The Causes and Consequences of Purdue Grade Inflation

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Purdue was (and is) unique among peer universities for our low average GPA. However, average grades have increased dramatically, starting in the 2009 academic year.

Table 1: Average GPA at Peer Institutions

<table>
<thead>
<tr>
<th>Institution (year)</th>
<th>Average GPA</th>
<th>Institution (year)</th>
<th>Average GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Georgia Tech (2014)</td>
<td>3.25</td>
<td>Texas (2014)</td>
<td>3.22</td>
</tr>
<tr>
<td>Indiana (2013)</td>
<td>3.19</td>
<td>UCLA (2013)</td>
<td>3.27</td>
</tr>
<tr>
<td>Maryland (2014)</td>
<td>3.17</td>
<td>Virginia (2013)</td>
<td>3.32</td>
</tr>
</tbody>
</table>
Research Findings

Causes of Grade Inflation

• 1/3rd better-prepared students
• 1/3rd course and instructor selection
• 1/3rd unexplained grade inflation
  (better teaching, better facilities, better academic support, and easier grading)
• 4 colleges are responsible for nearly all the grade inflation:
  Engineering, Liberal Arts, Polytechnic Institute, and Science (the reasons are different)

Consequences of Grade Inflation

• Grade inflation increased graduation rates by about 2 percentage points
• Grade inflation helps students persist in higher-paying majors
• Grade inflation has not decrease starting salary for graduates (yet)
Data and Analysis

Data:

• 9-Year Time Period: Fall 2008 – Spring 2017
• All undergraduate student grades earned at the West Lafayette campus

Analysis:

• Fixed-effects regression decomposition method
• Estimate how much grade inflation is caused by specific factors
• Some grade inflation is left unexplained
Grade Inflation by Semester

- Inflation (GPA)

Raw

- Students

34%
Grade Inflation by Semester

- Inflation (GPA)

- Raw
- Students
- College

- 34%
Grade Inflation by Semester

- Raw: 34%
- Students: 14%
- College: 8%
- Subject: 8%
- Course: 8%
- Instructor: 8%
- Repeats: 8%
Grade Inflation by Semester

- Raw
- Students
- College
- Subject
- Course
- Instructor
- Repeats

Better Students
Course & Instructor Selection
Grade Inflation by Semester

- Raw
- Students
- College
- Subject
- Course
- Instructor
- Repeats

Better Student
Course & Instructor Selection
Unexplained Grade Inflation
Differences by Lower- and Upper-Division Courses

Lower-Division Courses:
• Higher grade inflation, more of it caused by better students (47%)
• 41% of lower-division grade inflation is unexplained
• Only 12% is due to course selection, primarily across subjects

Upper-Division Courses:
• 50% of the grade inflation is caused by course selection, primarily within subjects
  • Better advising, helping students be successful
  • More flexibility and more choice in plans of study (better fit leads to better outcomes)
  • More student hunting for courses that grade easy (& technology)
Grade Inflation in Lower-Division Courses

- Student Ability: 47%
- Course Selection: 12%
- Unexplained Grade Inflation
Grade Inflation in Upper-Division Courses

- **Student Ability**: 11%
- **Course Selection**: 50%
- **Unexplained Grade Inflation**: 11%
Grade Inflation by College and Differences in Causes

Grade Inflation Driven by 4 Colleges:
- **Engineering** – unexplained
- **Liberal Arts** – unexplained
- **Polytechnic Institute** – unexplained, high-grade instructors
- **Science** – better students, course selection across subjects

Low Grade Inflation:
- **Agriculture** – better students, course selection within subjects
- **Management** – better students, high-grade instructors

No Grade Inflation:
- **Education**
- **Health & Human Science**
Consequences of Grade Inflation for Students

Cohort Data:

• Undergraduate students entering between fall 2008 and fall 2012 (5 cohorts)
• All courses they take between 2008 and 2017

Analysis:

• We deflate grades: given the student characteristics, we compute the grade they would have earned in each course if it had been taken in fall 2008.
• Using credit-hour weights, we compute the student’s Real GPA:
  the GPA he or she is predicted to have earned had he or she taken all courses in fall 2008
• Net Grade Inflation is the difference between the Nominal GPA and the Real GPA
Net Grade Inflation for Students

75% of students have positive net grade inflation

Average = 0.06
Net Grade Inflation for Courses

52% of courses have positive net grade inflation

Average = 0.02
Net Grade Inflation for Courses Weighted by Enrollment

61% of courses have positive net grade inflation

Average = 0.06

More net grade inflation in larger enrollment courses
## Effect of Grade Inflation on Probability of Graduation

<table>
<thead>
<tr>
<th></th>
<th>4-year rate</th>
<th>5-year rate</th>
<th>6-year rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Real GPA</strong></td>
<td>0.323***</td>
<td>0.349***</td>
<td>0.343***</td>
</tr>
<tr>
<td>(0.0036)</td>
<td>(0.0032)</td>
<td>(0.0032)</td>
<td></td>
</tr>
<tr>
<td><strong>Net Grade Inflation</strong></td>
<td>0.086**</td>
<td>0.197***</td>
<td>0.210***</td>
</tr>
<tr>
<td>(0.0344)</td>
<td>(0.0297)</td>
<td>(0.0282)</td>
<td></td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>-0.431***</td>
<td>-0.294***</td>
<td>-0.246***</td>
</tr>
<tr>
<td>(0.0108)</td>
<td>(0.0103)</td>
<td>(0.0102)</td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>23,547</td>
<td>23,547</td>
<td>23,547</td>
</tr>
<tr>
<td><strong>R^2</strong></td>
<td>0.229</td>
<td>0.312</td>
<td>0.324</td>
</tr>
<tr>
<td><strong>Mean Grad. Rate</strong></td>
<td>0.527</td>
<td>0.745</td>
<td>0.775</td>
</tr>
</tbody>
</table>

Notes: this table reports the effect of Net Grade Inflation on 4-, 5-, and 6-year graduation rates. The estimates suggest that grade inflation has a positive effect on graduation rates. Standard errors in parentheses: * p < 0.1, ** p < 0.05, *** p < 0.01
Effect of Lower-Division Grade Inflation on Graduation

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4-year rate</td>
<td>5-year rate</td>
<td>6-year rate</td>
<td>Switch college</td>
</tr>
<tr>
<td>Real GPA (lower)</td>
<td>0.226***</td>
<td>0.219***</td>
<td>0.208***</td>
<td>-0.073***</td>
</tr>
<tr>
<td></td>
<td>(0.0039)</td>
<td>(0.0040)</td>
<td>(0.0041)</td>
<td>(0.0065)</td>
</tr>
<tr>
<td>Net Grade Inflation (lower)</td>
<td>0.258***</td>
<td>0.311***</td>
<td>0.311***</td>
<td>-0.126***</td>
</tr>
<tr>
<td></td>
<td>(0.0231)</td>
<td>(0.0198)</td>
<td>(0.0192)</td>
<td>(0.0239)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.135***</td>
<td>0.100***</td>
<td>0.162***</td>
<td>0.502***</td>
</tr>
<tr>
<td></td>
<td>(0.0115)</td>
<td>(0.0125)</td>
<td>(0.0128)</td>
<td>(0.0207)</td>
</tr>
<tr>
<td>N</td>
<td>20,579</td>
<td>20,579</td>
<td>20,579</td>
<td>16,328</td>
</tr>
<tr>
<td>R²</td>
<td>0.166</td>
<td>0.196</td>
<td>0.194</td>
<td>0.341</td>
</tr>
<tr>
<td>Mean dep. var.</td>
<td>0.537</td>
<td>0.755</td>
<td>0.784</td>
<td>0.271</td>
</tr>
</tbody>
</table>

Notes: this table reports the effect of Net Grade Inflation in only 100- and 200-level courses on 4-, 5-, and 6-year graduation rates. The estimates suggest that grade inflation has a positive effect on graduation rates and a negative effect on switching out of the college to which the student was originally admitted. Standard errors in parentheses: * p < 0.1, ** p < 0.05, *** p < 0.01
## Effect of Grade Inflation on Log Salary

<table>
<thead>
<tr>
<th></th>
<th>(1) Naïve</th>
<th>(2) Full controls</th>
<th>(3) Non-switchers</th>
<th>(4) Switchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GPA</td>
<td>0.061***</td>
<td>0.095***</td>
<td>0.097***</td>
<td>0.098***</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.010)</td>
<td>(0.012)</td>
<td>(0.022)</td>
</tr>
<tr>
<td>Net Grade Inflation</td>
<td>0.687***</td>
<td>0.202**</td>
<td>0.229***</td>
<td>0.044</td>
</tr>
<tr>
<td></td>
<td>(0.075)</td>
<td>(0.083)</td>
<td>(0.083)</td>
<td>(0.163)</td>
</tr>
<tr>
<td>Constant</td>
<td>10.589***</td>
<td>12.575***</td>
<td>13.014***</td>
<td>12.496***</td>
</tr>
<tr>
<td></td>
<td>(0.037)</td>
<td>(1.614)</td>
<td>(2.108)</td>
<td>(2.820)</td>
</tr>
<tr>
<td>N</td>
<td>6,999</td>
<td>6,999</td>
<td>5,278</td>
<td>1,669</td>
</tr>
<tr>
<td>R²</td>
<td>0.016</td>
<td>0.493</td>
<td>0.499</td>
<td>0.525</td>
</tr>
<tr>
<td>Mean Salary</td>
<td>$52,816</td>
<td>$52,816</td>
<td>$54,052</td>
<td>$49,237</td>
</tr>
</tbody>
</table>

Notes: this table reports the effect of Net Grade Inflation on the log of the student’s starting salary after graduation. The estimates suggest that grade inflation has a positive effect on salary, with effects concentrated on students who graduate from the same college to which they were originally admitted. Standard errors in parentheses: * p < 0.1, ** p < 0.05, *** p < 0.01
Conclusions

Consequences

• Grade inflation increased graduation rates by about 2 percentage points
• Grade inflation helps students persist in higher-paying majors and has not hurt starting salary (yet)

Remaining Questions

• What caused the large unexplained grade inflation in Engineering, Liberal Arts, and the Polytechnic Institute?
• How has increased student choice contributed to grade inflation?
• How did the introduction of the core curriculum contribute to grade inflation?
• Has competition for students across majors lead to relaxed grading standards?