What Determines Success in University

Population Change and Lifecourse Strategic Knowledge Cluster

Summary

- What characterizes those students who have a high quality educational experience as measured by accumulated credits and cumulative grade averages?

- What differentiates those students who continue in the university at which they first register from those who leave within one or two years?

- What distinguishes those who complete a university degree from those who fail to do so within a reasonable span of time?

We examine persistence and success using a rich administrative data set that links information on individual students at four Ontario universities with information on the high school performance of individual students, the high school that the student attended, and the neighbourhood in which the student grew up.

These data sets provide many relevant factors, a large number of observations, and the actual measures (not self-reports) of such academic outcomes as grade averages, credits and degrees completed.

- We find that the explanatory power of the high school grade point average (GPA) greatly dominates that of other variables such as university program, gender, and neighbourhood and high school characteristics.

- Indeed, high school and neighbourhood have weak links with success in university, regardless of whether we use specific measures, such as average test scores for a high school or average neighbourhood income, or models with fixed effects for each high school and neighbourhood.

- Students from low income neighbourhoods and weaker high schools appear to be almost as well prepared for university as students from more advantaged backgrounds but the same high school grades.

- The favourable inference for the university system is that these four institutions provide an environment in which students with similar high school records but otherwise heterogeneous backgrounds have very similar likelihoods of success.

Data

Four Ontario universities provided student-level information. The combined undergraduate enrolments at these universities accounts for 28% of the total at Ontario universities over our sample period.

Our data set is limited to students who entered a full time university degree program directly from an Ontario high school in September. Such students comprise over 90% of all entering undergraduate students at Ontario universities.

Two universities provided data for entering cohorts in September of 1994 through 2004. The entering dates were 1994 through 2005 for the third school and 1999 through 2006 for the fourth school.

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Basic Findings

In the full paper, we report estimates of a regression model of each of our four outcomes (measures shown in Box 1), that contain all of the variables (shown in Boxes 2, 3 and 4) plus interactions between high school grades and gender, program, neighbourhood average income and high school performance on the standardized Grade 9 math assessment.

The finding that stands out is the importance of the student's high school grade average.

In addition, the explanatory power of the high school grade average greatly dominates that of other variables such as university program, gender, neighbourhood average income, and average high school performance on Grade 9 standardized tests.

These latter variables have coefficients that are often statistically significant but usually very small in magnitude. These findings were true of students entering all four major programs: Arts, Science, Business and Engineering.

Box 1: Measures of persistence and success in university:

- Cumulative grade average on a 0 to 100 scale at the end of two calendar years after entry.
- Credits completed at the end of two calendar years after entry. 0.5 credits is given for a one-term course and 5 credits is the most common annual full-time course load.
- Departure from the university during the two calendar years after entry. The term "departure" as opposed to "dropout" is used because the destination of such students is unknown.
- Completion of any type of degree during the six calendar years after entry. The six year window is used to accommodate students in coop programs and in five-year combined degree programs

Box 2: Individual Characteristics provided by the form submitted to the Ontario Universities Application Centre (OUAC) by all applicants to Ontario universities:

- Average grade in the student's best six Grade 12/13 University level courses.
- Sex
- Mother tongue
- Citizenship
- Postal Code

Box 3: Neighbourhood Characteristics of the residence of the student's family at the time of university application provided by data for Enumeration Areas (EA) in 1996 Census and Dissemination Areas (DA) in 2001 and 2006 Censuses.

- Residence in a low-income, middle-income or high-income neighbourhood as measured by Average Equivalent Income which is average neighbourhood income divided by the square root of the neighbourhood average number of persons per household.
- Proportion of adults with a Bachelor's Degree or more
- Proportion of families headed by a lone mother
- Proportion of persons who have English for a mother tongue
- Proportion of persons who have immigrated to Canada since 1981
- Proportion of adults who are unemployed.

Box 4: High School Characteristics provided by the Ontario Ministry of Education for the years 2000 through 2003.

- High school is low, middle or high performing as measured by the proportion of students taking the Grade 9 standardized Academic Math Assessment that receive a "high score".
- High school is private.
- High school is Catholic.
- High school is Francophone.
- High school enrolment is small, medium or large.
- High school is in a rural area.
- Distance of the high school from the nearest university and the nearest college.

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Illustration of Basic Findings

These four figures show the relationship between high school grade averages and university outcomes by neighbourhood average equivalent income tercile.

In Figure 1, students in the lowest (less than 75) and highest (greater than 95) high school grade categories have university grade averages that differ by about 25 percentage points.
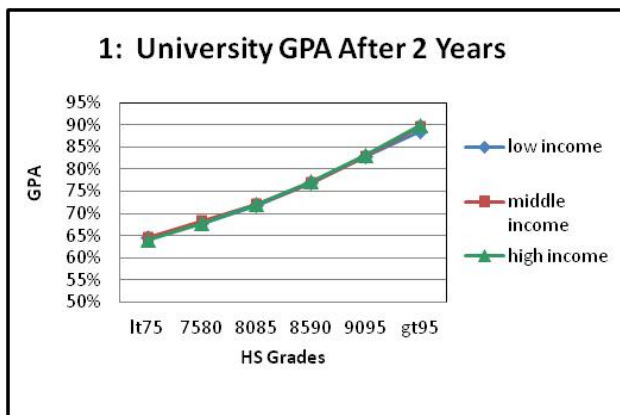

At the end of two years, students in the lowest high school grade category in Figure 2 have earned 2.4 fewer credits (almost a half a year less) than those in the highest high school grade category.
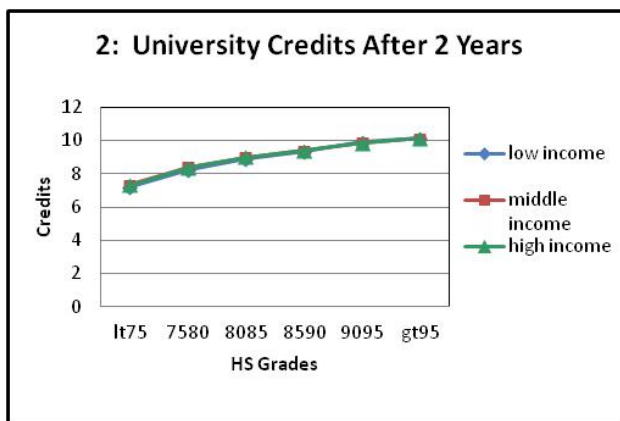
In contrast in Figures 1 and 2, the differences between students from low income and high income neighbourhoods in university grades are 1 percentage point or less and the differences in credits completed are 0.2 credits or less for each high school grade category.

In Figure 3, students in the lowest high school grade category have a departure rate that is almost 21 percentage points higher than those in the highest high school grade category.
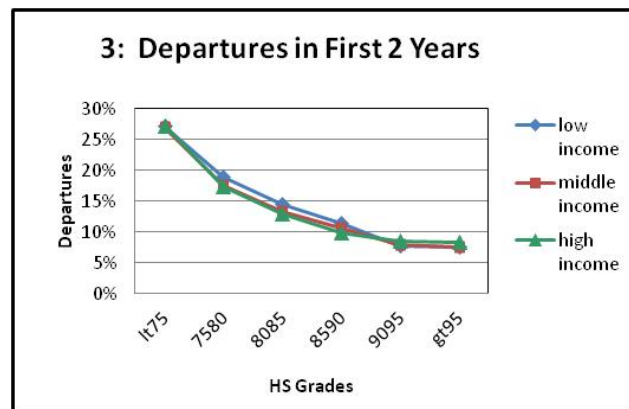
In Figure 4, the students in the lowest high school grade category have a degree completion rate that is 36 percentage points lower than those in the highest high school grade category.

However, the differences in departure rates between low- and high-income students in Figure 3 are at most 1.5 percentage points and the differences in degree completion rates in Figure 4 are at most 3 percentage points.
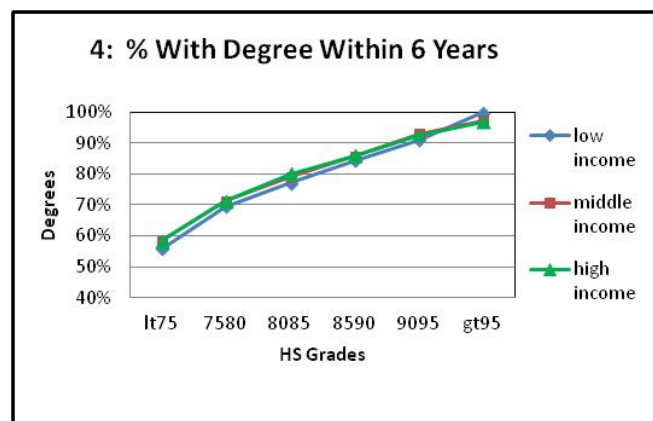
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Other Findings

The same is true in figures (see full paper) that show the relationship between high school grade averages and university outcomes by gender, by academic program or by the average performance of the student's high school on the academic Grade 9 standardized math test. Differences in university outcomes by gender, program or high school performance on standardized tests are very small and very much dominated by differences in the students' high school grade averages.

Policy Implications

Two important, albeit tentative, policy conclusions can be drawn from our findings.

First, there is a positive message regarding the educational system in Ontario.

♦ Students in our sample from disadvantaged neighbourhoods and high schools with weaker performance on standardized tests are as well prepared for university as students with the same individual high school grades but from advantaged neighbourhoods and higher performing high schools.

♦ Viewed from the university perspective, the positive message is that these four institutions provide an environment in which students with similar high school grades but otherwise heterogeneous backgrounds have very similar likelihoods of success.

Of course, it might be that a different set of neighbourhood and high school variables would have much better explanatory power and yield different conclusions. Our estimates with fixed effect models for both high schools and neighbourhoods, however, do not indicate that this would be the case.

Second, students with the lowest high school grades in our sample have a very low probability of completing a degree at these four universities and are much less likely to do so than students with slightly better grades.

This provides a clear note of caution regarding a policy of improving access to the university system by reducing admission averages.

About the Policy Brief

This Policy Brief is based on *Understanding the Determinants of Persistence and Academic Success in University: An Exploration of Data from Four Ontario Universities,* a report prepared by Martin D. Dooley, A. Abigail Payne, A. Leslie Robb, McMaster University, for the Higher Education Quality Council of Ontario. The full report is available at:

http://www.heqco.ca/SiteCollectionDocuments/Persistence_in_University_ENG.doc

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