Descriptive analysis (not shown here)
   • Statistical models (provide a taste)

2. Use models to predict students at greatest risk of leaving

3. Target and test student success initiatives

4. Adopt effective practices
Variables Included in the Analysis (sort of)

• Individual characteristics ("Background Variables")
  • Cohort
  • Age at entry
  • Gender and Urban/Rural
  • International student identifier

• High School Grades

• Program identifiers: i) faculty, ii) school
Results

Marginal Effects
(Regression Analysis)
Student Characteristics
Age at Entry (18 year old)

Separately

Background and Risk Factors

Background, Risk Factors, High School Grades
Gender (Male) &
Urban/Rural/Int. (Rural)

Separately
Background and Risk Factors
Background, Risk Factors, High School Grades
Faculty Differences
Differences Across Faculties (Comparison to Business, Skilled Trades and Apprenticeship)
Schools
Business, Skilled Trades & Apprenticeship (Human Services)
Engineering Technology, Media & Entertainment (Human Services)

- Building and Construction Sciences
- Chemical, Enviro, Mechanical & Industrial
- Electrical & Computer Engineering
- Media and Entertainment

Legend:
- School Only
- Add Background
- Add High School Grades
Now Use the Models to Predict Leaving Rates at the Individual Level
Start with Differences by Selected Characteristics
Predicted Leaving Rates by Age

Density

Probability of Leaving

0 10 20 30 40 50 60

0 0.01 0.02 0.03 0.04 0.05 0.06 0.07

0

Probability of Leavin

20-22 18

- 20-22
- 18
Predicted Leaving Rates by Gender

Density

Probability of Leaving

Male
Female
Predicted Leaving Rates
By High School Grades

Density

Probability of Leaving

A Plus  A Minus  B Plus  B Minus
Predicted Leaving Rates by Faculty

- Business, Skilled Trades and Apprenticeship
- Health Sci., Comm. And Urban Studies
- Interdisciplinary Studies
- Eng. Tech., Media and Entertainment
Overall Leaving Rates – True “Predictive Models”
Overall Predicted Leaving Rates

- Probability of Leaving
- Overall Predicted Leaving Rates

Graph showing the density of predicted leaving rates for school and program models. The graph compares the leaving rates with probability on the x-axis and density on the y-axis, with two curves representing the school model (orange) and program model (blue).
Overall Predicted Leaving Rates

Probability of Leaving

School Model
Program Model

Target these students
Overall Predicted Leaving Rates

- Probability of Leaving
- Overall Predicted Leaving Rates
- School Model
- Program Model
- Or these students
Overall Predicted Leaving Rates

- Density
- Probability of Leaving
- Overall Predicted Leaving Rates

<table>
<thead>
<tr>
<th>School Model</th>
<th>Program Model</th>
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Or these students
Evaluate Student Initiatives

1. Use models to control for observable factors

2. Use “discontinuity analysis” based on our targeting

3. Use traditional experimental design
So Far We have Learned...

• Student retention is complex: no silver bullets

• Statistical modeling is valuable
  • to understand student retention
  • to identify students at risk
  • to evaluate initiatives

• The more data available, the better
  • Basic admin. data
  • Pre-entry assessments and surveys
  • Updates on student situation as they move through their studies
Next steps

- Two HEQCO Projects ($)
  
  1. Student Advising - using students targeted with our models
  
  2. Future Authoring - random assignment experiment
Pathways

• An elaboration on retention analysis

• But need to be able to track students across institutions

• Where do we get such data?
  • Individual institutions collaborate
  • Provincial and related data aggregates
  • PSIS

• But inherently tricky/challenging work
III: Tracking Student’s Post-Graduation Labour Market Outcomes: uOttawa Pilot Study
What We Do: Track Students’ Post-Schooling Labour Market Outcomes

• Year-by-year after graduation
• Cohort-by-cohort
• By faculty
• By gender
• Across the distribution of earnings (by quintile)
Graduates 1998-2010

Linked to tax data

Data
Social Science Graduates
(Starting with 1998 Graduates)
Mean Earnings of Social Science Graduates ($2011)
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Mean Earnings of Social Science Graduates ($2011)
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Years After Graduation

Mean earnings increase over time after graduation.
Mean Earnings of Social Science Graduates ($2011)
Mean Earnings of Social Science Graduates ($2011)
Mean Earnings of Social Science Graduates ($2011)
Mean Earnings of Social Science Graduates ($2011)
Showing Selected Cohorts:
Mean Earnings of Selected Cohorts ($2011) – Social Science Graduates
Comparing Social Science and Humanities Graduates
Mean Earnings of Selected Cohorts ($2011)

Social Science

Humanities
Mean Earnings of Selected Cohorts ($2011)

Social Science

Humanities
Mean Earnings of Selected Cohorts ($2011)

Social Science

Humanities
Comparing Graduates Across All Faculties
Mean Earnings of Selected Cohorts ($2011)
Mean Earnings of Selected Cohorts ($2011)
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Mean Earnings of Selected Cohorts ($2011)

- **Health**
- **Social Science**
- **Mathematics and Natural Sciences**
- **Humanities**
Mean Earnings of Selected Cohorts ($2011)

**Engineering and Computer Science**

**Mathematics and Natural Sciences**

**Health**

**Social Science**

**Humanities**

**Natural Sciences**
Mean Earnings of Selected Cohorts ($2011)

- **Business**
- **Engineering and Computer Science**
- **Mathematics and Natural Sciences**
- **Health**
- **Social Science**
- **Humanities**
Why are These Results So Important?

• Valuable information for all stakeholders, especially students

• Unique nature of the data
  • Year by year, cohort by cohort, by field of study, etc.
  • Full, representative samples
  • Accurate earnings information
Next Steps for Tax Linkage Work

• ESDC project involving 12 institutions (colleges and universities)
  • New results – new and powerful LLMI
  • Establish a research platform starting with these institutions
  • Show feasibility for other related projects, including PSIS-based

• Extend
  • Dig deeper into how outcomes are related to a wide range of student characteristics and schooling experiences
  • Add institutions or do whole systems
  • Link to other data
The Different Research Agendas are Related

• Retention/pathways: means identifying student characteristics and tracking their schooling experiences

• Tracking labour market outcomes starts simple...

• But then leads to relating outcomes to any number of student chars. and schooling experiences
New Data, New Projects, New Frontiers

• To better understand and improve student outcomes

• Just getting started

• CICAN project?
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