CIBC Centre for Human Capital & Productivity
The University of Western Ontario

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POLICY BRIEF

Optimism, College Major, and Post-Secondary Dropout

Students make a wide range of important decisions after entering college or university (these terms are used interchangeably here). These decisions impact graduation rates, future job prospects, earnings, and other aspects of their post-graduate lives. As such, they are central to analyses of income inequality and intergenerational mobility. They are also of direct interest to policymakers concerned with these issues as well as the costs associated with government education and public transfer programs. The dramatic changes in educational attainment and labour market participation among women in recent decades are also heavily influenced by changes in their post-secondary choices and market responses to those choices.

"Before we begin to design policies to reduce college dropout or to encourage certain majors, it is crucial to develop a full understanding of how these decisions are made. Unfortunately, our current understanding is at best incomplete."

Most fundamental among student decisions is the choice to dropout or to remain in school until graduation. This decision is particularly important, since school dropouts typically earn much less than graduates and have a more difficult time repaying their education debts. The fact that roughly half of all entering students from low-income families leave school without a degree raises important concerns about intergenerational mobility and the extent to which rising post-secondary costs prevent some students from completing their programmes (NCES, 2007).

Recently, considerable attention has not only focused on whether students graduate, but also on the course of study they have chosen. In particular, it is now commonplace to read about the dearth of graduates in math and science, areas widely viewed as central to the general success of modern economies. Given the high labour market returns associated with degrees in these areas, it is natural to ask why so few students graduate with a math, science or engineering major.

Before we begin to design policies to reduce college dropout or to encourage certain majors, it is crucial to develop a full understanding of how these decisions are made. Unfortunately, our current understanding is at best incomplete. As former university presidents William Bowen (Princeton) and Derek Bok (Harvard) note in their popular book, *Shape of the River*, we still do not know whether the substantial dropout rates of low income students are "…due to the inability of students and their families to meet college costs, rather than to academic difficulties or other factors."

Todd and Ralph Stinebrickner shed new light on this issue in recent CIBC Working Paper (2008-6). They dive deeper into the post-secondary decision process in a second study (CIBC Working Paper 2011-1) which analyzes the evolution of college major choices throughout school.

Data for these studies come from the Berea Panel Study, which has been regularly surveying students from low-income families (as often as twelve times each year) attending the four-year Berea College in Kentucky. This longitudinal survey provides unequaled depth and detail about factors likely to influence post-secondary decisions. The findings from this research reveal that the most fundamental of all factors—learning about one's own academic ability—plays a crucial role in dropout and college major decisions.

continued

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In "Learning about Academic Ability and The College Drop-Out Decision" (CIBC WP 2008-6), Stinebrickner and Stinebrickner estimate that roughly 40% of college dropout can be attributed to what students learn about their academic ability and grade performance after entering college. Put another way, 40% of college dropout occurs because students learn that they are not as well-suited for their post-secondary programmes as they initially thought. On average, students enter school overly optimistic about their likely performance, predicting upon entry that they will obtain a grade point average (GPA) of 3.22, significantly higher than their actual first semester GPA of 2.88. Subsequently, students become more realistic about their ability and performance, revising their predicted GPA downward on average. Many students learn over the course of their studies that college is not a good match for them academically, and they choose to drop out.

Is it just a matter of students not studying hard enough? Not quite. While an earlier study by Todd and Ralph Stinebrickner (2008) shows that study effort is important for college grade performance, students also tend to over-estimate their grades given their level of study effort (i.e., they over-estimate their academic "ability"). This implies that many students are unknowingly under-prepared for a typical college classroom. As such, these results highlight the importance of policies targeting individuals at younger (pre-college) ages to better prepare them for a quality post-secondary education.

This research also contributes to our understanding of higher educational attainment rates for women (relative to men) in recent years. Their estimates suggest that gender differences in dropout are largely explained by current or predicted future grade performance. Furthermore, men self-report on time diaries that they put in less study effort. Consistent with this, men report that they dislike studying more than do women. So, why do poorly performing males enter college in the first place? The data suggest that they are simply more overly optimistic.

In "Math or Science? Using Longitudinal Expectations Data to Examine the Process of Choosing a College Major" (CIBC WP 2011-1), Todd and Ralph Stinebrickner examine the process of choosing a college major and how that choice evolves over time. Given recent policy discussions, they emphasize the choice of Math or Science majors.

Because the Berea Panel Study follows students throughout their college careers, it is possible to track students' expectations about their future majors to

Figure 1: *Perceived probability of finishing school in actual final major, by semester*

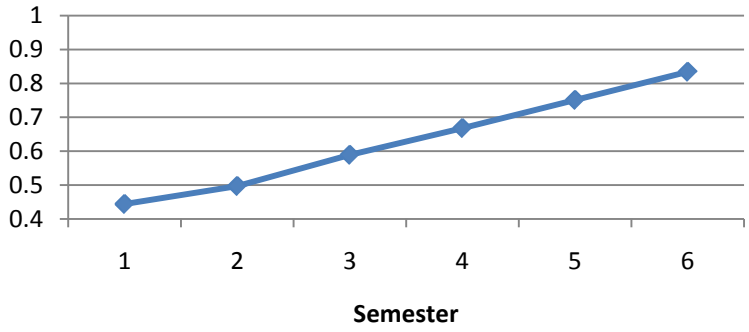


Figure 2: *Proportion of students believing that a particular major is most likely, by semester.*

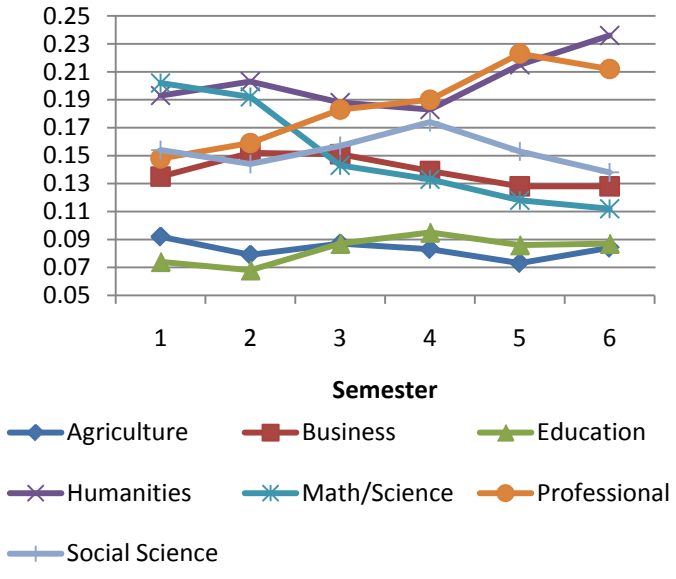
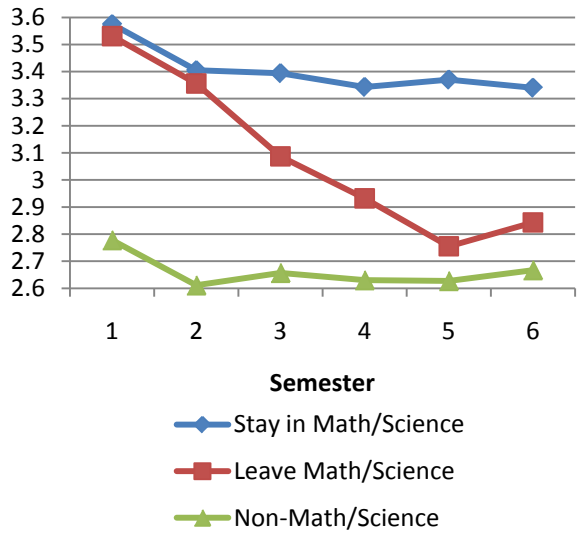


Figure 3: *Expected grade point average in Math/Science, by semester*



compare those beliefs against actual major choices. At the beginning of each semester, students are asked to estimate the probability that they will end their college career in different majors. Figure 1 reveals considerable uncertainty about this at the time of college entrance. On average, individuals initially place a .45 probability on finishing school in the major they eventually end up in. This probability rises to roughly .50 in the second semester of college, .67 in semester four, and nearly .85 in semester six.

Figure 2 shows that students are quite open to the idea of majoring in Math/Science at the start of college. Indeed, the fraction of entering students who believe that Math/Science is their most likely major 'group' exceeds that for any other major group. However, after only a year in college, the proportion of students who believe that Math/Science is their most likely major has decreased substantially (falling to fifth out of seven major groups).

Why do students tend to leave Math/Science? In short, grades. Figure 3 reports students' expected GPA if they were to major in Math/Science for three different subpopulations: (i) students who started and stayed in Math/Science, (ii) students who initially believe they will major in Math/Science but end up 'leaving' those majors, and (iii) students who initially believe they will major in something other than Math/Science. The figure reveals that students who enter college thinking they will major in Math/Science believe that they will perform well in those majors relative to those who choose other majors (and almost never change into Math/Science).

There is virtually no difference in initial beliefs between those who ultimately 'leave' Math/Science and those who 'stay'; however, over time, the 'leavers' dramatically adjust downward their expected GPA if they were to stay in Math/Science. These 'leavers' essentially learn that they are not well-suited to math and science majors. Indeed, by the third year, beliefs about likely success in Math/Science are quite similar for those who left those majors and those who started in another major.

Not surprisingly then, a formal quantitative analysis shows that virtually all of the decline in the expected likelihood of finishing school as a Math/Science major (as seen in Figure 2) can be explained by the fact that many students learn that they would perform poorly in Math/Science. Additionally, the decline in optimism about grade performance in Math/Science among 'leavers' is due to the fact that it is difficult for them and not that they are unwilling to work hard.

"...these results highlight the importance of policies targeting individuals at younger (pre-college) ages to better prepare them for a quality post-secondary education."

These general findings cast considerable doubt on policies aimed at encouraging more university students to major in math and science. The fact is many try, but few succeed. Instead, these results suggest that efforts to increase the number of math and science graduates need to focus on better preparing high school students (or even younger students) in these subjects.

References

National Center for Education Statistics (2007). Placing College Graduation Rates in Context. How 4-Year College Graduation Rates Vary with Selectivity and the Size of Low-Income Enrollment. U.S. Department of Education 2007-161.

Stinebrickner, Todd and Stinebrickner, Ralph, "The Causal Effect of Studying on Academic Performance," The B.E. Journal of Economic Analysis and Policy: Vol. 8: Iss. 1 (Frontiers), Article 14

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