Truth & Consequences
Opting Out of Calculus I and Subsequent Student Success

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The research loop
(AKA …the questions keep coming....)
Cohort table - developed to track student persistence & performance
Previously Established Baseline Model of Six-Year Graduation
Factors related to graduating within 6 years

- High School GPA
- Math Placement
- Affiliation
  - Scholars’ programs
  - Athletes
  - Honors College
- AP Credit
- Dorm Status
- Sex
- Geographic origin
- Major Area
- UMBC Merit scholarship
- Expected Family Contribution
- Difficulty of coursework
So, how did we come to this?

Previous study:
Calc II grades positively related to six-year grad rate

Administration believes those who opt out Calc I will not perform as well in the long run

So…we study it!
What others have to say...

• AP students do just as well
  (Morgan & Ramist, 1998)

• Even when control for ability
  (Dodd et al, 2002)

• AP students higher 5 year grad rates
  (Dougherty et al, 2006)
This study...

- Focus on new freshmen
- Look at MATH courses taken
- Compare progress for:
  Students starting in Calc I vs. Calc II
Outcomes of interest...

- Math performance
- 1st-yr retention rate
- 6-yr graduation rate
- Graduate school
The Data

17,623 New Freshmen
F95 to S08

15,531 took at least one math course at institution

First Math Course:
Calc I – 3,598
Calc II – 875
Four groups of interest...

- **CALC I/ no AP** (n=2,593)
- **CALC I/ AP I or II** (n=180)
- **CALC I/ MEY** (n=375)
- **CALC II** (n=875)
FALL 1995 TO FALL 2003 COHORTS ONLY
GRADUATION RATES

C I - No AP (n=1,758) 62.4%
C I - AP (n=89) 47.2%
C II (n=554) 72.4%
C I - MEY (n=272) 87.5%
Overall (n=11,770) 54.9%

6 yr
5 yr
4 yr
% Female

- C I - No AP (n=2,593) 35.1%
- C I - AP (n=180) 33.9%
- C II (n=875) 28.2%
- C I - MEY (n=375) 50.1%
- Overall (n=17,623) 45.5%
% STEM

- **C I - No AP (n=2,593)**: 68.9%
- **C I - AP (n=180)**: 72.2%
- **C II (n=875)**: 78.9%
- **C I - MEY (n=375)**: 88.0%
- **Overall (n=17,623)**: 50.0%
% in Residence Halls

- C I - No AP (n=2,593) - 65.1%
- C I - AP (n=180) - 78.9%
- C II (n=875) - 71.8%
- C I - MEY (n=375) - 100.0%
- Overall (n=17,623) - 67.2%
Average MATH SAT

<table>
<thead>
<tr>
<th>Category</th>
<th>SAT Score</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>C I - No AP</td>
<td>648</td>
<td>(n=2,593)</td>
</tr>
<tr>
<td>C I - AP</td>
<td>685</td>
<td>(n=180)</td>
</tr>
<tr>
<td>C II</td>
<td>686</td>
<td>(n=875)</td>
</tr>
<tr>
<td>C I - MEY</td>
<td>684</td>
<td>(n=375)</td>
</tr>
<tr>
<td>Overall</td>
<td>607</td>
<td>(n=17,623)</td>
</tr>
</tbody>
</table>
Average HS Grade Point Average

- C I - No AP (n=2,593): 3.59
- C I - AP (n=180): 3.80
- C II (n=875): 3.75
- C I - MEY (n=375): 3.96
- Overall (n=17,623): 3.46
FALL 1995 TO FALL 2003 COHORTS ONLY

Average # Math Courses

<table>
<thead>
<tr>
<th>Category</th>
<th>Average # Courses</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>C I - No AP</td>
<td>3.16</td>
<td>n=1,758</td>
</tr>
<tr>
<td>C I - AP</td>
<td>3.11</td>
<td>n=89</td>
</tr>
<tr>
<td>C II</td>
<td>4.05</td>
<td>n=554</td>
</tr>
<tr>
<td>C I - MEY</td>
<td>5.00</td>
<td>n=272</td>
</tr>
<tr>
<td>Overall</td>
<td>3.04</td>
<td>n=11,770</td>
</tr>
</tbody>
</table>
FALL 1995 TO FALL 2003 COHORTS ONLY
MATH GPA

>=3.0  b/w 2.0 & 3.0  <=2.0

C I - No AP (n=1,758)
C I - AP (n=89)
C II (n=554)
C I - MEY (n=272)
Overall (n=11,770)
FALL 1995 TO FALL 2003 COHORTS ONLY
GRADE IN CALC II BY FIRST MATH COURSE

- C I - No AP (n=927)
- C I - AP (n=45)
- C II (n=554)
- C I - MEY (n=248)
- Overall (n=2,805)

Legend:
- A
- B
- C
- D
- F
- W/P/AUDIT
FALL 1995 TO FALL 2003 COHORTS ONLY

% Retained After One Year

- C I - No AP (n=1,758): 86.7%
- C I - AP (n=89): 74.2%
- C II (n=554): 88.6%
- C I - MEY (n=272): 98.2%
- Overall (n=11,770): 81.9%
FALL 1995 TO FALL 2003 COHORTS ONLY
GRADUATION RATES

- C I - No AP (n=1,758) 62.4%
- C I - AP (n=89) 47.2%
- C II (n=554) 72.4%
- C I - MEY (n=272) 87.5%
- Overall (n=11,770) 54.9%

GRADUATION RATES FOR FALL 1995 TO FALL 2003 COHORTS ONLY

- 6 yr
- 5 yr
- 4 yr

FALL 1995 TO FALL 2003 COHORTS ONLY
GRADUATION RATES

6 yr: 47.2%
5 yr: 72.4%
4 yr: 87.5%
54.9%
FALL 1995 TO FALL 2003 COHORTS ONLY

% of Bach Degrees in STEM Field

- C I - No AP (n=1,175) 67.7%
- C I - AP (n=45) 71.1%
- C II (n=411) 82.0%
- C I - MEY (n=243) 93.4%
- Overall (n=6,838) 46.5%
FALL 1995 TO FALL 2003 COHORTS ONLY

% Enrolling In School Again After Bachelor’s Degree Attained per National Student Clearinghouse

- **C I - No AP**
  - (n=1,175)
  - 35.5%

- **C I - AP**
  - (n=45)
  - 31.1%

- **C II**
  - (n=411)
  - 39.2%

- **C I - MEY**
  - (n=243)
  - 70.8%

- **Overall**
  - (n=6,838)
  - 38.6%
The Truth...

Skipping Calc I doesn’t appear to have negative consequences
What’s up with the CALC I /AP group?

- 47.2% six-year graduation rate
  - 66.7% for females (n=30)
  - 37.3% for males (n=59)
- 37 don’t graduate w/in 6 years
- 3 graduate after 6 years
34 Lost Students

- 50% (17) enrolled for one year or less
  - 10 left with a cumulative gpa ≤2.0
  - 5 left with a cumulative gpa ≥3.0

<table>
<thead>
<tr>
<th>Final GPA</th>
<th># enroll</th>
<th># elsewhere</th>
<th>Degrees earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=2.0</td>
<td>19</td>
<td>6</td>
<td>1 Bach, 1 AA</td>
</tr>
<tr>
<td>b/w 2.0 &amp; 3.0</td>
<td>7</td>
<td>4</td>
<td>2 Bach, 1 AA</td>
</tr>
<tr>
<td>&gt;=3.0</td>
<td>8</td>
<td>8</td>
<td>5 Bach, 1 Master’s</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>
Next Steps...

- Further investigate low graduation rate for Calc I /AP group

- Transfer students