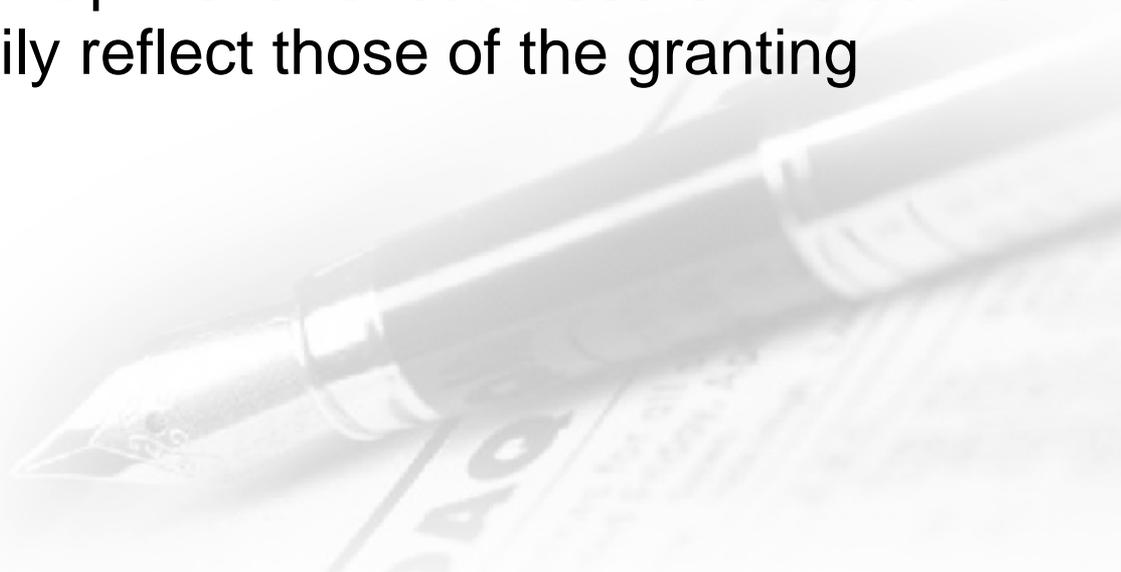# Racial/Ethnic and SES Differences in the Timing of Initial Postsecondary Education Enrollment: An Event History Analysis Approach

Pedro Villarreal III

ASHE 2008

Special Thanks to AERA

Setting the Context

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).

Setting the Context

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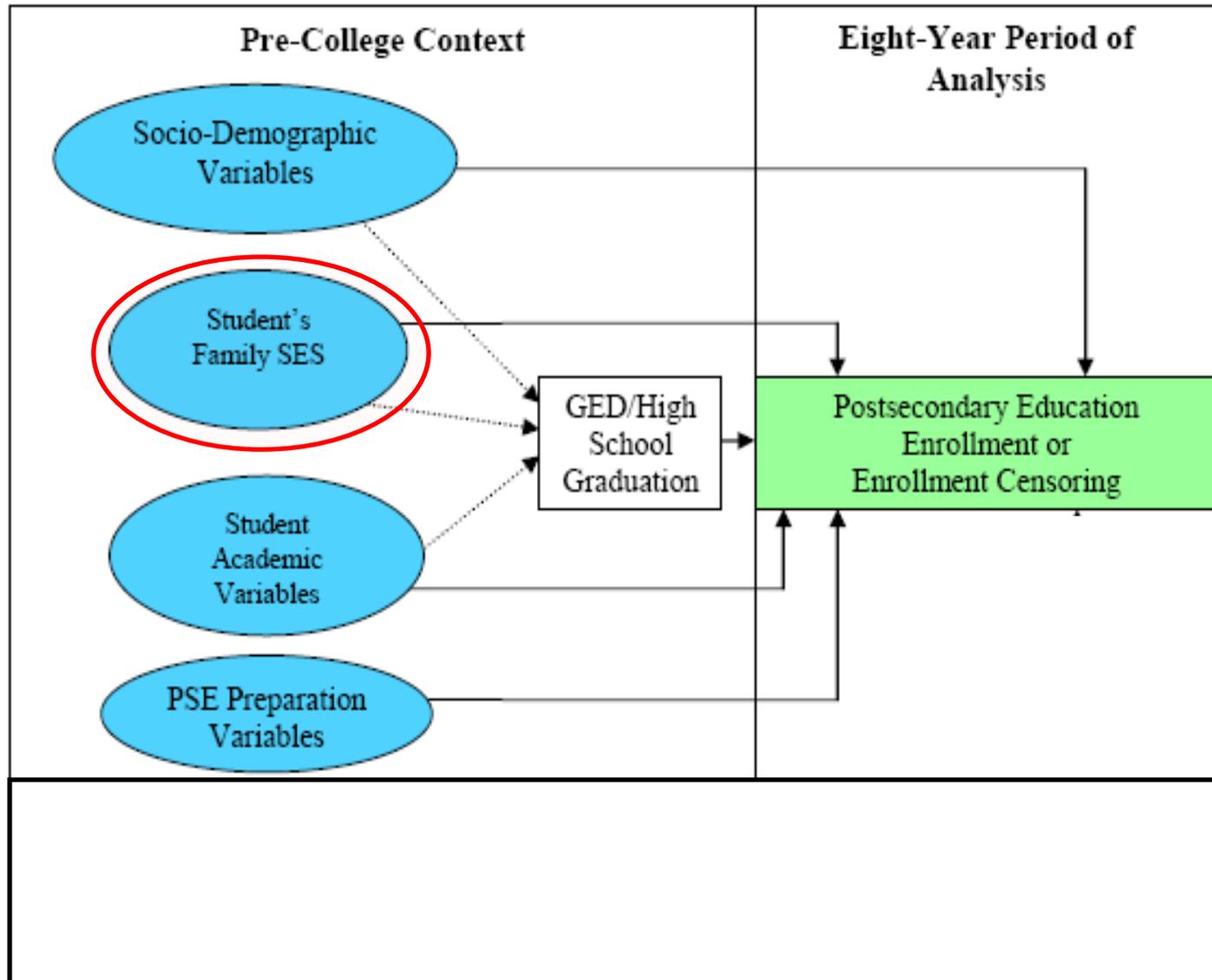
Research Questions

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 and Methods

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

Statistical Method	Strengths or Limitations		
	Censored Cases	Different Outcomes	Measures Time
Ordinary Least Squares Regression (OLS)	No	No	Some ability if time variable is normally distributed.
Censored Normal Regression (CNR)	Yes	No	Same as above.
Logistic Regression (LR)	Some ability though not as good as CNR.	No	No
Multinomial Logistic Regression (MLNM)	Same as above.	Yes	No
Event History Analysis (EHA)	Yes	Yes	Yes

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.

Sound Methods Employed

- 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.
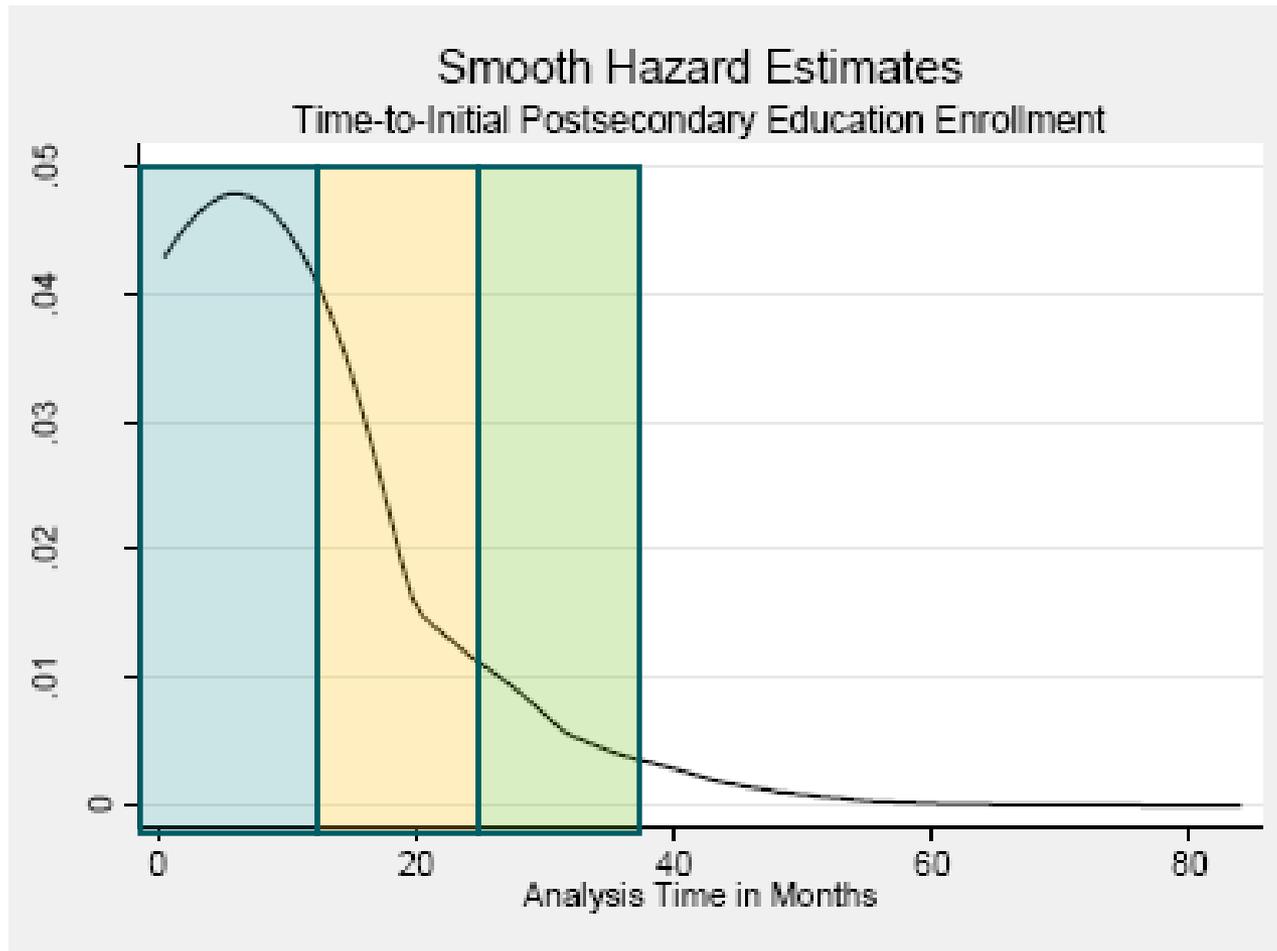
Results

- 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

Smooth Hazard Estimates
Time-to-Initial Postsecondary Education Enrollment

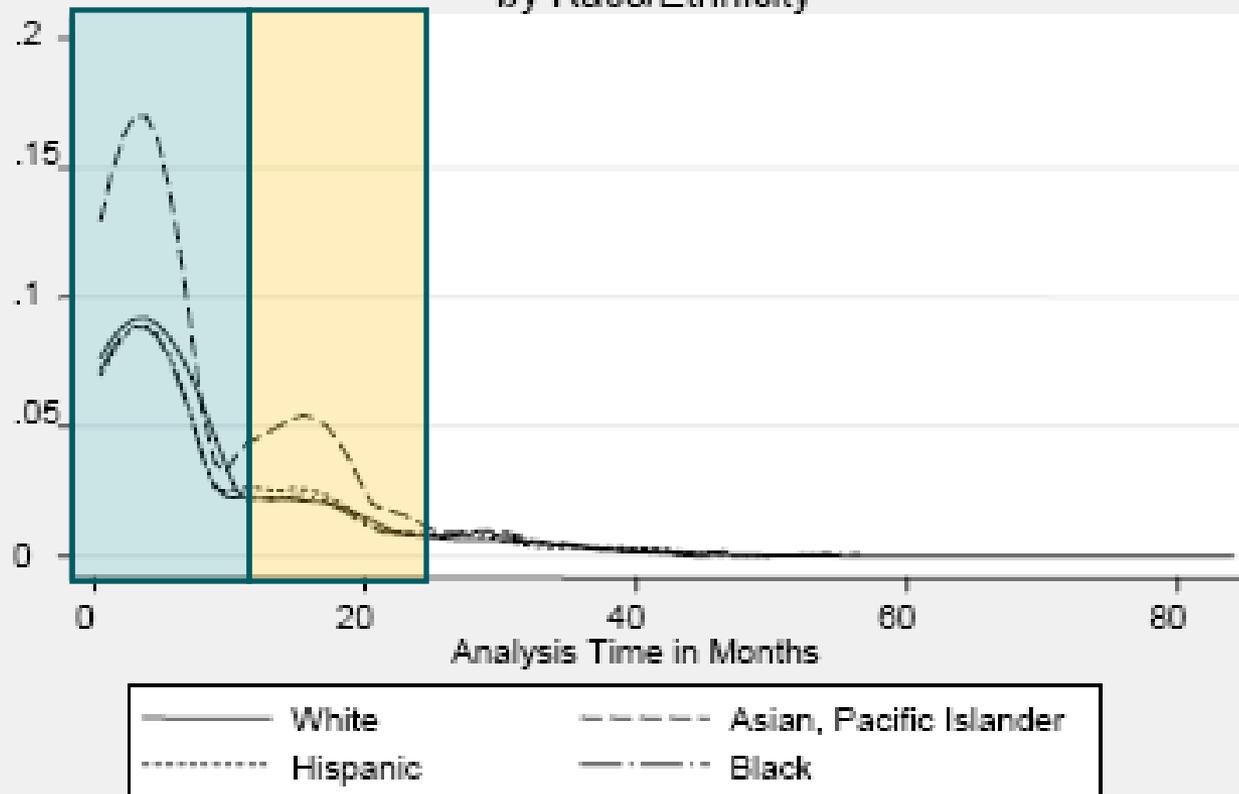General pattern for the hazard of PSE enrollment.

Highest hazard of PSE enrollment occurs during the initial 2 years.

Legend

Year 1
Year 2
Year 3

Results

Smoothed Hazard Estimates
by Race/Ethnicity

Legend: White, Hispanic, Asian, Pacific Islander, Black

Asian students appear to have a different pattern for hazard of PSE enrollments during the first 2-years.
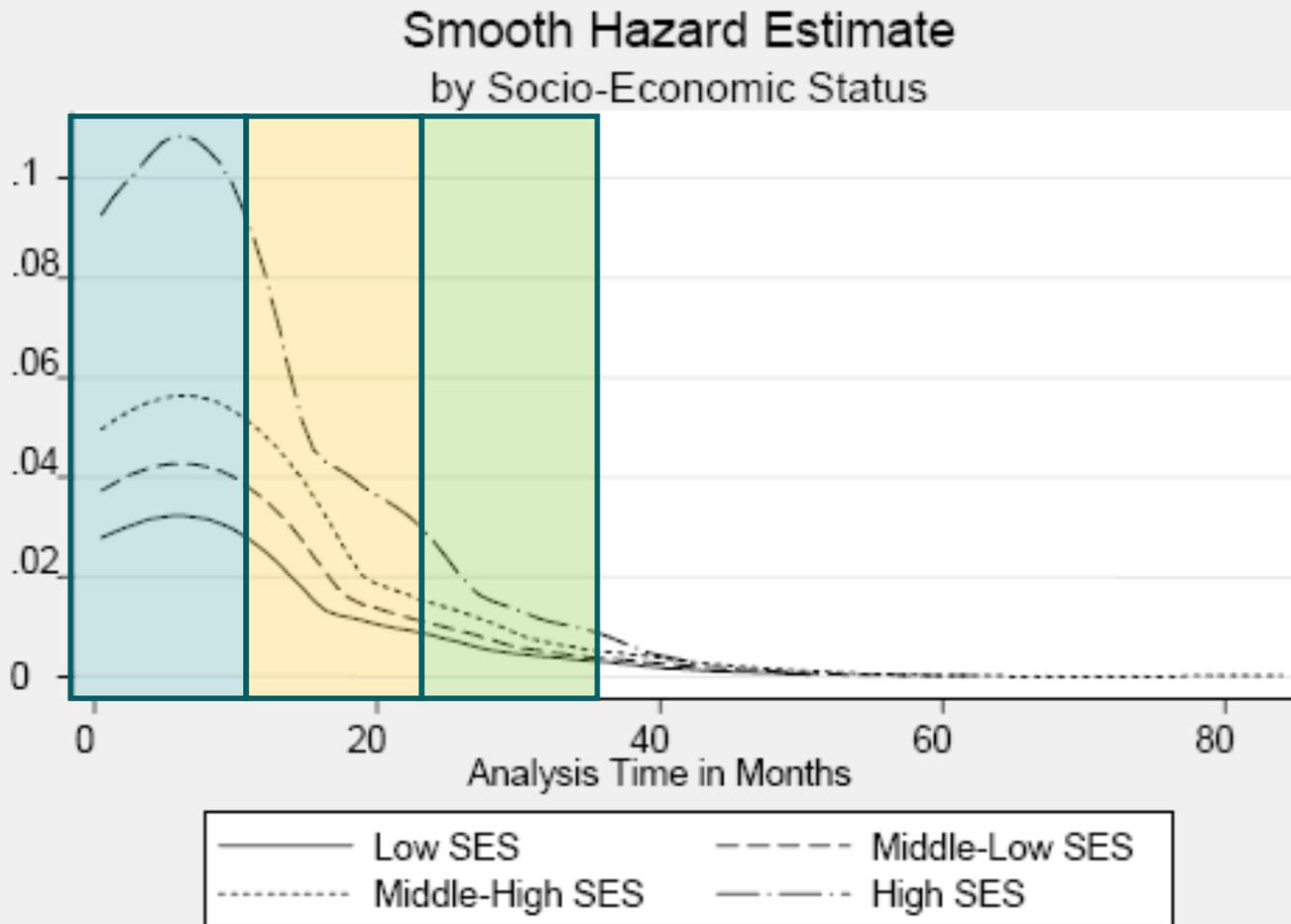
Legend
Year 1
Year 2
Year 3

Results

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.

Smooth Hazard Estimate
by Socio-Economic Status

Legend
- Year 1
- Year 2
- Year 3

Low SES
Middle-Low SES
Middle-High SES
High SES

Analysis Time in Months

Results

Smoothed Hazard Estimates
by Type of Postsecondary Institution Enrolled
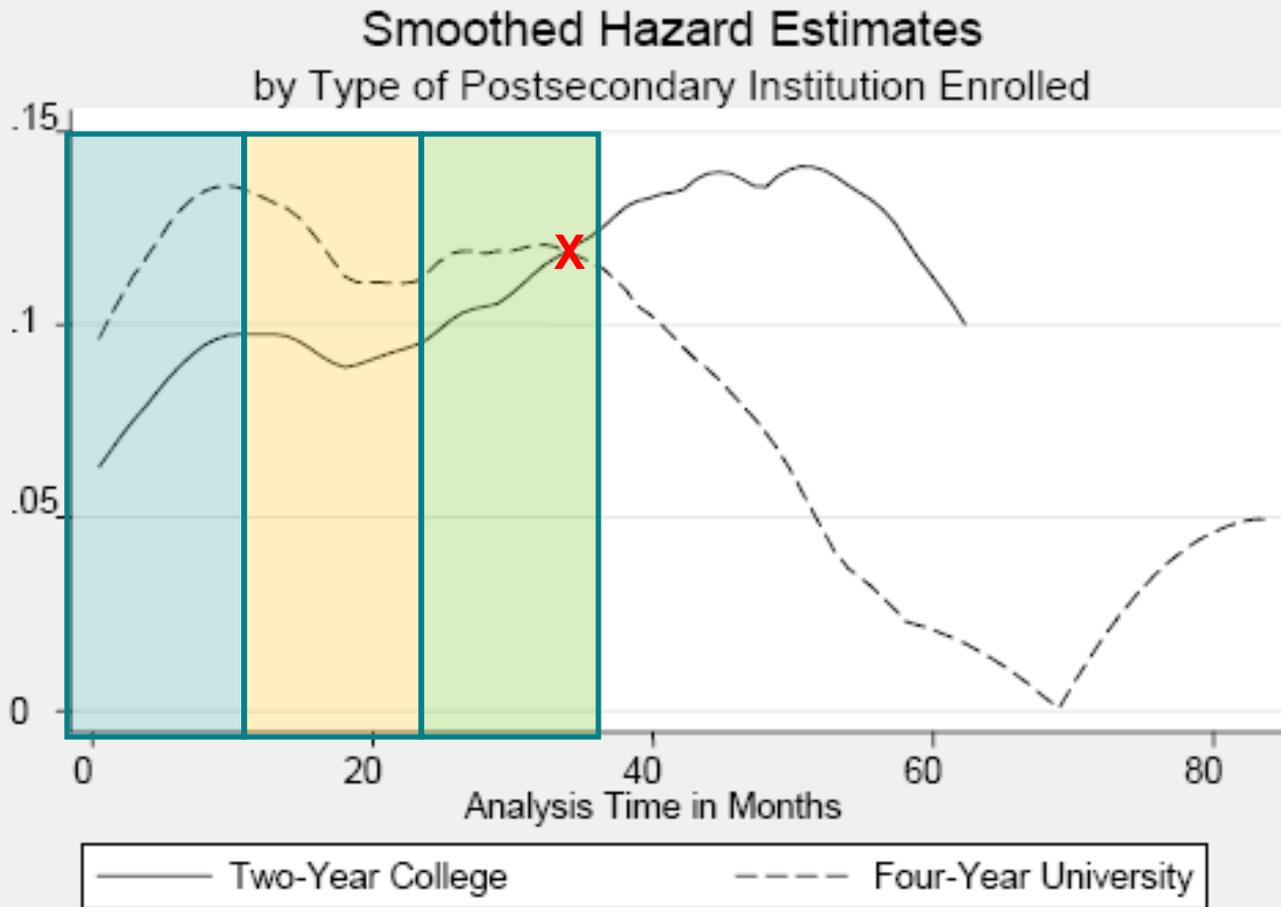
Students have higher hazards of enrolling in 4-year over 2-year institutions during the first two years.

Legend
Year 1
Year 2
Year 3

Competing-Risks Hazard Regression

Table 3

Competing-Risks EHA Hazard Model: Relative-Risk Hazard Ratios for Type of Postsecondary Education Enrollment[†] (n=10,827)

PSE Enrollment[∞] (relative to Not Yet Enrolled)	RRH(se)[#]	
	Two-Year	Four-Year
Female	1.104(.076)	1.331(.078)[a]
Race (White)		
Asian	1.328(.179)	1.433(.142)[a]
Hispanic	1.219(.135)	1.234(.127)
Black	0.675(.117)[a]	1.211(.178)
Socio-Economic Status	1.159(.078)[a]	1.575(.076)[a]
Asian*SES	0.799(.124)	0.743(.072)[b]
Hispanic*SES	1.134(.166)	0.953(.127)
Black*SES	0.772(.134)	0.825(.180)
Region (Northeast)		
West	1.626(.189)[a]	0.828(.082)
Midwest	1.071(.123)	0.954(.086)
South	1.376(.161)[c]	0.885(.089)
Urbanity (Suburban)		
Urban	0.830(.078)	1.048(.080)
Rural/Outside MSA	0.789(.062)[b]	1.087(.075)
GED (HS Diploma)	0.427(.076)[a]	0.345(.132)[b]
Other Type of HS Program	1.020(.089)	1.504(.106)[a]
Comprehensive Examination	0.990(.006)	1.047(.005)[a]
PSE Entrance Exam	1.069(.106)	4.040(.610)[a]
Plans (No College Plans)		
Plans to Attend College	2.784(.251)[a]	5.841(.810)[a]
Don't Know Plans	1.410(.196)[c]	1.820(.514)
Number of PSE Applications	1.181(.081)[z]	1.393(.066)[a]
Accepted at College	1.670(.309)[c]	2.586(.475)[a]
Time	0.932(.017)[a]	1.008(.035)
Time*Time	1.000(.001)	0.993(.002)[b]
Time*Time*Time	1.000(.000)	1.000(.000)[a]

Log-pseudolikelihood	-24,340.766
LR χ^2	24,858.478
df for LR χ^2	48
McFadden's Adjusted R^2	.34
BIC[S]	49,303

Statistically Significant: [a]$p<.001$ [b]$p<.005$ [c]$p<.01$
Marginally Significant: [x]$p\approx.015-.020$ [y]$p\approx.021-.025$ [z]$p\approx.026-.030$

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!

Pedro (Pete) Villarreal III, Ph.D.

Visiting Assistant Professor of Educational Research

The George Washington University

Department of Educational Leadership

2134 G Street, NW, Suite 113

Washington, DC 20052