

# A Note On Job Market Conditions And Students' Academic Performance

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## ABSTRACT

*This paper presents a model of student effort and resulting grade performance under varying labor market conditions. Following previous studies that have found a negative relationship between the expected income and grades by discipline, we extend the analysis to the effect of changing labor market conditions on student effort and the resulting changes in the average grades. The empirical results support the theoretical model's conclusion that reduced employment opportunities result in higher average grades by discipline.*

**Keywords:** Unemployment; Student Effort; Grades

## INTRODUCTION

Post-secondary grade levels have been studied from a number of perspectives. However, of interest here are the behavioral models that employ incentives to explain grading differences between disciplines and, over time, salaries give rise to more difficult grading practices resulting in lower grade point averages for the discipline. Freeman (1999) expands on the relationship between grading standards and the market benefits of a particular discipline by offering a model wherein money prices, tuition, are equal within the institution and individual disciplines apply grading standards “commensurate with market benefits.” In this formulation, departments manage enrollments by “pricing” their courses with grading standards that reflect the market benefits as measured by expected incomes. This “full-price” hypothesis assumes that students respond to both the present non-monetary costs and the expected returns to a particular course of study. His empirical results suggest that both ability and effort are significant factors in determining student performance, but that market considerations explain some of the variation in grades across disciplines. The finding that student characteristics are a principal determinate of student performance is supported by Clauretje and Johnson (1975) and Eskew and Faley (1998) who find a significant correlation between student attributes and the grades received. Thus, holding student characteristics, ability and effort, constant students will accept higher grading standards in discipline that promise the highest expected wage.

However, job market conditions are dynamic and salary levels and employment opportunities will change with labor market conditions. For example, other studies have established negative relationship between improved labor market opportunities and college enrollments (Bozick, 2009). One explanation of increased enrollment during economic downturns is that individuals are investing in human capital to increase their employment opportunities. We hypothesize that changing job market conditions will also affect the effort students expend on course work. Specifically, as unemployment increases and the job market becomes more competitive, students will attempt to improve their academic performance to differentiate themselves from their job market competitors, their college cohort. The next section offers a theoretical model of students' responses to changing labor market conditions.

## A Model Of Labor Market Conditions And Student Behavior

A relationship between students' effort and graded performance is required for reduced employment opportunities to result in higher grades requires. A number of studies (Karstenson and Vedder, 1974; Park and Kerr, 1990; Romer, 1993; Johnson, Joyce and Sen, 2002; and Rich, 2006) have established a positive relationship between students' effort, measured in a variety of ways, including attendance and their academic performance.

The relationship between employment opportunities and student performance can be formalized by adapting a model introduced by Green and Weisskopf (1990) which examines how the threat of unemployment affects work intensity and workers' efforts. Their model starts with a simple production function:

$$Q=f(K, L) f_k, f_l > 0 \tag{1}$$

L represents "effective labor" as measured in efficiency units. The authors define work intensity as the average effective labor input per hour of labor employed:

$$h=L/H = h(X,Y,Z) h_x, h_y, h_z \geq 0 \tag{2}$$

where X is the negative sanction against shirking arising from the threat of job loss, Y is a set of variables representing other negative sanctions against shirking, Z represents an array of variables representing positive incentives for greater work effort, and H is the number of labor hours employed.

Green and Weisskopf then employ the effort regulation models of Rebitzer (1987) and Bowles (1985) to model work effort:

$$X = X(PC, PD, W^*) X_{PC}, X_{PD}, X_{W^*} > 0 \tag{3}$$

where PC is the probability of a worker being caught shirking, PD is the probability of being fired conditional on getting caught shirking, and  $W^*$  is the cost of job loss. Further, PD is a function of E, the cost associated with finding and training a replacement worker. Search theory states that E is a function of the unemployment rate and  $dE/dU < 0$ .

Using the above equations, the cost of job loss to a worker may be expressed as:

$$W^* = W - r(U)W^a - [1 - r(U)]B; dr/dU < 0, W^a > B \tag{4}$$

where W is the worker's real wage,  $W^a$  is an alternative wage if the worker is hired by another employer, r is the probability of being hired, and B are the real welfare benefits received while unemployed. Thus, the impact of unemployment on work intensity may be expressed as:

$$dh/dU = h_x[X_{PD}PD_E E_U - X_{W^*}r_U(W^a - B)] \tag{5}$$

leaving  $dh/dU$  unambiguously positive so long as  $h_x > 0$  and alternative employment offers superior wages to welfare benefits.

We adapt the model, starting with educational effort, L, as proxied by course grade.

$$L = f(g, D) \tag{6}$$

where effort is a function of g, an unobservable inherent ability to grasp the coursework, and D, the distance between the grade obtainable with minimal effort given g and the grade the student desires.

$$D = f(S, M, P) \tag{7}$$

D is a function of the dollar amount of grade-contingent scholarships (S), unobservable pride in grade (M), as well as the student's estimate of grades needed to attract the attention of potential employers (P).

Employers' actual grade expectations will be positively correlated with the perceived quality of the applicant pool. The applicant pool's quality is positively correlated with the unemployment rate.

$$P = f(Q(U)) \tag{8}$$

Consequently,  $dL/dU$  is positive signed.

## DATA, METHODOLOGY AND EMPIRICAL RESULTS

Our sample consists of over 2.8 million course-grade observations for individual students at a large southern university collected from August 1984 through January 2009. Our dependent variable – grade – is qualitative and ordinal in nature. Although we assign numeric values to the values of the observations (e.g., A=4, B=3, etc.), the distance between grades is not necessarily equal to the distance between numbers on the real number line. When the dependent variable manifests itself in this fashion, using ordinary least squares (OLS) will lead result in similar problems as when it is applied to binary data: heteroskedasticity and predicted probabilities outside the range of zero to one. To address this problem, we opt to use an ordered probit model in our multivariate analysis based on the following specification:

$$y^* = \beta x_i + \varepsilon_i$$

$$y_{ij} = \begin{cases} 0 & \text{if } y^* \leq \mu_0 = 0 \\ 1 & \text{if } \mu_0 < y^* \leq \mu_1 \\ 2 & \text{if } \mu_1 < y^* \leq \mu_2 \\ 3 & \text{if } \mu_2 < y^* \leq \mu_3 \\ 4 & \text{if } \mu_3 < y^* \leq \mu_4 \end{cases}$$

The dependent variable,  $y^*$ , is an unobserved continuous index of course performance. The observed grade for course  $j$  for person  $i$  is denoted by  $y_{ij}$ .  $\beta$  is a vector of coefficients,  $x_i$  is a vector of explanatory variables for student  $i$ ,  $\varepsilon_i$  is a standard normal random error, and the set of  $\mu_i$  represents threshold parameters. Higher positive coefficients on  $\beta$  indicate a higher probability of higher course performance. We use the following explanatory variables:

**ChgUnempl** = the annual change in national unemployment rate

**CumGPA** = student's cumulative GPA as of the term prior to the course being taken

**BusCourse** = indicator variable taking the value of 1 if the course is taught within the business school, 0 otherwise

**ChngBus** = an interaction term between ChngUnempl and BusCourse

The variable of interest is the annual change in the unemployment rate - ChgUnempl. It is expected that the unemployment rate and student grades will be positively related; that is, as the unemployment rate increases, student effort and resulting academic performance, as measured by course grades, also increase. The student's accumulative grade point average – CumGPA - is a control variable that proxies for aptitude and previous effort and is expected to be positively related to a course grade. A dummy variable that takes the value of 1 for business courses - BusCourse - measures the extent to which students receive higher grades in these courses. Finally, the interactive term ChngBus - the change in the unemployment rate and the business course dummy variable - isolates any increase in business course grades resulting from a change in the unemployment rate. This variable should capture any marginal difference between the performance in business and non-business courses. A positive sign supports the conclusion that a student's effort in business courses is disproportionately higher than for non-business courses.

The results of estimating the model are given in Table 1. The variable of interest - the change in unemployment rates - is positive as hypothesized and significant at the one-percent level. Additionally, the control variables are all of the expected sign and also significant at the one-percent level. A student's past performance possesses the greatest predictive power with a coefficient at 0.875. This is expected as the variable captures both the student's aptitude and previous level of effort. The next largest coefficient is for the business course variable. The results show that one's average grades in business courses are over one-half a letter grade higher than in non-business courses.

**Table 1: Estimation Results - Changes in Unemployment Rates and Students' Graded Performance**

Variable	Coefficient	Std. Error	P>z
CumGPA	0.8753***	0.0009	0.000
ChgUnemp	0.0363***	0.0008	0.000
BusCourse	0.5585***	0.0040	0.000
BusChng	0.0724***	0.0049	0.000

There are two explanations for this.

1. Students give greater effort to business courses that are upper division and major courses.
2. The business courses, in general, may be easier with higher grading than non-business courses. We leave the reader to weigh the relative merits of the arguments. The interactive term between whether the grade was received in a business course and the change in the unemployment rate is of interest as it evidences a greater student effort in business courses compared to all other courses taken. This could be interpreted as the business student's greater marginal adjustment to changing labor market conditions as a result of greater awareness relative to students and professors engaging in non-business courses.

## CONCLUSIONS

The empirical results support the hypothesis that more competitive labor market conditions result in higher average grades. There are several non-exclusive mechanisms by which this result can arise:

1. Students expend greater effort in order to gain a competitive advantage
2. Reduced opportunities for students to work increases the time and effort to spend on courses. Paul (1982) found that student performance decreases monotonically with the number of hours worked in outside employment.
3. Students who enroll in colleges as a result of reduced employment opportunities are more serious about gaining marketable job skills.
4. Faculty members in low-demand disciplines reduce the non-monetary costs to attract a disproportionate number of new students into their discipline.

This latter observation suggests additional research questions. The student cohort is changed by the entrance of more students into the university. Whether the marginal student will perform differently than those already enrolled is an empirical question. The cohort mix will be more important to open-enrollment universities like the one studied here.

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**NOTES**