

Identifying Student and Institutional Factors that contribute to Undergraduate Student Success

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- The purpose of this presentation is to examine some of the institutional and individual factors that lead to success defined here as graduating in six years from the same institution. This study builds on previous work on the timing of major change and the number of major changes as they impact time to degree (Redlinger, et al., “Effects of Major Change on Persistence and Timely Graduation,” RMAIR, October 18, 2007, Reno, Nevada).
- The study is part of a larger effort to raise the retention and graduation rates for the university in accordance with the university’s strategic plan and the UT System’s focus on graduation rate improvement at component institutions.



THE UT SYSTEM BOARD OF REGENTS: RESOLUTION TO IMPROVE GRADUATION RATES

All academic institution presidents **align institutional policies to maximize their positive impact on graduation rates – i.e. financial aid, academic advising, performance reviews, tuition, course scheduling, campus housing, curriculum, admissions and any other institutional policy that improves graduation rates.**

All academic institution presidents **develop specific targets** by April 15, 2006 to meet or exceed national averages for four-year, five-year and six-year graduation rates for full-time, part-time and transfer students. ...

All academic institution presidents **report each quarter the specific steps** taken to align policies and to improve graduation rates and that they provide statistics and progress toward the specified targets annually to the Board for each group of students.

SYSTEM BOARD OF REGENTS' WEBSITE



Imperative Seven from UTD's Strategic Plan: Improve Graduation Rates

Graduation Rate	UT Dallas Current	National Average	UT Dallas 2015 Goal
4 Year (FTIC 2003)	42%	26%	47%
5 Year (FTIC 2002)	54%	47%	62%
6 Year (FTIC 2001)	55%	53%	72%



Context: UTD's UNDERGRADUATE DEMOGRAPHICS FALL 2007

Enrollment by Race/Ethnicity

	N	%
White Non-Hispanic	5,125	56%
Black Non-Hispanic	672	7%
Hispanic	1,003	11%
Asian/Pacific Islander	1,846	20%
American Indian	53	0.6%
International	364	4%
Unknown/Other	33	0.4%

Total Enrollment by Residence Code

	N	%
DFW Area*	6,021	66%
Other Texas counties	1,592	18%
Out of State	286	3%
International	1,197	13%

* This area includes the following counties: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, Wise.

Note: "residence" is identified by student's permanent address at time of application. International status is determined by visa status (students who are neither citizens nor permanent residents of the U.S.)

FTIC 2006-2007 Retention Rate was 81%

6-Year Graduation rate for the 2001 FTIC Cohort was 55.2%

Achievement Test Scores for the fall 2007 FTIC Cohort:

SAT Critical Reading Middle Range 540-670

SAT Math Middle Range 580-690

SAT Writing Middle Range 530-640

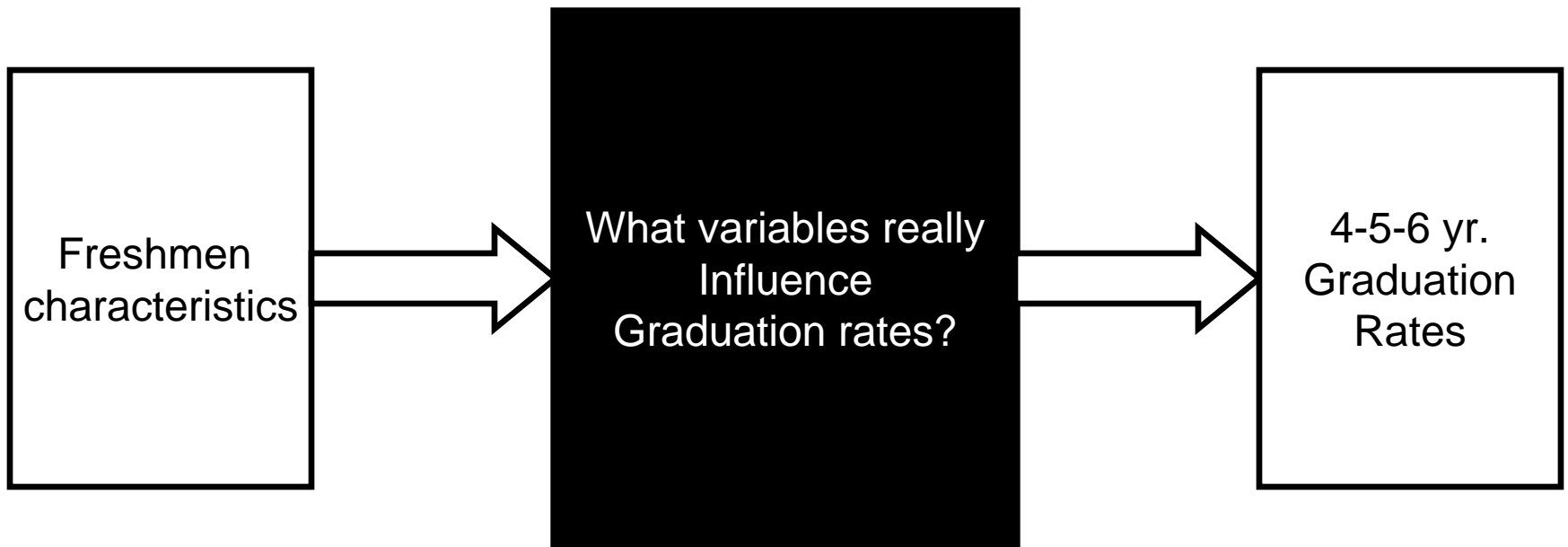
ACT Composite Middle Range 24-29

Percent in top tenth of high school graduating class 43%

Percent in top quarter of high school graduating class 74%



The Black Box



What are the effects of freshmen characteristics?

Freshmen characteristics

Do variables that predict freshmen retention also predict timely graduation?

4-5-6 yr. Graduation Rates

A Few of Our Research Speculations

1. The higher the SAT/ACT score the higher the probability of first year success, the higher the probability of first-year retention.
2. The effects of SAT/ACT diminish over time and are not significantly related to six-year graduation (in the context of our university).
3. Gender and ethnicity are related to first-year retention and their effects do not diminish.
4. The lower the first semester GPA the less likely a student is to be retained; the lower the first-year GPA the less likely the student is to be retained.
5. The effects of the first semester/first year have sustained effects on time to graduation.
-The lower the first semester GPA (first-year GPA) the longer the time to graduate;
6. The lower the ratio of earned hours to attempted hours the longer the time to graduate.
7. The greater the number of major changes the longer the length of time to graduate.
8. The later in a student's career they change majors the longer the time to graduate.



Selected Literature

- Astin (1975, 1993), using large national data sets, identified **involvement** (academic involvement, involvement with faculty, involvement with student peers) as a key factor in retention.
- Tinto's (1987) model of institutional departure is based on **academic and social integration**. The greater the amount of integration, the greater the probability of retention.
- Berger and Milem (1999) used Astin's Theory of Involvement as a helper theory to more explicitly specify Tinto's description of departure. These findings show that students who **successfully integrate into the academic and social subsystems** are more likely to persist at the institution, and are students whose values, norms, and established patterns of behavior are congruent with those already dominant on campus.
- Nagda et al (1998) studied the impact of undergraduate student-faculty research partnerships on student retention. The primary finding was that such a program increased retention rates for some groups of students, particularly African-American students and for sophomores.
- McLaughlin, Brozovsky, and McLaughlin (1998) suggested that institutional researchers can play a vital role in identifying student retention as a strategic issue by analyzing data at the college and departmental levels, examining "killer" courses, and attaching money to the loss of students.
- Young and Redlinger (2001) analyzed student flows to understand student persistence and success. They suggest that **first year success** is an important factor in graduation. They suggest that major declaration early is a significant variable influencing positive student outcomes.
- Cavote and Kopera-Frye (n.d.) in a power point presentation studied a 1999 cohort of 711 students at UN-Reno. They found that entering test scores, HS GPA were not significant factors but that **1st semester GPA was a significant factor**. Traditional status had a positive effect on the first semester that persisted through to graduation.
- Belcheir (2005) studied 1,333 full-time FTIC fall 2003 students at Boise State using SIS variables and survey data. For retention, first semester GPA, course load, financial aid, an admissions index score and on-campus residency were significant.
- Mathew et al. (2007) analyzed the 1999 and 2000 FTIC cohorts at The University of Texas at El Paso using 23 variables considered to be predictors of graduation. They found **first term GPA, gender, high school class rank, number of classes failed, and number of credits attempted** to be significant predictors of success.



Data Sources

- The primary data used consist of archival records of three FTIC entering classes 1999 (n=635), 2000 (n =840), and 2001 (n= 1,031) as stored in the student information system as well as data in the freshmen database maintained by the Dean of Undergraduate Studies (total N =2,506). Students were tracked over 6 years (through Summer) to examine retention and graduation rates by major, outflows to other majors, and performance in courses.
- Using semester transcript records, a detailed “life history” for each student was generated that included courses attempted, courses completed, courses repeated, semester GPAs, and transfer hours (if any).
- In addition, the Freshmen Characteristics variables (see the following slide) were gathered. These variables are used in our yearly retention and persistence analyses.



Freshmen Characteristics in First-Year Retention Model

- Full time (12 or more SCH) or Part time Status
- Ethnicity
- Gender
- High School Class Rank
- Achievement Test Scores (SAT, ACT)
- Merit Scholarship
- Need Based Aid
- Declared or undeclared major at time of matriculation
- Residency-Tuition Status
- First Semester GPA



Methods

- **Multiple methodological approaches were applied to analyze the data.**
- **Initially, a series of cross tabulations were created to examine the effects of selected variables on graduation rates in each specific cohort.**
- **Our initial first-to-second year retention models employ logistic regression, and we extended the use of this procedure to 4-5-6+ year graduation rates. We were examining whether or not entering characteristics (e.g., SAT scores) had any predictive value with regard to graduation rates. The logistic regression (graduation =1) was conducted in four steps with variables entered sequentially beginning with class rank and achievement scores to first year performance variables.**
- **Using student records, we sought to identify the timing and context for major changes, and precursor and subsequent behavior as evidenced in the archival records. Linear regression models were used to test the effects of GPA, number of major changes and the timing of major changes on time to graduation. Only students who graduated were included in this analysis.**
- **Path models of student behavior were constructed using individual student record data to identify common pathways to persistence and success (or failure).**



6 Problems in Archival Data Analyses

1. The problem of selective deposits. Student Records are produced for purposes other than research.
2. The problem of selective errors. Archives are produced for someone else and by some set of others. Thus, one must carefully evaluate the way in which the records were produced over time.
3. The problem of omitted variables. There is no opportunity to generate new data that could overcome what is lacking in the record.
4. Accuracy of Dating. The dating in the archive (Student Information System) is accurate as to date of entry, not necessarily date of occurrence.
5. Procedure changes. The archival records do not necessarily record changes in administrative procedures, the augmentation of programs, or new programs; but their effects may be discerned in the residual data.
6. Time Effects. Changes in the size and composition of cohorts may mean that findings must be limited to specific cohorts.



Issues in Cohort Analysis

Archival records can be used to compare “cohorts” who experience one set of conditions to cohorts who did not experience the same conditions. However, there are 5 critical issues.

1. Definitional Issues. Cohort: a “group” of persons sharing a particular statistical or demographic characteristic, in this case classification as FTIC freshman. But is this classification sufficient to define them as unique?
2. Differential Treatment Effects. “Cohorts” are supposed to move in a systematic way through the educational structure creating predictable and systematic turnover. Do members of a cohort receive the same exposure to treatments? Just because freshmen enter at the same time does not mean they necessarily experience the same set of situations or social reality. (What to do about summer entrants? What about Honors Colleges? What about learning communities?)
3. Selection Bias. Cohort analyses are strengthened if the cohort groups being compared do not systematically differ and thus partially guard against bias introduced by selection. Are the characteristics of the freshman class sufficiently the same?
4. Misspecification of partitioning variables when cohorts are divided into subgroups.
5. Mortality. Effects may be selective due to differences in the students who dropped out during the period of study. (see next slide)

Cohort Mortality

- Students who left UTD to attend another institution were counted as not retained and were not counted in the 6-year graduation rate for this study. If one's interest is strictly in the institution where the student matriculated, then this approach is appropriate.
- However, Adelman (1998, 1999) argues that in this time of multi-institutional attendance, institutional graduation rates do not make much sense.
- **Including students who matriculate at one institution and graduate from or another can greatly impact graduation rates.** The Texas Higher Education Coordinating Board tracks “composite” graduation rates for the Texas Legislature. These rates include students who graduate from both the same and other state universities, but do not include information on students who transfer and graduate from private or out-of-state institutions. Moreover, because we do not know *which* students transferred and graduated, the ability of the matriculating institution to analyze academic outcomes for these students is severely limited.
- The next slide provides a comparison of six-year institutional and composite rates to illustrate the problem.

Six-Year Composite Graduation and Persistence Rates for Freshmen Enrolling in Fall*

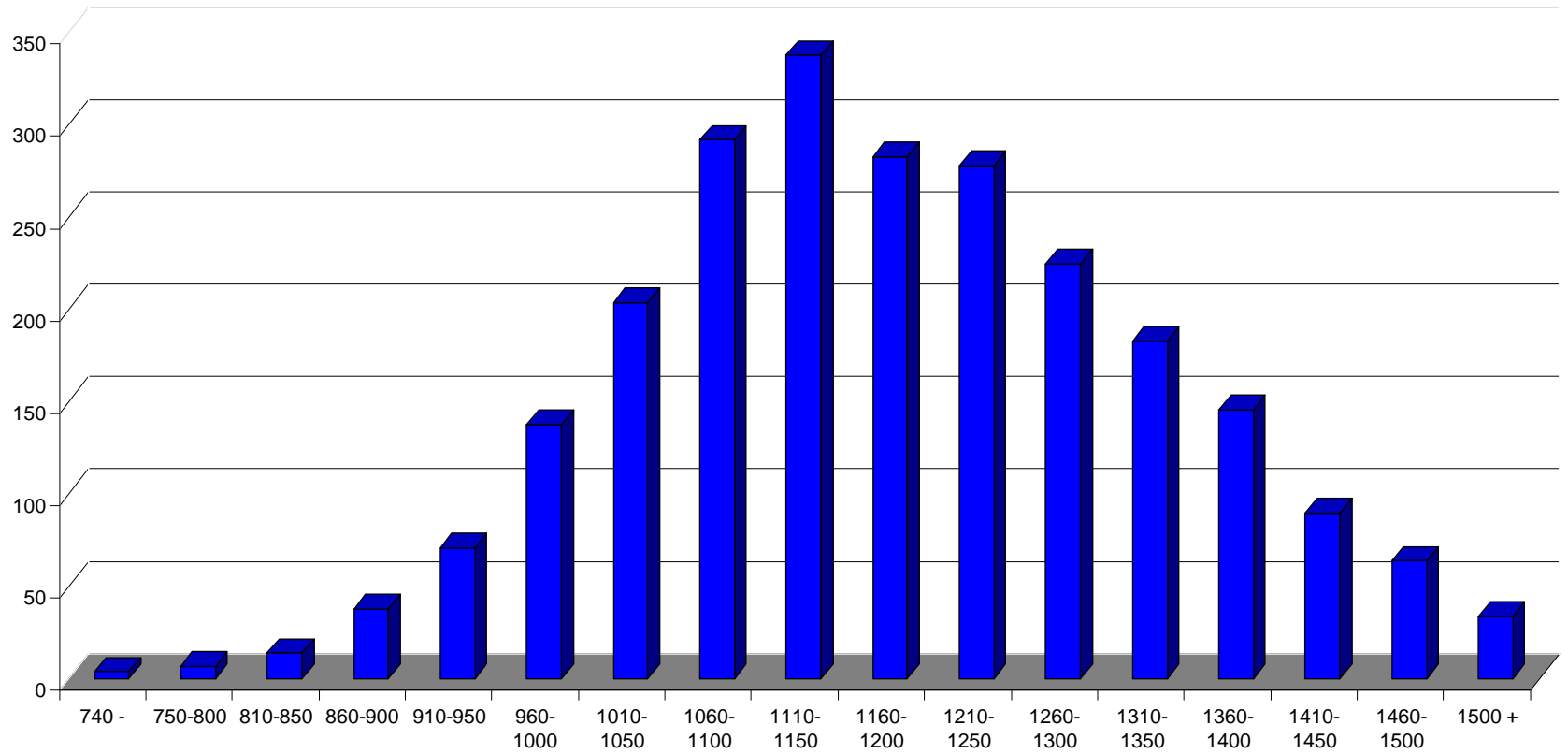
Cohort	Graduating from UTD	Graduating from another Texas Institution	Persisting at UTD	Persisting at another Texas Institution	Composite Graduation and Persistence Rate
1995	55.2%	6.5%	4.3%	6.9%	72.9%
1996	51.8	12.8	5.2	5.8	75.6
1997	56.2	6.7	5.6	4.3	72.8
1998	56.4	9.2	3.7	7.3	76.6
1999	56.6	7.5	6.0	6.8	76.9

*Source: Texas Higher Education Coordinating Board. Beginning in 1998, the composite graduation and persistence rates include students enrolled or graduating from private Texas institutions. Prior years' rates only track students enrolled or graduating from public institutions in Texas.

The Cohorts

- The analysis we will present in the following slides will utilize pooled data.
- We analyzed the three cohorts for significant differences and concluded that they were not significantly different from each other. Significant results for each single cohort were also significant for the other two.
- Except where otherwise noted, the results we present are for the pooled cohorts.
- The next slide shows the pooled SAT data for the three (1999-2001) cohorts.

SAT Distribution for Pooled FTIC Cohorts, 1999-2001



Mean = 1183

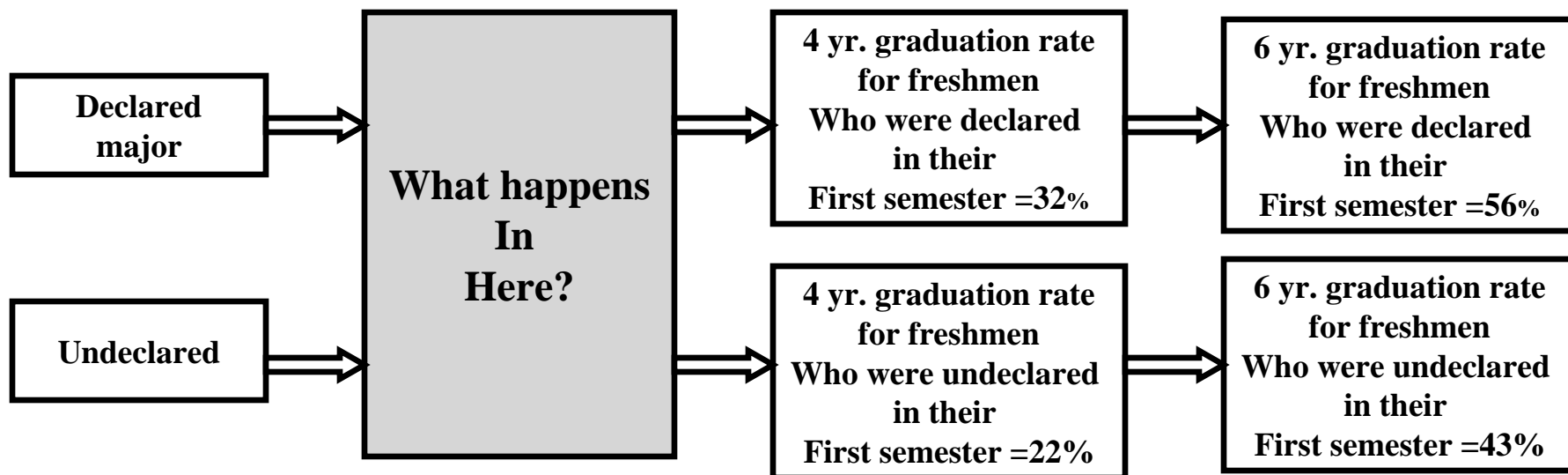
A variety of comparison tests indicated that the cohorts could be pooled

Results of Logistic Regression Models Using Freshmen Characteristics to Predict 6-year Graduation Rates FTIC Pooled Cohorts 1999-2001

- In all models, females have a significantly higher graduation rate. (Odds Ratio = 1.374)
- Freshmen with declared majors at onset have significantly higher graduation rates. (Odds Ratio = 1.51)
- Asian American students have higher graduation rates. (Odds Ratio = 2.182)
- Students with merit based aid have a higher 4-yr. graduation rate, but the effect dissipates thereafter.
- Need-based aid shows no effects on graduation for the 1999-2001 cohorts.
- Full time status in the first year has a significant positive effect on graduation rates. (Odds Ratio = 1.766)
- First Semester GPA: The higher the first semester the GPA the stronger the positive effect
 - Low first semester GPA (<1.5) has a significant negative effect on 6-year graduation rates.
 - Average first semester GPA (2.5) has a significant positive effect on 6-year graduation rates
 - High first semester GPA has a significant positive effect on 6-year graduation rates.



Freshman Characteristic: First Semester Enrollment Cohort 2000—Declared/Undeclared



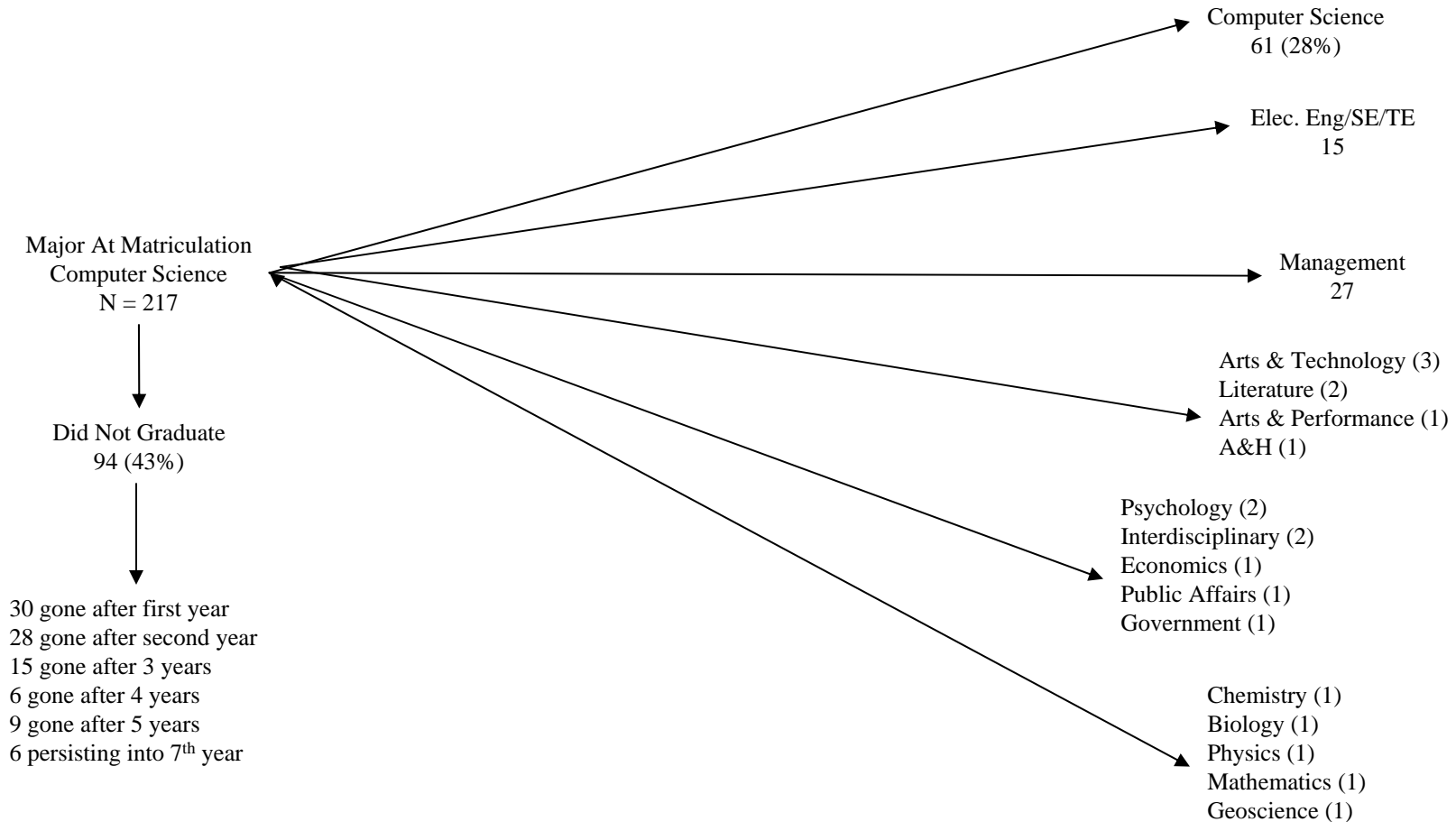
For all three cohorts, not having a declared major significantly raises the risk of not being successful at four and six years. Students who are “undeclared” should be considered at greater risk.

Fall 2000 FTIC Cohort who graduated in 6 years or less: First Semester School and School of Graduation

Pipeline Analysis Example

First Semester School	Completed a Degree	Graduated from A&H	Graduated from BBS	Graduated from ECS	Graduated from EPPS	Graduated from GS	Graduated from MGT	Graduated from NSM	% Starting and finishing in the Same School
A&H	9	8					1		88.9%
BBS	22		18		1		2	1	81.8%
ECS	176	8	3	106	5	5	41	8	60.2%
EPPS	21	1			13	1	6		61.9%
GS	3	1	1			1			33.3%
MGT	66	2	3		5	1	54	1	81.8%
NSM	82	4	11	1	4	5	9	48	58.5%
UG	71	6	6	12	4	9	28	6	
TOTAL	450	30	42	119	32	22	141	64	55.1%

Focus on Computer Science FTIC Cohort 2000

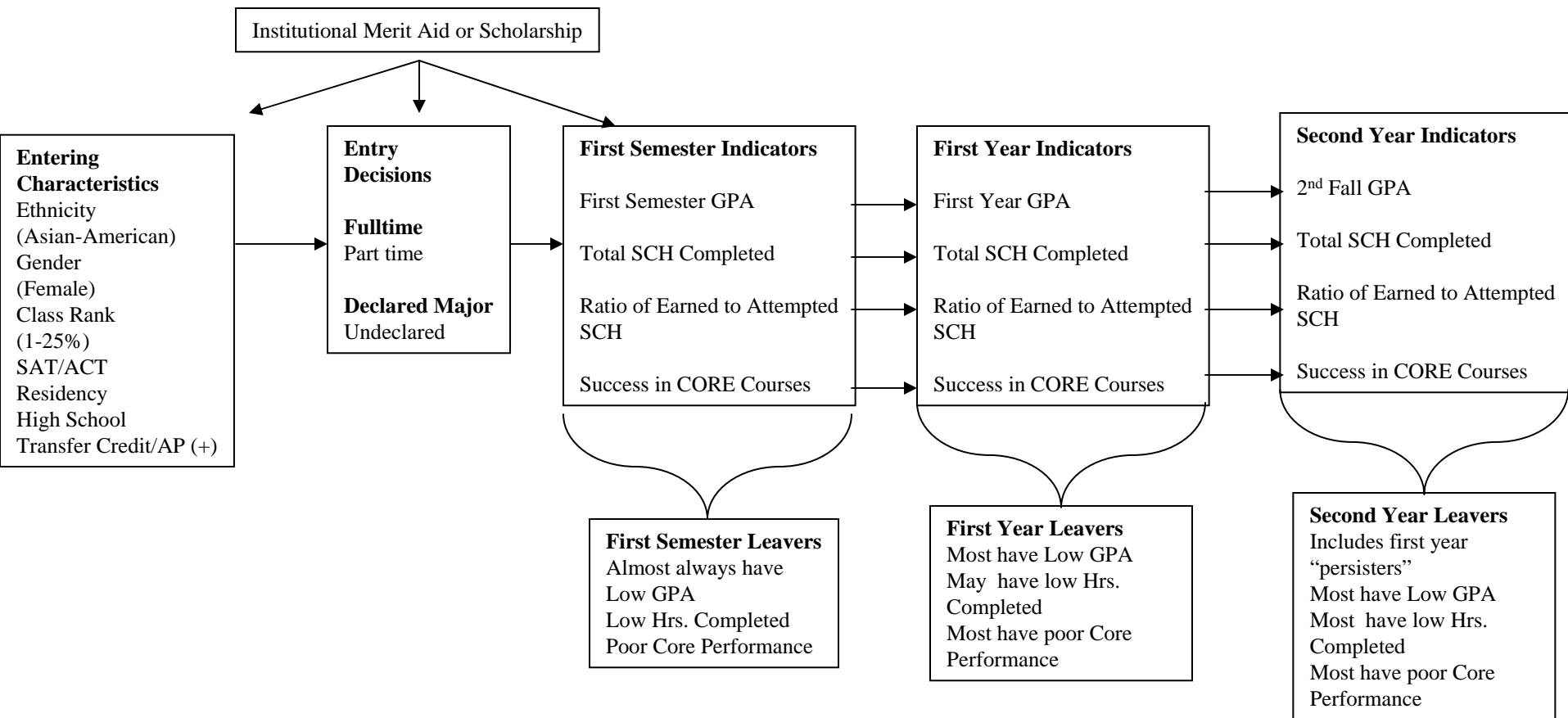


2000 FTIC Graduates: Years to Graduation by Selected Variables

Years To Graduation	Number of Students	Average Attempted SCH	Average Earned SCH	Average Transfer Hrs.	Average GPA	Average # Major Changes	Average Last Semester of Major Change
>6	27	149	116	19	2.85	2.04	4.63
>5 to 6	47	144	116	14	2.91	2.23	5.87
5	71	134	119	16	3.18	2.17	4.77
>4 to <5	121	127	114	13	3.13	2.01	4.12
4	144	119	114	15	3.42	1.77	3.22
<4	69	103	99	29	3.50	1.54	2.25
Total	479						
4.52	Group Means	125	113	17	3.24	1.91	3.87

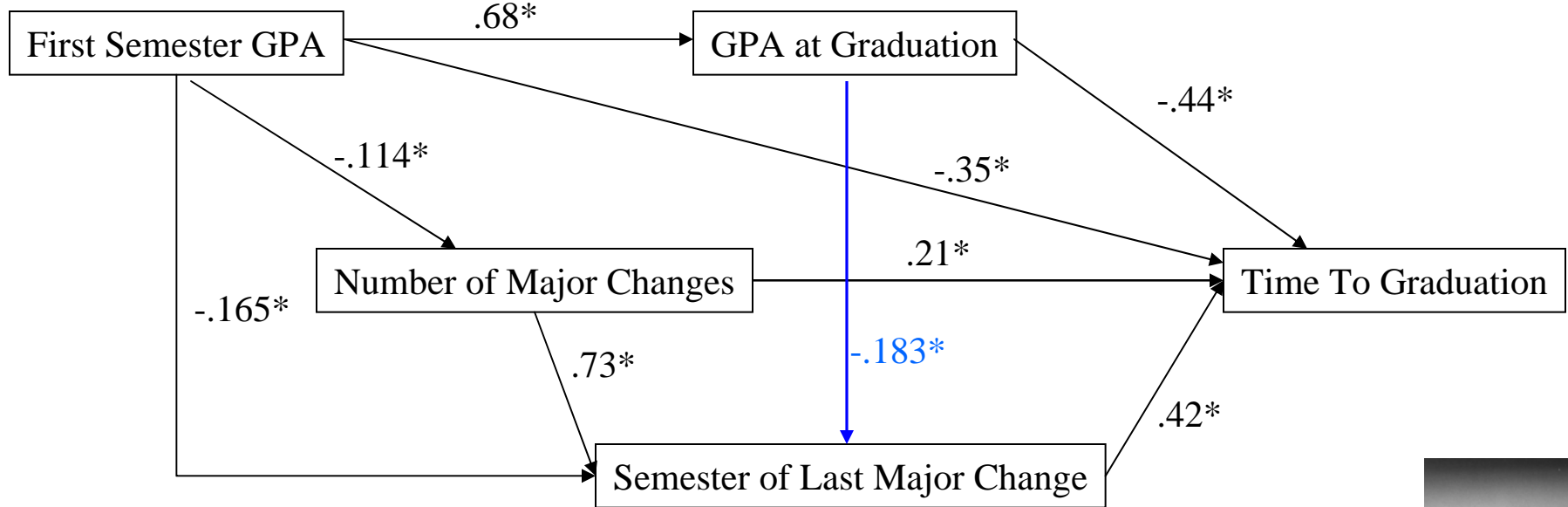
Significant Freshmen-Sophomore Variables

Pooled Cohorts



Includes Stop-outs and Community College

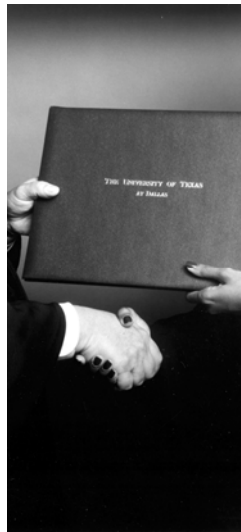
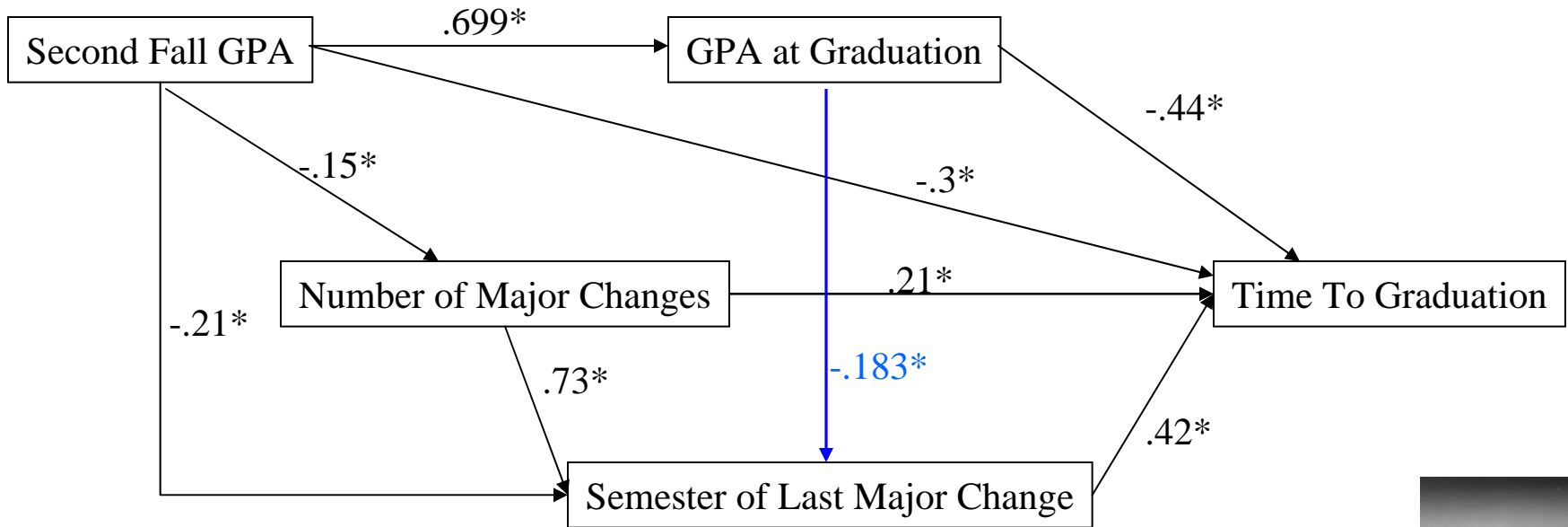
Graduation Path Model: First Semester GPA



The predictive power of first semester GPA cannot be underestimated. The university and student in co-production should produce successful and positive learning outcomes.



Graduation Path Model: Second Fall Pooled Cohorts



8 Common Pathways

- In the next 4 slides we present 8 common pathways based on the analysis of semester transcript histories.
- Note the influences of the three first semester drivers: low earned SCH, core course trouble, and low GPA

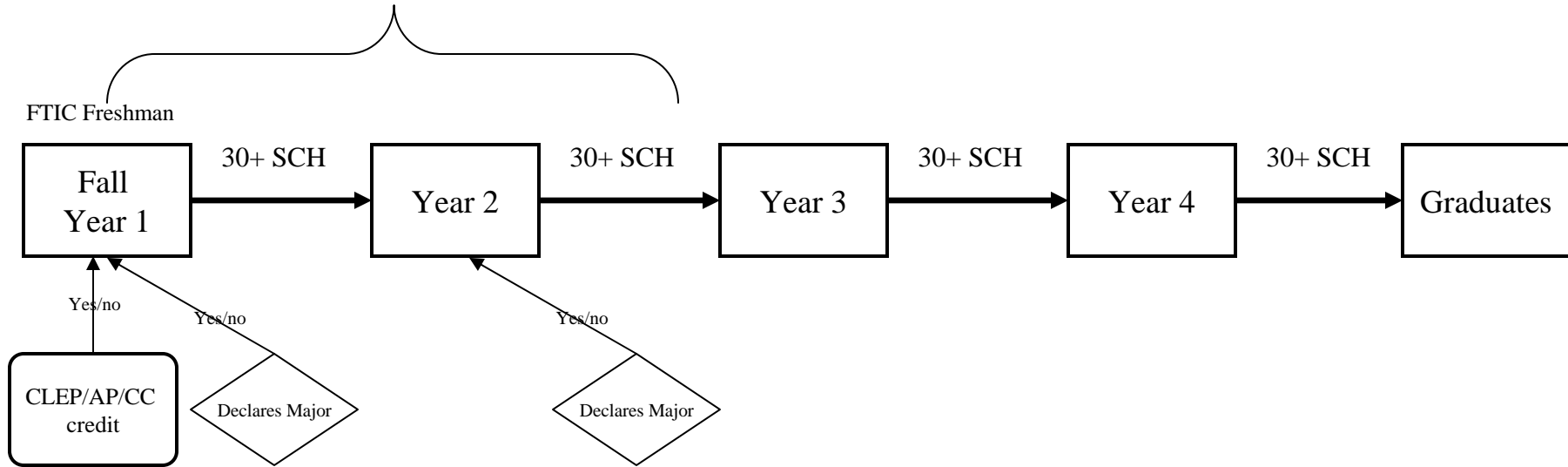


“It should be noted that the phrase ‘typical college student career’ is used largely for heuristic purposes. We know that there are a number of different ‘typical’ college career paths which mark the movement of individuals into and through the higher educational system...”

Tinto, 1987:216

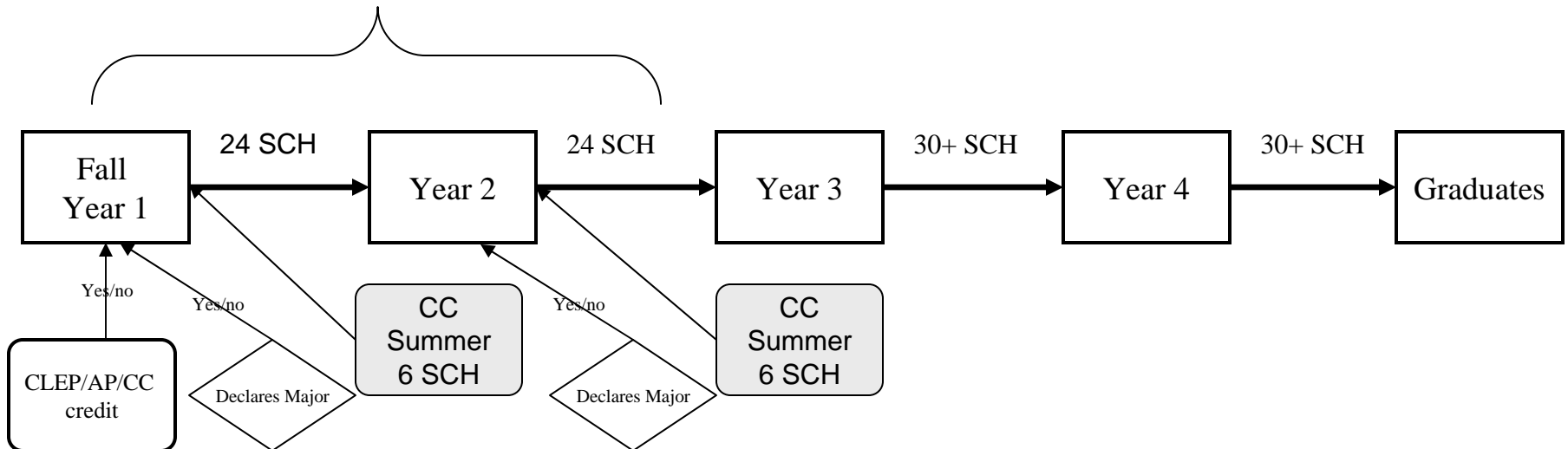
Takes Undergraduate Core & Major Gateway Courses

1 Ideal Type

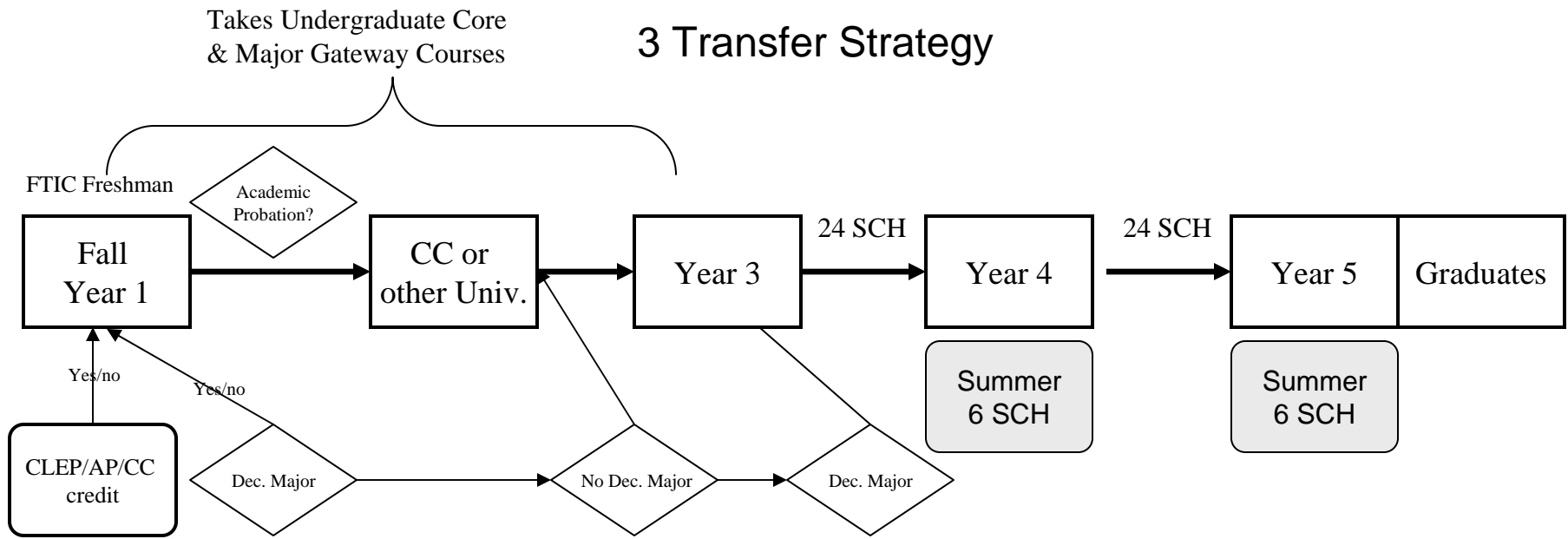


Takes Undergraduate Core & Major Gateway Courses

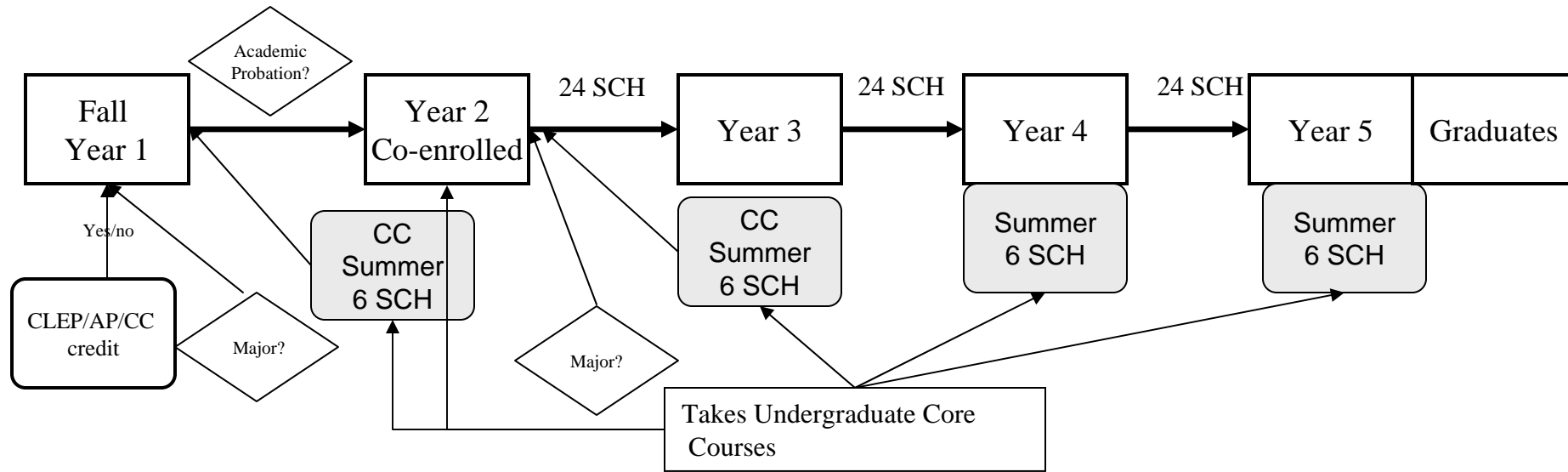
2 "Catch-up and Cost Reduction Strategies"



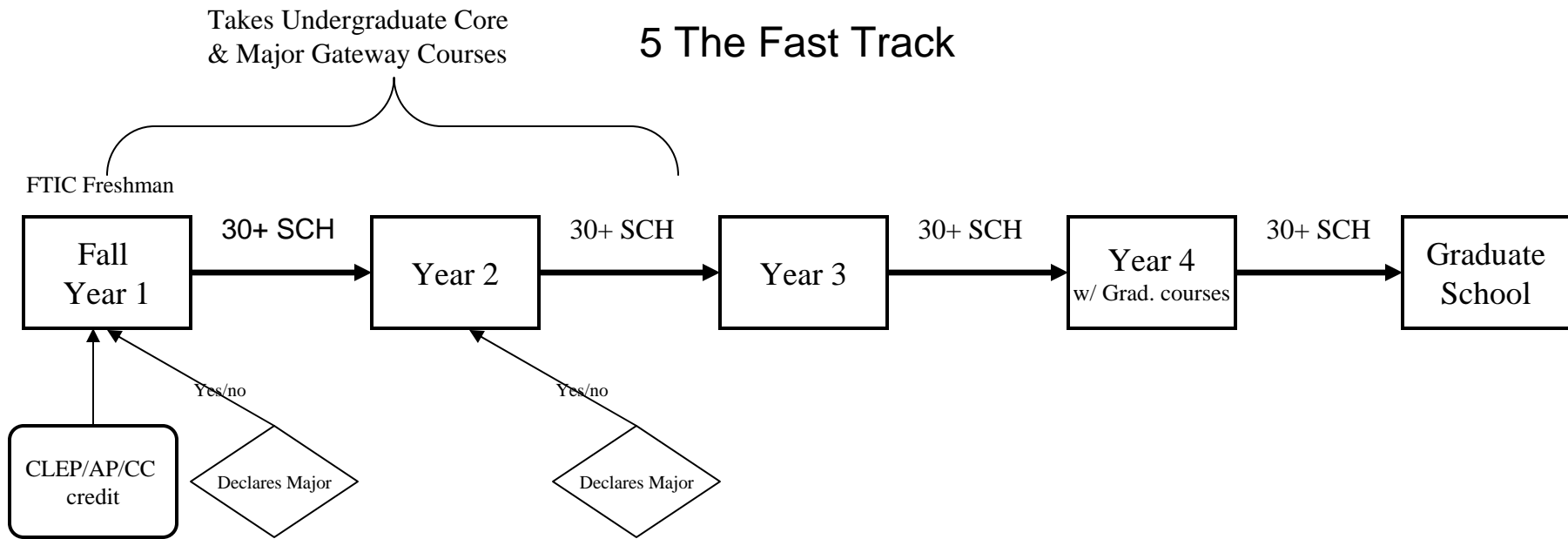
3 Transfer Strategy



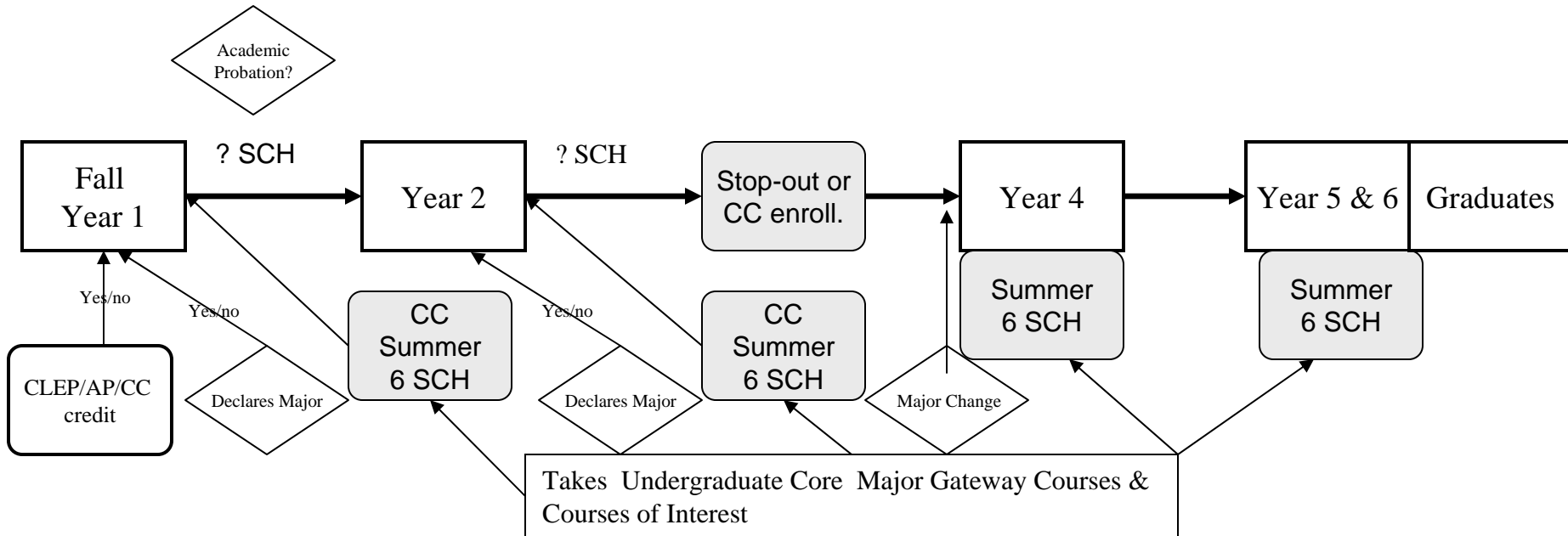
4 Co-enrollment Strategy



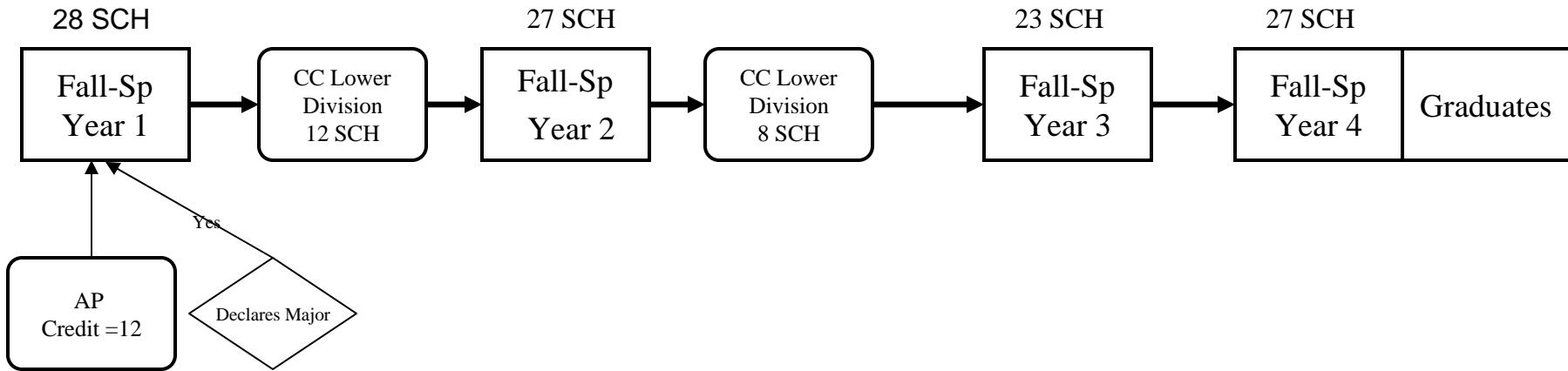
5 The Fast Track



6 The Persistence Model

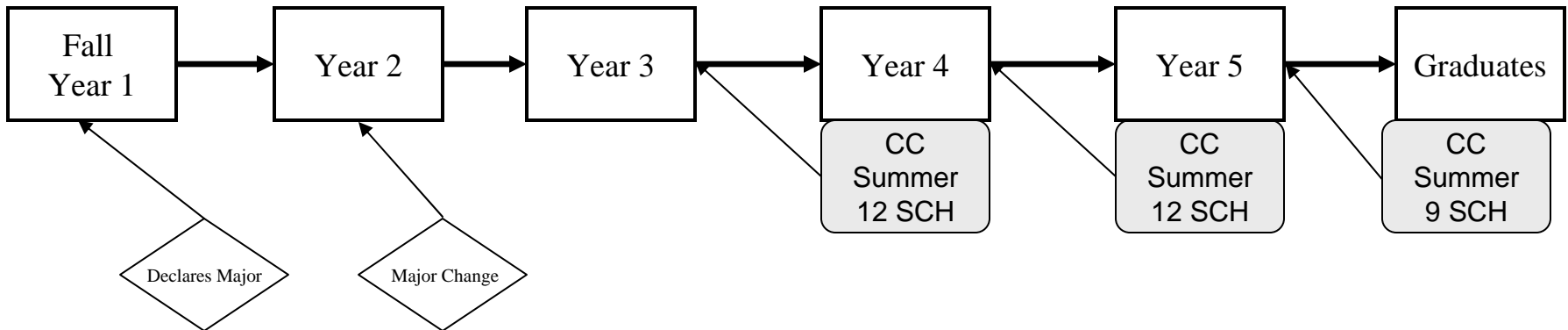


7 Take all Non-degree lower division core at CC



Takes FEW Undergraduate Core & Major Gateway Courses

8 The Belated Lower Division Core



Questions and Discussion

- Demographic variables (Female, Asian American), in the context of our university, have significant positive effect on 6-year graduation
- Not having a declared major, in the context of our university, has a significant negative effect on timely graduation.
- Being an undeclared major at time of matriculation may indicate uncertainty about career goals and appears to lead to course choices that, for many undeclared students, lengthen time to degree. It may also signal a lack of integration into the structure at our university.
- Full time status in the first year, coupled with academic success ($GPA > 2.5$) is positively related to graduation rates.
- While the number of major changes negatively effects time to degree, the semester in which the last major change is made is a more powerful predictor of time to degree.
- First Semester GPA is highly correlated with second fall GPA are both significant predictors of GPA at time of Graduation and time to degree.

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