



# Measuring inflation in grades: An application of price indexing to undergraduate grades<sup>☆</sup>



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## ABSTRACT

Rising average grades at American universities have prompted fears of “grade inflation.” This paper applies the methods used to estimate price inflation to examine the causes of rising grades. We use rich data from a large public university to decompose the increase in average grades into those components explained by changes in student characteristics and course choices, and the unexplained component, which we refer to as “inflation.” About one-quarter of the increase in grades from 1982 to 2001 was driven by changes in the courses selected by students; enrollment shifted toward historically ‘easier-grading’ departments over time, mechanically increasing average grades. An additional one-quarter of the increase is attributable to increases in the observable quality of students, such as average SAT scores. Less than half of the increase in average grades from 1982 to 2001 appears to arise from the unexplained factors, or “inflation.” These results add to the evidence suggesting that differences in relative grades across departments discourage students from studying in low-grading departments, like math, physics, or engineering.

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## 1. Introduction

Average grades at many American universities have increased significantly over the past 50 years, from about 2.5 in 1960 to 3.1 in 2006 (on a 4 point grading scale), raising concerns about what is often termed grade inflation (Rojstaczer, 2016). The use of the word “inflation”—borrowed from the language of consumer prices—reflects a common belief that today’s faculty are assigning higher grades for what was once ordinary work (Rojstaczer, 2016). However, as with consumer prices, average grades may also rise because of improvements in quality or changes in the composition of the basket of consumer choices. At many top colleges, admissions has become more competitive, plausibly increasing the quality of student work, while student enrollments have tended to shift from harder to easier grading classes, changing the composition of the basket. Rojstaczer and Healy (2010) show that grades in the broad categories of humanities, social sciences, and engineering are higher than those in the natural sciences; if enrolment in these categories increases over time, then so would the mean earned

grade. Understanding the importance of these factors is relevant for understanding the costs associated with rising grades and for designing policies to address grade inflation. However, the role of these factors is uncertain because the appropriate data and empirical methods have yet to be applied to measure these sources of rising grades.

In this paper, we propose applying the tools used to construct quality-adjusted price inflation indices to measure the inflation component of rising grades. These methods provide both a new measure of grade inflation as well as a way to decompose overall increases in grades into those components explained by changes in student characteristics and their course choices.

We apply these methods to rich individual student-level data from Clemson University. Our data includes 20 years of exact transcript information (such as courses attended and grades received) and student characteristics (such as SAT scores, age, and gender) which we use to measure grade inflation controlling for school-wide changes in both student characteristics and course choices. The transcript data contain over 2.5 million individual grades earned by almost 90,000 students, making it the largest dataset used to analyze grade inflation. Over the sample period, average grades increased 0.32 grade points (from 2.67 to 2.99), similar to increases recorded at other national universities (Rojstaczer, 2016). At the same time, average SAT scores increased by about 34

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points (or roughly 9 percentile points on math and 5 percentile points on verbal sections).<sup>1</sup>

In order to compare the grades of students taking the same (or very similar) classes at different points in time, we matched classes based on end-of-sample course titles and descriptions with those from earlier course catalogs. Over the 20-year period, in departments where grades were historically high, enrollment increased—particularly in the humanities and certain career-oriented fields—while enrollment fell in historically low-grading departments like math, physics, and engineering.

Although the fact that expected grades affect enrollment choices has been well documented (Bar, Kadiyali, & Zussman, 2009; Sabot & Wakeman-Linn, 1991), the literature has not examined how changes in course enrollment affected measured grade inflation over time. We propose to measure grade inflation using standard hedonic regression techniques that underlie many quality-adjusted price indices. These methods also allow us to decompose the average increase in grades into those components explained by changes in student characteristics, changes in the distribution of classes selected by students, and unexplained factors, which, as in the price literature, we describe as “inflation.” In essence, this analysis attempts to form the counterfactual “what would grades have been in 2001 if those students took the same classes and had the same characteristics and qualifications as students in 1982?” using the DiNardo, Fortin, and Lemieux (1996) reweighting technique. This technique has been widely applied in other contexts, particularly relating to changes in wages, but has never before been used to analyze changes in the distribution of grades.

According to these analyses, more than half of the increase in average grades from 1982 to 2001 at Clemson University arises because of changes in course choices and improvements in the quality of the student body. The shift to historically easier classes increased average grades by almost 0.1 grade point. Increases in SAT scores and changes in other student characteristics boosted grades by almost another 0.1 grade point. Nevertheless, almost half of the increase in grades is left unexplained by observable characteristics of students and enrollment—a figure that suggests the assignment of higher grades plays a large role in the increase.

## 2. Rising grades

A number of studies document the increase in average undergraduate grades over the last half century. For example, Rojstaczer and Healy (2010, 2012) find that average grades have increased by roughly 0.1 per decade (on a 0 to 4 scale) since the 1960s, or roughly 0.7 at private universities and 0.5 at public universities from 1960 to 2006. Similarly, Babcock (2010) cites results from the National Postsecondary Student Aid Study, reporting that GPAs for full-time students rose from 2.83 to 2.97 between 1993 and 2004. Though the magnitude of grade inflation varies across data sources, the evidence taken together suggests that grades rose somewhere around 0.1 grade points per decade between the 1960s and 2000s, except during the 1970s when average grades stayed relatively constant.

A common explanation for rising grades is ‘inflation’ in the sense of faculty assigning higher grades for equivalent work. For instance, Rosovsky and Hartley (2002) provide a list of possible contributors to rising grades whose central theme is summarized as an upward shift in grades without a corresponding increase in student achievement that is driven by a number of potential factors: incentives to grant higher grades due to the Vietnam War

draft; a response to student diversity; new curricular or grading policies; responses to student evaluations; adjunct faculty; or a growing consumer culture. Some theorize that competition among colleges to place students in better jobs also encourages grade inflation (Chan, Hao, & Suen, 2007; Tampieri, 2011). Institutional and resource constraints may also matter. DeWitte, Geys and Solondz (2014) argue that giving public schools additional resources may also lead to grade inflation, while Wikström and Wikström (2005) show that higher level of competition among secondary schools dampens the magnitude of grade inflation in Sweden. International comparisons show that institutional traits, such as school autonomy, centralized exams, and competition from private schools, matter more than resource differences when predicting grade increases in the math and sciences (Wößmann, 2003).

A number of studies have also examined how grades influence student choices. First, it is clear that there are large and persistent differences in grades across departments (Achen & Courant, 2009). In addition, Johnson (2003), Sabot and Wakeman-Linn (1991), and Bar et al. (2009) show that students are responsive to the incentives in grading and seek out easier-grading departments and classes. These studies, and related research (Rojstaczer & Healy, 2010) suggest an important role of shopping by students for classes to improve their grades. Similarly, Hernández-Julián (2010) shows that grade-dependent scholarships may lead students to seek out easier-grading classes to maintain the required GPA. Bar et al. (2009), in particular, examine a change in policy that provided information on median course grades and find that this policy change encouraged students to migrate to courses with higher grades and show that these changes in course selection increased grades.

Our analysis contributes to existing research on rising grades by applying a framework drawn from the price literature to examine grading trends over time, by using that framework to measure the contribution of different factors to rising grades, and through the use of the richest set of student-level data yet examined. When measuring trends in grades over time, almost all research refers to changes in overall mean grades. Because the courses students are taking over time may be changing towards those course that give the higher grades, a comparison that uses mean grades does not follow an unchanging set of courses over time. Our analysis is the first in the literature that decomposes the increase in grades to three component parts: changes in course choices, changes in student traits, and “inflation” proper.

## 3. Data

Our analysis uses data from Clemson University, a large, selective, public, primarily residential, research institution ranked among the top 100 national universities by *U.S. News and World Report*, covering the period from 1982 to 2001. The transcript data contain over 2.4 million individual grades earned by more than 86,000 students over the course of 40 academic semesters starting in the fall of 1982 and ending in the summer of 2002. Throughout the analysis “years” refers to school years starting with the fall semester (i.e. 2001 corresponds to fall 2001, spring 2002, and summer 2002). Each grade is matched to records of students’ demographic characteristics, including age, gender, and date of university enrollment. For over three-quarters of these students, we also observe SAT scores.<sup>2</sup> The analysis focuses on the sample of students for whom all demographic information and SAT scores are available, although the overall pattern of average grades,

<sup>1</sup> SAT scores were re-centered by the College Board in April 1995; SAT scores for students entering prior to 1996 have been re-centered using a conversion table (College Board, 2012).

<sup>2</sup> Our dataset includes ACT score data for some students but it is not a useful substitute for SAT scores, since 94 percent of students with missing SAT scores also have missing ACT scores.

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