Factors that Predict Obtaining a Post Baccalaureate Degree

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This presentation was made at the California Association for Institutional Research Conference on November 19, 2010.
What?

- Predict obtaining Graduate Degree (Masters or Higher) from UNDERGRADUATE MEASURES
- Predict which Undergraduates will go onto graduate/professional school
- Predict whether students enrolled in graduate/professional school will obtain graduate degree from undergraduate factors

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Origins of Study

• AN OBSERVATION: Able to reliably identify criterion from National Student Clearinghouse (easier to determine WHO obtains a graduate degree than who goes on to graduate school).

• Availability of CIRP Survey results for large percentage of Saint Mary’s populations (results back to 1971).

• Better understand factors that can contribute to student motivation to succeed academically and obtain graduate degree.
What We Know...

- Approximately 65% of college freshmen indicate an interest in pursuing some form of post-baccalaureate education

(Astin, Parrot, Kom, & Sax, 1997 as cited in Rajecki, Lauer, & Metzner, 1998)
<table>
<thead>
<tr>
<th>1972-2004 HIGH SCHOOL SENIOR EXPECTATIONS</th>
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</thead>
<tbody>
<tr>
<td>• Surveys conducted in 1972, 1980, and 1992 showed that more high school (HS) seniors expected to end their postsecondary education with a bachelor’s degree than a graduate or professional degree.</td>
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<tr>
<td>• By 2004, however, a greater proportion of HS seniors expected to earn a graduate or professional degree than with a bachelor’s degree.</td>
</tr>
<tr>
<td>• Expectations of attaining a graduate degree increased from 13 percent in 1972 to 38 percent in 2004. During the same time period, expectations for finishing with a bachelor’s degree showed no difference.</td>
</tr>
</tbody>
</table>

Ingels & Dalton, 2008

Expectations versus Attainment of Post-Baccalaureate Degrees from the High School Senior’s Point of View. Major changes from 1972 through 2004.
College GPA

- College GPA represents an "objective" measure of academic performance that has already been established in the literature as a predictor of future graduate study

Kuncel, Hezlett, & Ones, 2001

“The most important predictor of future graduate level study is (college) GPA.”
There are other factors besides College GPA that predict going on to future graduate study. One these is Gender.....

Noticeable differences from 1972 through 2004 found in Gender Differences: Expectations and Aspirations versus Attainment

“In 1972, more males expected to earn a graduate or professional degree than females. By 2004, the trend reversed and more females did.”

**Gender Differences**

- For both males and females, expectations of attaining a graduate or professional degree were higher in 2004 than in 1972. Noticeable differences:
  - In 1972, males expected to earn a graduate or professional degree in greater proportions than females (16 percent versus 9 percent)
  - In 2004, females expected to earn a graduate or professional degree more often than males (45 percent versus 32 percent).

  Ingels & Dalluri, 2006

- Females earned 59% of master’s degrees in 2003-2004 compared with 49% in 1979-1980. (NCES 2006)
Ethnicity may be another predictor....

Racial/Ethnic Differences: Expectations and Aspirations for Graduate or Professional Degrees. 1972 versus 2004

“In 2004, expectations were higher for ALL racial groups than in 1972. Most noticeable changes in expectations occurred with Asian students.”

<table>
<thead>
<tr>
<th>1972-2004 HS SENIOR – ETHNICITY TRENDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Expectations for a graduate or professional degree were higher in 2004 than 1972 for all racial/ethnic groups.</td>
</tr>
<tr>
<td>• Asian high school seniors’ expectations for a graduate or professional degree, which were lower than Whites’ in 1972 (17 percent versus 22 percent), topped the expectations of all other groups in 2004 (at 51 percent) and represented the largest percentage point gain in any group, 35 points.</td>
</tr>
</tbody>
</table>

Ingels & Dalton, 2008
First Generation Students: Aspirations versus Attainment of degrees beyond the bachelor’s.

“Studies show that parental education plays an important role in baccalaureate and post-baccalaureate expectations. Unfortunately, attainment of such is unremarkable.”
Tangible data such as GPA, SAT and demographics may very well prove to be viable predictors of successful completion of graduate degrees. In addition, intangibles are introduced to the college freshman that may pique their curiosity and augment their post-baccalaureate aspirations.
How?

- DATA SOURCES:
  - Data on who goes on to graduate school and who obtains graduate/professional degree from Saint Mary’s traditional undergraduates who obtained their bachelors degree from 1999 – 2003 (allows enough time to complete graduate or professional degree)
  - Data from Saint Mary’s enrollment files
  - Data from CIRP Freshmen Survey (35% match rate)

- DATA ANALYSES – Multiple Logistic Regressions:
  - Predicting COMPLETION of graduate/professional degree
  - Predicting ENROLLMENT in graduate or professional school
  - Predicting COMPLETION of graduate/professional degree AFTER ENROLLMENT in graduate/professional school
Note data like Parent Education and Parent Income are only available via the CIRP survey during these years. In later years these data would be available from either our application for admission or from financial aid data. Though 90% or so of St. Mary’s freshmen completed the CIRP survey for the graduating cohorts studied, the match is only about 35% because ID numbers were NOT required on the CIRP TFS survey.
This presentation was made at the California Association for Institutional Research Conference on November 19, 2010.
Need to narrow degrees to 1999 – 2003 time period to allow graduates to complete degrees. Degrees in this table include associate and second bachelors degrees, but do NOT include credentials.
After eliminating associate and second bachelor’s degrees, a total of 56 between 1999 - 2003. Number of Masters degrees and above is 613, not 669 as shown on previous slide. Overall 23% of Saint Mary’s traditional undergraduates received Masters+ post-graduate degrees in this five year period, with 35% of School of Science graduates obtaining Masters+ degrees, 26% of School of Liberal Arts, but only 12% of School of Economics and Business graduates.

At Saint Mary’s “Schools” are good stand-ins for “disciplines”
Education and Business are the most popular disciplines for post-graduate degrees from Saint Mary’s. Would be different for schools with different populations (e.g. University of California campuses).

NOTE: Disciplines and degrees are not categorized in a standard way in the Clearinghouse data. Degree majors are reviewed manually to categorize them into the disciplines shown on this slide.
Logistic regression will test three models for three different populations.

Graduates with CIRP survey are reduced to 503 because only about 35% of graduates supplied valid ID numbers on the CIRP survey (ID was not required – in later years a much larger percentage of students submitted ID numbers).
Mean differences show potential patterns that can emerge via logistic regression analysis.

Some findings:
1) Cumulative Undergraduate GPA is highest for those having obtained graduate degrees.
2) Percentage of Saint Mary’s graduates from the School of Economics and Business going on to graduate school is lower (regardless of whether they obtained a degree or not).
3) Percentage of Saint Mary’s graduates from the School of Science obtaining a graduate degree is higher than the corresponding percentages in the “No Grad School” and “In Grad School – NO Degree Groups”.
4) Females are a little overrepresented among those going on to graduate school.

NOTE: Percentages of minorities are low in these years, but will be more subject to study in later years as Saint Mary’s is now a “minority majority” campus, and almost qualifies as a “Hispanic serving institution”.

<table>
<thead>
<tr>
<th>Measure</th>
<th>NO Grad School</th>
<th>In Grad School NO Degree</th>
<th>Have Grad Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=2,366</td>
<td>1,167</td>
<td>587</td>
<td>612</td>
</tr>
<tr>
<td>Cumulative Undergraduate GPA (Mean)</td>
<td>3.04</td>
<td>3.12</td>
<td>3.26</td>
</tr>
<tr>
<td>School of Economics and Business Graduate (%)</td>
<td>40%</td>
<td>18%</td>
<td>16%</td>
</tr>
<tr>
<td>School of Science Graduate (%)</td>
<td>16%</td>
<td>23%</td>
<td>31%</td>
</tr>
<tr>
<td>School of Liberal Arts Graduate (%)</td>
<td>44%</td>
<td>59%</td>
<td>53%</td>
</tr>
<tr>
<td>Catholic (%)</td>
<td>67%</td>
<td>69%</td>
<td>69%</td>
</tr>
<tr>
<td>Female (%)</td>
<td>58%</td>
<td>64%</td>
<td>65%</td>
</tr>
<tr>
<td>White (%)</td>
<td>68%</td>
<td>66%</td>
<td>69%</td>
</tr>
<tr>
<td>Asian (%)</td>
<td>9%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Black (%)</td>
<td>4%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Latino (%)</td>
<td>13%</td>
<td>18%</td>
<td>13%</td>
</tr>
</tbody>
</table>
The logistic regression analyses reveal the variables that are still significantly predict the criteria after parsing out overlapping effects.

Best prediction is for Predicting going on to Graduate School (0.128), followed by No Grad Degree vs. Have Grad Degree (0.102) followed by obtaining a graduate degree for those already enrolled in graduate school (0.056). R-squares are the lowest of any of the analyses with these limited number of measures.

Cumulative Undergraduate GPA is THE most predictive measure in all three of the analyses. School of Economics and Business and School of Science are important in the analyses (relative to the reference School of Liberal Arts). Latinos are less likely to obtain a graduate degree once in graduate school.

**NOTE ON Nagelkerke R-square:** N. J. D. Nagelkerke, “A Note on a General Definition of the Coefficient of Determination,” *Biometrika* 78, no. 3 (1991): 691; N. J. D. Nagelkerke, “Maximum Likelihood Estimation of Functional Relationships, Pays-Bas,” *Lecture Notes in Statistics* 69 (1992): 110. Nagelkerke R-square is one of several “pseudo R-squares” used to evaluate the goodness of fit of the logistic regression models. It is an attempt to imitate the interpretation of multiple R-square based on the log likelihood of a final model vs. log likelihood for a baseline model. Like R-square in ordinary least squares, it is on a 0–1 scale. Nagelkerke’s R-square has the advantage over some other pseudo R-squares in that the range of possible values can extend to 1.
Mean differences show potential patterns that can emerge via logistic regression analysis.

Some findings:
1) Cumulative Undergraduate GPA is highest for those having obtained graduate degrees. 
2) Percentage of Saint Mary’s graduates from the School of Economics and Business going on to graduate school is lower (regardless of whether they obtained a degree or not) than the corresponding “No Grad School” Group.
3) Percentage of Saint Mary’s graduates from the School of Science going on to graduate school is higher than the corresponding percentage in the “No Grad School” Group.
4) Percentage of Saint Mary’s graduates from the School of Liberal Arts going on to graduate school is higher than the corresponding percentage in the “No Grad School” Group.
5) There is a higher percentage of Whites and a lower percentage of Latinos in the Have Grad Degree group compared with the “No Grad School” and “In Grad School-No Degree” Groups.
6) Mean SAT Verbal and especially SAT MATH were highest in the Have Grad Degree Group.
The logistic regression analyses reveal the variables that are still significantly predict the criteria after parsing out overlapping effects.

Best prediction is for Predicting going on to Graduate School (0.113), followed by No Grad Degree vs. Have Grad Degree (0.097) followed by obtaining a graduate degree for those already enrolled in graduate school (0.065). R-squares are low, but higher than in the previous analyses which excluded SAT Scores.

Cumulative Undergraduate GPA is THE most predictive measure in all three of the analyses. School of Economics and Business BUT NOT the School of Science is important in the analyses (relative to the reference School of Liberal Arts).

Having higher SAT math score appears to be important for obtaining a Graduate Degree. Latinos are less likely to obtain a graduate degree once in graduate school.
Mean differences show potential patterns that can emerge via logistic regression analysis.

Some findings:
1) Cumulative Undergraduate GPA is highest for those having obtained graduate degrees.
2) Percentage of Saint Mary’s graduates from the School of Economics and Business going on to graduate school is lower (regardless of whether they obtained a degree or not) than the corresponding “No Grad School” Group.
3) Percentage of Saint Mary’s graduates from the School of Science going on to graduate school is higher than the corresponding percentage in the “No Grad School” Group.
4) Percentage of Saint Mary’s graduates from the School of Liberal Arts going on to graduate school is higher than the corresponding percentage in the “No Grad School” Group (though less prominent differences than for the other schools).
5) There is a higher percentage of Whites and a higher percentage of Catholics in the Have Grad Degree group compared with the “No Grad School” and “In Grad School-No Degree” Groups.
6) Mean SAT Verbal and SAT MATH were highest in the Have Grad Degree Group.
For the CIRP Survey it was not possible to use the broader Scale variables (e.g. Habits of Mind) because of insufficient N available for the population studied. Had to fall back on individual survey items WITH SUFFICIENT N. Reviewed a number of measures before setting on those shown here from different parts of the instrument.

1) Mean level of Mother’s Education (8-point scale) is highest among those obtaining a Graduate Degree

2) 94% of those who obtained a graduate degree indicated when they were entering freshmen that they planned to seek a degree of Masters or better, a higher percentage than in the “In Grad School, No Degree” Group (86%) or in the “No Grad School” Group (81%).

3) The importance of becoming an authority in ones field is rated lower in the “Have Grad Degree” Group, a counterintuitive finding.

4) The self-rating of “cooperativeness” is lower in the “Have Grad Degree” Group

5) Likelihood of changing career is rated lower among those going on to graduate school

6) Those going on to graduate school indicate they are more likely to participate in volunteer or community service.

NOTE: Variable names in CAPS are provided from CIRP Freshman Survey (TFS) multi-year data file (in case others want to use them).
The logistic regression analyses reveal the variables that are still significantly predict the criteria after parsing out overlapping effects.

**IN THE “FIRST STEP” OF THESE ANALYSES WE CONSIDER ONLY THE MEASURES USED IN THE FIRST TWO ANALYSES ON THE POPULATION WHO ALSO HAVE CIRP DATA, BUT WITHOUT THOSE CIRP MEASURES BEING INCLUDED.**

Best prediction is for Predicting going on to Graduate School (0.150), followed by No Grad Degree vs. Have Grad Degree (0.123) followed by obtaining a graduate degree for those already enrolled in graduate school (0.090). R-squares are relatively low, but higher than in the previous analyses on larger populations.

Cumulative Undergraduate GPA is THE most predictive measure in all three of the analyses. School of Economics and Business and the School of Science are important in the analyses (relative to the reference School of Liberal Arts) in predicting going on to graduate school. Whites, Asians, and Latinos are more likely to go on to graduate school (though not necessarily more likely to finish in this analysis).
The logistic regression analyses reveal the variables that are still significantly predict the criteria after parsing out overlapping effects.

**IN THE “SECOND STEP” OF THESE ANALYSES WE CONSIDER THE MEASURES USED IN THE FIRST TWO ANALYSES ON THE POPULATION WHO ALSO HAVE CIRP DATA, ALONG WITH THE CIRP MEASURES.**

Best prediction is for Predicting going on to Graduate School (0.218), followed by No Grad Degree vs. Have Grad Degree (0.216) followed by obtaining a graduate degree for those already enrolled in graduate school (0.184). R-squares are the highest of any of the analyses, especially for the prediction of who will complete graduate school.

Cumulative Undergraduate GPA is THE most predictive measure in all three of the analyses. School of Economics and Business and the School of Science are important in the analyses (relative to the reference School of Liberal Arts) in predicting going on to graduate school.

Whites, Asians, and Latinos are more likely to go on to graduate school (though not necessarily more likely to finish in this analysis).

Being Catholic is predictive of going on to graduate school and obtaining a graduate degree.
HERE ARE THE REMAINING VARIABLES IN THE “SECOND STEP”, THE CIRP MEASURES:

Note first of all the SIGNIFICANT GAINS BETWEEN THE FIRST STEP (WITHOUT CIRP MEASURES) AND SECOND STEP (WITH CIRP MEASURES): Predicting going on to Graduate School increases from 0.150 in Step 1 vs. 0.218 in Step 2; No Grad Degree vs. Have Grad Degree increases from 0.123 in Step 1 to 0.216, in Step 2; and most significantly, obtaining a graduate degree for those already enrolled in graduate school doubles from 0.090 in Step 1 to 0.184 Step 2. R-squares are the highest of any of the analyses due to the addition of the CIRP variables.

<table>
<thead>
<tr>
<th>Measure (N=503)</th>
<th>No Grad School vs. Grad School</th>
<th>No Grad Degree vs. Have Grad Degree</th>
<th>Not Complete Grad School vs. Have Grad Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nagelkerke R-square – STEP 1</td>
<td>0.150</td>
<td>0.123</td>
<td>0.090</td>
</tr>
<tr>
<td>Nagelkerke R-square - STEP 2</td>
<td>0.218</td>
<td>0.216</td>
<td>0.184</td>
</tr>
<tr>
<td>Parent Income (INCOME)</td>
<td>-0.007</td>
<td>-0.017</td>
<td>-0.008</td>
</tr>
<tr>
<td>Mother’s Education (MUMEDUC)</td>
<td>0.101</td>
<td>0.184***</td>
<td>0.166**</td>
</tr>
<tr>
<td>Highest Academic Degree Plannend - % Masters+ (DEGASP)</td>
<td>0.562*</td>
<td>1.210****</td>
<td>1.243***</td>
</tr>
<tr>
<td>Importance of becoming an authority in my field (GOAL04)</td>
<td>-0.127</td>
<td>-0.288**</td>
<td>-0.277*</td>
</tr>
<tr>
<td>Cooperativeness (RATE06)</td>
<td>-0.344**</td>
<td>-0.510****</td>
<td>-0.509***</td>
</tr>
<tr>
<td>Change Career Choice (FUTACT04)</td>
<td>-0.393****</td>
<td>-0.197</td>
<td>0.048</td>
</tr>
<tr>
<td>Participate In Volunteer or Community Service (FUTACT25)</td>
<td>0.267**</td>
<td>0.162</td>
<td>0.027</td>
</tr>
</tbody>
</table>

*p < .10, **p < .05, ***p < .01, ****p < .001

A) CIRP VARIABLES PREDICTING GOING ON TO GRADUATE SCHOOL:
1) Changing Career Choice (less likely)
2) Cooperativeness (less likely)
3) Participate in Volunteer or Community Service (more likely)
4) Say one plans to get a Masters Degree or higher when an entering freshmen (more likely)

B) CIRP VARIABLES PREDICTING GETTING A GRADUATE DEGREE:
1) Cooperativeness (less likely)
2) Say one plans to get a Masters Degree or higher when an entering freshmen (more likely)
3) Higher Level of Mother’s Education (more likely)
4) Important to Become an Authority in One’s Field (less likely) – counterintuitive
Summary - 1

- **College GPA** is the best predictor of going on to graduate school and obtaining a graduate or professional degree.

- At Saint Mary’s, compared with graduates from the School of Liberal Arts (the “reference” category):
  - graduates from the School of Economics and Business were **less likely** to go on to graduate school
  - graduates from the School of Science were **more likely** to obtain their graduate or professional degree
Summary - 2

• Whites, Asians, and Latinos were more likely to go on to graduate school, though Latinos were less likely to obtain a graduate or professional degree.

• Perhaps related to being in science disciplines, those with higher SAT scores in Math were more likely to complete graduate/professional degrees.
Summary – 3 (CIRP TFS Items)

In addition to having higher College GPAs
(NOTE: These items ADD significantly to prediction)

- **Those going on to graduate school were**
  - less likely to rate themselves as “cooperative”
  - less likely to say they would change careers
  - more likely to participate in voluntary or community service.

- **Those obtaining a graduate or professional degree were**
  - more likely to say they will seek an advanced degree
  - more likely to come from families where there is a higher level of mother’s education
  - less likely to rate themselves as “cooperative”
  - less likely to say is important to become an authority in their field
  - more likely to be Catholic (In 1 analysis only—needs more study)
Issues/Next Steps

• Need for **INTERNAL** and **EXTERNAL** CROSSVALIDATION.

• In future years, in later graduating classes, can use CIRP scales (e.g. “Habits of Mind”, etc.) instead of single items. Also, at Saint Mary’s, for later classes can use consistent applicant file and financial aid file data that were not available for this study.

• Get a better understanding of the roles attitudes and discipline selection play on for both completing as well as going on to graduate/professional school.

• CLEARINGHOUSE data, SURVEYS (like CIRP), and internal college file data combinations **CAN** be employed IN COMBINATION to answer research questions.