Racial/Ethnic and SES Differences in the Timing of Initial Postsecondary Education Enrollment: An Event History Analysis Approach

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College access has increased.

- From 1900, there has been a rise in American postsecondary education enrollments. This can be attributed to various reasons. (GI Bill, Financial Aid Programs, Women’s Movement, Economic Recessions, Sputnik and the Space Race, etc.)

- In 1992, of the 2,466,003 total students who completed high school, 1,338,860 (54.3%) students transitioned into some form of postsecondary education right after high school. (National Center for Higher Education Management Systems, 2006)

- In 2002, the number of high school seniors who attended postsecondary education subsequent to completion of a high school rose to 1,643,496 representing 56.6% of those eligible. (National Center for Higher Education Management Systems, 2006).
There remain problems in college access.

- According to Rogers, “African Americans and Hispanics are significantly less likely than Caucasian students to enroll in postsecondary education, and black-white and Hispanic-white gaps have remained virtually unchanged since the 1970’s” (2005, p. 6).

- “Research consistently shows lower rates of enrolling in college within 1 or 2 years of high school graduation for students with lower income and low socioeconomic status than for other students” (Rowan-Kenyon, 2007, p.189).

- While the number of high school students enrolling in college has increased, a concomitant increase in students who postpone enrollment also has been evidenced (Bozick & DeLuca, 2005).

- Postponing college enrollment negatively affects student persistence and graduation (Bozick & DeLuca, 2005).
Conceptual Framework

Race
SES
Region
Urban Location
Rural Location
GED
HS Diploma
HS Program
Comprehensive Exam
PSE Entrance Exam
College Plans
# of PSE Applications
Accepted at College
Applied for Aid
Offered Aid at College

FA Info – Teacher
FA Info – Loan Officer
FA Info – Adult
US Ed. Dept.
School Materials
Military Materials
# of FA Sources

Pre-College Context

Socio-Demographic Variables

Student’s Family SES

Student Academic Variables

PSE Preparation Variables

GED/High School Graduation

Eight-Year Period of Analysis

Postsecondary Education Enrollment or Enrollment Censoring
1) What are the time-to initial postsecondary education enrollment trajectories for students enrolling in postsecondary education by race/ethnicity?

2) What are the time-to initial postsecondary education enrollment trajectories for students enrolling in postsecondary education by SES quartiles?

3) What are the time-to-initial postsecondary education enrollment trajectories for students enrolling in postsecondary education institutions by type (two-year or four-year institutions)?

4) What is the relationship between race/ethnicity on whether, when, and where a student enrolls in postsecondary education over an eight-year period subsequent to completing a secondary education while holding other student characteristics constant?

5) What is the relationship between SES on whether, when, and where a student enrolls in postsecondary education over an eight-year period subsequent to completing a secondary education while holding other student characteristics constant?
**METHODOLOGY**

Quantitative Research Design using a Large-Scale Data Set

**METHODS**

- Logistic Regression
- Multinomial Logistic Regression
- Non-Parametric Event History Analysis (EHA)
- Discrete-Time EHA Regression
- Competing-Risks EHA Regression
## Strengths and Limitations of Statistical Techniques

<table>
<thead>
<tr>
<th>Statistical Method</th>
<th>Strengths or Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Censored Cases</strong></td>
<td></td>
</tr>
<tr>
<td>Ordinary Least Squares Regression (OLS)</td>
<td>No</td>
</tr>
<tr>
<td>Censored Normal Regression (CNR)</td>
<td>Yes</td>
</tr>
<tr>
<td>Logistic Regression (LR)</td>
<td>Some ability though not as good as CNR.</td>
</tr>
<tr>
<td>Multinomial Logistic Regression (MLNM)</td>
<td>Same as above.</td>
</tr>
<tr>
<td>Event History Analysis (EHA)</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Different Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>Ordinary Least Squares Regression (OLS)</td>
<td>No</td>
</tr>
<tr>
<td>Censored Normal Regression (CNR)</td>
<td>No</td>
</tr>
<tr>
<td>Logistic Regression (LR)</td>
<td>No</td>
</tr>
<tr>
<td>Multinomial Logistic Regression (MLNM)</td>
<td>Yes</td>
</tr>
<tr>
<td>Event History Analysis (EHA)</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Measures Time</strong></td>
<td></td>
</tr>
<tr>
<td>Ordinary Least Squares Regression (OLS)</td>
<td>Some ability if time variable is normally distributed.</td>
</tr>
<tr>
<td>Censored Normal Regression (CNR)</td>
<td>Same as above.</td>
</tr>
<tr>
<td>Logistic Regression (LR)</td>
<td>No</td>
</tr>
<tr>
<td>Multinomial Logistic Regression (MLNM)</td>
<td>No</td>
</tr>
<tr>
<td>Event History Analysis (EHA)</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Sound Methods Employed

- Handled subject data censoring and truncation using Event History Analysis methods.

- Generated a (traditional) longitudinal, time-span, and person-period data sets for all the different analyses.

- Correctly used design variables (panel-flag, panel sampling weights, etc.) in data analyses.

- Correctly coded and centered variables.

- Used the Bayesian Information Criterion method for model fit comparisons in addition to other methods.
• Used both the Taylor-Series Linearization and Huber-White variance estimation methods.

• Appropriately dealt with Time-Dependence in hazard modeling.

• Used traditional and Adjusted Wald and Multivariate Wald Hypothesis Testing where applicable.

• Used both single imputation and multiple imputation methods (Stata’s *ice* command) to deal with item-level missing data.
Results

• The first set of results included analyses from non-parametric Event History Analysis methods.

• As part of that process, I examined the hazard distributions of initial PSE enrollment patterns.

• Then, I conducted hazard regression models.
What is a Hazard Probability?

• First a hazard probability is not a bad thing.
• Additionally, the event of interest is enrollment so a higher hazard is a good thing.
• A statistically significant relationship is understood the same way as a regression coefficient.
Results

General pattern for the hazard of PSE enrollment.

Highest hazard of PSE enrollment occurs during the initial 2 years.
Asian students appear to have a different pattern for hazard of PSE enrollments during the first 2-years.
Initially High-SES students have visibly higher hazards than the other three SES groups.

It takes more than three years for SES differences to disappear.

Legend
- Year 1
- Year 2
- Year 3
Students have higher hazards of enrolling in 4-year over 2-year institutions during the first two years.
## Competing-Risks Hazard Regression

Table 3
Competing-Risks EHA Hazard Model: Relative-Risk Hazard Ratios
for Type of Postsecondary Education Enrollment * (n=10,827)

<table>
<thead>
<tr>
<th>PSE Enrollment*</th>
<th>RRH(se)</th>
<th>Two-Year</th>
<th>Four-Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>1.104(.076)</td>
<td>1.331(.078)*</td>
<td></td>
</tr>
<tr>
<td>Race (White)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>1.328(.179)</td>
<td>1.433(.142)*</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.219(.135)</td>
<td>1.234(.127)</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>0.675(.117)</td>
<td>1.211(.178)</td>
<td></td>
</tr>
<tr>
<td>Socio-Economic Status</td>
<td>1.159(.078)</td>
<td>1.575(.076)*</td>
<td></td>
</tr>
<tr>
<td>Asian*SES</td>
<td>0.799(.124)</td>
<td>0.743(.072)b</td>
<td></td>
</tr>
<tr>
<td>Hispanic*SES</td>
<td>1.134(.166)</td>
<td>0.953(.127)</td>
<td></td>
</tr>
<tr>
<td>Black*SES</td>
<td>0.772(.134)</td>
<td>0.825(.180)</td>
<td></td>
</tr>
<tr>
<td>Region (Northeast)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>1.626(.189)*</td>
<td>0.828(.082)</td>
<td></td>
</tr>
<tr>
<td>Midwest</td>
<td>1.071(.123)</td>
<td>0.954(.086)</td>
<td></td>
</tr>
<tr>
<td>South</td>
<td>1.376(.161)b</td>
<td>0.885(.089)</td>
<td></td>
</tr>
<tr>
<td>Urbanity (Suburban)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>0.830(.078)</td>
<td>1.048(.080)</td>
<td></td>
</tr>
<tr>
<td>Rural/Outside MSA</td>
<td>0.789(.062)b</td>
<td>1.087(.075)</td>
<td></td>
</tr>
<tr>
<td>GED (HS Diploma)</td>
<td>0.427(.076)*</td>
<td>0.345(.132)b</td>
<td></td>
</tr>
</tbody>
</table>

Other Type of HS Program
- 1.020(.089) 1.504(.106)*
- Comprehensive Examination
  - 0.990(.066) 1.047(.005)*
- PSE Entrance Exam
  - 1.069(.106) 4.040(.610)*
- Plans (No College Plans)
  - Plans to Attend College
    - 2.784(.251)* 5.841(.810)*
  - Don’t Know Plans
    - 1.410(.196) 1.820(.514)
- Number of PSE Applications
  - 1.181(.081)* 1.393(.066)*
- Accepted at College
  - 1.670(.309)b 2.586(.475)*
- Time
  - 0.932(.017)b 1.008(.035)
- Time*Time
  - 1.000(.001) 0.993(.002)b
- Time*Time*Time
  - 1.000(.000) 1.000(.000)*

Log-pseudolikelihood: -24,340.766
LR $\chi^2$: 24,858.478
$df$ for LR $\chi^2$: 48
McFadden’s Adjusted $R^2$: .34
BIC*: 49,303

Statistically Significant: *p<.001 ② p<.005 ③ p<.01
Marginally Significant: *p≈.015-.20 ② p≈.021-.25 ③ p≈.026-.30
Findings and Implications for Research

• One of the major findings from this data analysis is that time matters in postsecondary education enrollments.

• Particularly for researchers who examine stratification of students across the two-year and four-year higher education sectors. Throughout the first three years, students have higher hazard probabilities of enrolling in four-year institutions. The crossover in hazard of enrollment occurs somewhere during the third year when students begin to have higher hazards of enrolling in two-years.

• The results illustrate that the different research questions generate different results. As policy researchers/analysts, a clear understanding should exist when asking research questions. While a method may suggest the elimination or exclusion of models or theories, other methods may substantiate a theoretical model under certain circumstances. This places a greater burden on the researcher in identifying appropriate research questions.
Findings and Implications

• Asian, Pacific Islander students have a different pattern of hazard probability distributions than the other racial/ethnic student groups. Policymakers should invest future research to understand the unique economic, social, familial, and educational forces that drive these racial differences.

• SES continues to have a significant relationship with the hazard of initial postsecondary education enrollment patterns. It appears that SES may be more important in the enrollment process than race.

• The Asian*SES interaction was unexpected but it appears that SES may not have a similar positive effect for Asians that SES may have among the other race groups.
Thank You!

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