College Grades and Labor Market Rewards

Ethel B. Jones; John D. Jackson

The Journal of Human Resources, Vol. 25, No. 2 (Spring, 1990), 253-266.

Stable URL:
http://links.jstor.org/sici?sici=0022-166X%28199021%2925%3A2%3C253%3ACGALMR%3E2.0.CO%3B2-K

The Journal of Human Resources is currently published by University of Wisconsin Press.

Communications

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I. Introduction

Although economists have found a positive association between undergraduate grade-point-average (GPA) and post-baccalaureate earnings (Wise 1975; Filer 1981, 1983) with some evidence of a difference by gender (Filer 1981, 1983), the relationship has not been extensively studied.[1] Furthermore, economists debate whether the human capital (Wise 1975) or the screening hypothesis (Lazear 1977) explains the relationship.

Using more recent information and a data set improved because grades have the common reference of only one university's evaluation of students, this study estimates the GPA-earnings relationship on the first job and five years after graduation. The estimated positive relationship is larger than in previous studies and is significant for both men and women. Three tests are conducted to determine support for the human capital or the screening hypothesis as the connecting link between GPA and earnings. These tests examine the relationship between (a) grades and on-the-job investment, (b) grades and earnings on the first job after graduation, and (c) grades and earnings by establishment size. The tests provide little

The authors wish to thank Randall K. Filer for supplying unpublished regression findings of his work and several anonymous referees for helpful comments upon an earlier version of this paper.

1. In earlier work, Weisbrod and Karpoff (1968) used rank in graduating class instead of GPA. They found from their study of male employees of one company that rank in class was associated with a higher rate of increase in earnings while employed by the company.

support for screening and no strong evidence for rejecting a human capital interpretation.

Information about the GPA-earnings relationship is useful in formulating education policy and understanding the gender-earnings gap. For the past two decades federal support of higher education has stressed access to college as a means of extending employment opportunity to a broader spectrum of the population. This policy has ignored improved academic achievement as a means of also enhancing earnings for persons assisted by student aid programs. Such an oversight may stem from the education community's continuing doubt that GPA and later earnings are related except through GPA requirements for admission to graduate and professional programs (e.g., Hoyt 1965, Baird 1985). Policy implications also derive from differential rewards for employee characteristics of men and women that generate a residual labelled discrimination in studies of the gender-earnings gap. Comparing the GPA-earnings increment by gender can determine whether the market reward to grades is a factor in discrimination.

Whether the human capital or the screening hypothesis is the link for the GPA-earnings relationship has implications for the design of government student financial aid programs. According to human capital, grades index human capital acquired in college. Increasing human capital augments job productivity. According to screening, the output enhancement of grades is through their informational role of differentiating ability levels ex ante to college for prospective employers. Equity considerations aside, if the human capital hypothesis is supported, using GPA to allocate expenditures on student aid would yield a higher social return because of the formation of increased human capital by persons with higher grades.[2] Also, programs to enhance academic achievement would yield increases in human capital and hence could have a positive social return. If GPA is a screen for ex ante ability, tying student aid to GPA and instituting programs to enhance academic achievement do not increase social returns because the information flow is not improved.

A brief description of the data base is provided in Section II, and estimates of the grades-earnings relationship are treated in Section III. Section IV presents the tests of inferences of the human capital and screening hypotheses, and concluding observations are made in Section V.

2. The issue of equity arises from variation across school systems in the quality of academic preparation for college. Insofar as low income areas provide fewer financial resources for the student's education, the student is placed at a disadvantage in attaining academic success. See, for example, McNair and Taylor (1988).

II. The Data

Data for the analysis came from a sample of 811 employed wage and salary persons who received an undergraduate degree from the college of business administration at a large, Southern, state-supported university.[3] All information except GPA was provided from a questionnaire mailed five years after graduation (1982–85) to four graduating classes (1977–80). Cumulative GPA was obtained from university information on graduating seniors.

All classes did not receive the same question for reporting annual earnings five years after graduation. The questionnaire mailed in 1982 (class of 1977) asked for a specific figure and yielded a low response rate (57 percent) for earnings on returned questionnaires. The salary question continued to ask for a specific figure from one-half of the 1983 (class of 1978) mailing. For the other half, the question provided a selection among listed intervals. The response rate increased to 93 percent for the categorical format but remained the same for the request for a specific figure. Because of the higher response rate, only the categorical structure was used in 1984 and 1985. In order to increase sample size, a specific figure was predicted for persons who did not respond to the earnings question in 1982 and 1983.[4] All earnings data acquired the categorical structure because specific figures, either reported or predicted, were assigned to salary intervals of the categorical format. The percent distribution of salary data by source is: predicted, 14; specific figure, 20; and categorical response, 66.

For regression analysis, a person's annual earnings five years after graduation is the estimated value for one of 12 salary categories, the highest of which is an open-ended interval.[5] Since salary distributions are not linear, estimates for categories below the highest are the median values obtained after fitting a logarithmic normal curve to the sample's frequency distribution (Croxton and Cowden 1939). The value for the

3. The sample excludes 193 respondents. The percent distribution of the reasons for exclusion are: self-employed, 34 percent; other nonwage activities, 12; and data unavailable for variable construction, 54. The self-employed are omitted because annual earnings were requested only from persons not self-employed. The population response rate was 42 percent.

4. Estimated values for salary nonrespondents in 1982 and 1983 have been obtained by regressing known specific earnings in each of these years upon a right-hand variable of the percentage salary increase since the first position after graduation. This instrumental variable was selected because of its high correlation (1982, 0.88; 1983, 0.92) with reported annual salary.

5. The salary categories are below \$10,000 (n = 6), 10 categories of equal width of \$5,000, and an open-ended interval of above \$60,000 (n = 17).

open-ended category is obtained with a Pareto-curve adjustment (Miller 1966).

III. The Grades-Earnings Relationship

A standard wage equation model is used to examine the relationship between grades and annual earnings:

$$E_i = \alpha + \beta_g GPA_i + \beta_s SEX_i + \sum_{j=1}^{m} \beta_j S_{ji} + \sum_{k=1}^{p} \delta_k X_{ki} + \epsilon_i$$

where E_i ($i = 1, \ldots, n$) is the natural logarithm of the real value (1982 = 100) of the salary estimate for the ith individual's salary class interval.[6] The terms GPA_i, SEX_i, S_{ji} ($j = 1, \ldots, m$), and X_{ki} ($k = 1, \ldots, p$) refer respectively to cumulative grade point average, gender (males = 1), m sample characteristics, and p human capital and job characteristics of the ith individual. Cumulative GPA is measured to two decimal places on a scale that weighted individual course grades from $F = D = 0$ to $A = 3$. The S vector of seven sample descriptor dummies allows for intercept differences that may arise because of the various sources of the earnings data (predicted, specific figure, categorical response) and the four-year period of data gathering (1982–85). Human capital variables include tenure (months on the current job), experience (months employed since graduation), and graduate degree status (degree holder = 1). Dummy variables for current job characteristics are location of employment by size of place (standard metropolitan statistical area = 1), by state of residence (residence in state of university = 1), by establishment size (100 or more employees = 1), and occupation (accountant, professional, other staff, company officer or manager, other supervisory, and advertising and sales).[7] Columns 1–3 of Table 1 show, for the total sample and separately by gender, coefficient estimates for the independent variables exclusive of sample descriptor and occupation variables.[8]

6. All price index data are from U.S. Bureau of Labor Statistics, *Monthly Labor Review* (1986).

7. The variable of state instead of region is used because few graduates locate outside of the Census South but do locate in two neighboring states that, because of their faster employment growth, may be expected to offer higher earnings opportunities to college graduates.

The questionnaire did not include designation by race. Over the years covered by the sample, blacks constituted less than 2 percent of undergraduate enrollment. Casual empiricism would suggest that the percent enrolled in the college of business was even less.

8. Complete estimates of all equations referred to in this study are available from the authors.

Use of Heckman's (1976) two-step procedure for sample selection bias indicates that the use of predicted values is unimportant for sample selection bias. The dependent variable of

Table 1
Wage Equations: Five Years After Graduation (t-values in parentheses)

Variable[1]	Sample				
	Total	Male	Female	Survey Years 1984–85	
Grades	.0851[a]	.0748[a]	.1088[a]	.0979[a]	.0915[a]
	(3.89)	(2.67)	(3.27)	(3.05)	(2.97)
Gender	.1985[a]	...	...	.2043[a]	.1636[a]
	(8.40)			(6.18)	(5.01)
Graduate degree	.1065[a]	.0758[c]	.1984[a]	.1352[b]	.1192[b]
	(2.65)	(1.65)	(3.35)	(2.30)	(2.10)
Tenure	.0014[a]	.0019[a]	.0006	.0011	.0011
	(2.87)	(2.81)	(0.74)	(1.47)	(1.52)
Experience	.0042[a]	.0031[c]	.0061[a]	.0049[b]	.0037[c]
	(2.92)	(1.66)	(2.88)	(2.38)	(1.82)
Establishment size	.0535[b]	.0388	.0921[a]	.0552[c]	.0439
	(2.41)	(1.33)	(2.80)	(1.76)	(1.45)
Job location	.0972[a]	.1184[a]	.0320	.0648[c]	.0467
SMSA	(3.85)	(3.74)	(0.78)	(1.78)	(1.33)
State of	−.1014[a]	−.0807[a]	−.1387[a]	−.1120[a]	−.1030[a]
residence	(−4.80)	(−2.99)	(−4.30)	(−3.68)	(−3.51)
Weekly work hours	...	...	...	...	.0121[a]
					(5.87)
Weeks not worked	...	...	...	...	−.0064
					(−1.19)
Intercept	9.3941[a]	9.6087[a]	9.4344[a]	9.4905[a]	9.0286[a]
	(91.32)	(73.92)	(63.24)	(65.65)	(54.91)
R^2	.24	.17	.29	.25	.31
n	811	567	244	434	434

1. Other included variables not reported are vectors for original form of salary data, year of sampling, and occupation.
Significance levels: a = 1 percent; b = 5 percent; c = 10 percent.

the first step probit model is equal to one if the dependent variable is predicted and zero otherwise. The coefficient of the selectivity variable entered into the wage equation of Column 1 is .0460 (t = 0.49).

For further consideration of the impact of predicted values upon the findings, all wage equations of this study have been estimated excluding the observations with predicted values from the sample. Exclusion increases in each case the estimated grades-earnings relationships. For the total sample (Table 1, Column 1), the coefficient rises from .0851 to .0996 (t = 4.07). The insignificant difference of the GPA coefficient between males and females and all other findings reported in Section IV continue to be supported.

The coefficient of GPA is significant for the total sample and by gender. Inclusion of a GPA-sex interaction term indicates no significant difference in the GPA coefficient between men and women.[9] For the total sample an increase in annual earnings of 8.9 percent accompanies a one-point rise in GPA (e.g., from *C* to *B*). This figure is considerably larger than Wise's estimate of a total increment of 1.4 percent between his lowest GPA category of less than 2.50 and the highest of 3.50–4.00. Filer estimated that a one-point rise in GPA (4-point scale) accompanied an increase of $42 (1967 dollars) in monthly earnings for a sample of persons who had attended college. From separate equations by gender his estimates are $42 for men and $17 for women, and the latter is insignificant. If average annual earnings of the state university sample are converted to a monthly basis in 1967 dollars, the implied increases for the total sample and for men and women are, respectively: $69, $64, and $76.

The university sample's GPA-earnings relationship is larger than either Wise's or Filer's although Filer's findings are closer. Wise's small estimate may be due to sample selection bias (Rosen 1977) since he studied the employees of one firm. Filer's and the university's samples include situations across many firms.[10] Observations across firms permit the GPA-earnings relationship to include persons whose levels of academic achievement are unsatisfactory for hiring and retention by one firm as well as persons whose traits as indicated by academic achievement are more highly rewarded outside the pay structure of a particular firm. Inclusion of nongraduates in Filer's sample (30 percent of the sample) may have reduced his estimate for two reasons. First, in a human capital framework, GPA of the non-graduate would not index the productive capacity of the job-related specialized courses of the academic major that are acquired in the later years of college. Second, GPAs insufficient to remain in school or graduate may be associated with lower labor market rewards.[11]

The model of Equations 1–3 omits variables for time worked, a dimension of labor force activity whose exclusion biases estimates of the rate of

9. With a gender interaction term in the equation, the coefficients are GPA, .1168 ($t = 3.10$) and *GPA* × *GENDER*, −.0456 ($t = -1.03$).

10. Filer's sample came from records for the period 1967–1977 of a firm conducting psychological evaluations of current and prospective employees for "several hundred" employers generally located in the South and mid-Atlantic states (1981, p. 378).

11. If grades represent human capital endowments, depreciation would be another reason for variation across studies. Wise's sample consisted of persons who had been with the firm between three and 20 years, whereas our graduates had five years of post-baccalaureate experience. Filer reports a mean age of 30.6 years for his initial total data set of which persons attending college were only one segment.

return to education (Rosen 1977). The 1984 and 1985 questionnaires requested hours per week usually worked and weeks not worked exclusive of vacation weeks during the prior 12 months. Columns 4 and 5 of Table 1 report earnings equations exclusive and inclusive of the time variables for this sample segment. Comparison of Columns 4 and 5 indicates little impact of the time variables on the GPA coefficient (a decline of 0.0064 or only 6.5 percent in the size of the coefficient). The variable of hours, but not weeks, is significant. The insignificant finding for weeks reflects the nonrepetitive events measured by this variable (illness or labor market entry and reentry) that do not influence the dependent variable because it records current, not last year's, annual salary.[12]

IV. Screening vs. Human Capital

Examination of the relationships between grades and (a) on-the-job investment, (b) earnings on the first job after graduation, and (c) earnings by establishment size provides tests of the consistency of the screening or human capital hypothesis as the basis for the positive GPA-earnings relationship.

A. On-the-job Investment

Lazear interpreted screening to imply a more rapid increase in wages on the job for workers of more innate ability because of the association between innate ability (higher GPA) and the rate of skill acquisition on the job (measured by the tenure coefficient). Riley (1979) expressed this implication more strongly: "Indeed, one of the crucial roles of educational screening is presumably to allow employers to select the more talented for jobs which involve considerable on-the-job training" (p. S231).

Determining whether employers make larger training investments in persons with higher GPAs involves three steps. First, occupations of the data set are placed in one of two groups depending upon expected dif-

12. Inclusion of the time-worked variables reduces the gender gap. For the sample segment upon which the equations of Columns 4 and 5 are estimated, the gender gap (one minus the ratio of female to male wages) is 18.5 percent without the time variables and 15.0 percent when the time variables are included. An Oaxaca-type (Oaxaca 1973) decomposition of the gap estimates 26.0 percent due to differences in time worked and 5.5 percent due to differences between the sexes in the other variables of the model.

The university sample's gender gap is similar to that found by Daymont and Andrisani (1984) in a national sample of college graduates. In 1979, three years after graduation, the gap was 14 percent in hourly earnings and 22.5 percent in weekly earnings.

ferences in the amount of employer investment. Second, the tenure coefficients of the two groups are compared to see if employer investments do differ. Third, from the finding that investments do differ, interaction terms between GPA and tenure for the occupational groupings are entered in the wage equation. Support of screening requires that the coefficients of the interaction terms imply a greater effect of grades upon earnings when on-the-job investment is larger.

The grouping of accountant, professional, and other staff (*COLLEARN*) is expected to require less on-the-job training and to depend more upon the knowledge obtained from business school courses. More on-the-job training is assumed for the occupations of officer, supervisor, and advertising and sales (*JOBLEARN*) where, together with the personal traits of leadership and human relations skills, job tasks require knowledge of the operations, product, and procedures specific to the employing firm.

Test results are reported in Table 2. Equation 1 repeats the wage equation estimate on the total sample from Table 1, but occupational groupings (*JOBLEARN* = 1) are substituted for individual occupations. A *GPA* × *JOBLEARN* interaction term is added in Equation 2. The t-value of the interaction term indicates no significant difference between the two occupational groupings in incremental earnings associated with a one-point increase in GPA. Equation 3 supports the expectation that the occupational categories do differ in the amounts of on-the-job investment. On-the-job investment is not significantly different from zero for *COLLEARN* according to the t-value of the tenure coefficient. However, the positive and significant (10 percent) interaction term between tenure and *JOBLEARN* suggests larger amounts of on-the-job investment for the *JOBLEARN* occupations.

The independent variables of Equation 4 include the interaction terms for *GRADES* × *TENURE* by occupational grouping in addition to the independent variables of Equation 3. The coefficient of $G \times T$ measures the joint effect of grades and on-the-job investment on the earnings of *COLLEARN*, and the coefficient of $G \times T \times JL$ measures the difference in this joint effect between *COLLEARN* and *JOBLEARN*. If the joint effect of grades and investment is larger for *JOBLEARN*, then higher grades accompany more on-the-job investment for *JOBLEARN* since grades increment earnings similarly for both groups of occupations (Equation 2), but the *JOBLEARN* occupations have more on-the-job investment (Equation 3). The coefficients of both interaction terms are insignificant, suggesting no difference between the occupational groups. Thus, larger amounts of on-the-job investment are not directed toward persons with higher grades as the screening hypothesis implies.

Table 2
Wage Equations, Five Years After Graduation: Occupations Grouped by On-the-job Investment (t-values in parentheses)

	Equation Number			
Variable[1]	(1)	(2)	(3)	(4)
Grades (G)	.0846[a]	.0892[a]	.0859[a]	.0650
	(3.98)	(3.02)	(4.04)	(1.61)
Gender	.2002[a]	.2004[a]	.1998[a]	.2004[a]
	(8.44)	(8.44)	(8.44)	(8.44)
Graduate degree	.1046[a]	.1045[a]	.1007[a]	.1010[a]
	(2.89)	(2.88)	(2.78)	(2.78)
Tenure (T)	.0014[a]	.0014[a]	.0005	−.0017
	(2.72)	(2.70)	(0.61)	(−0.78)
Experience	.0036[b]	.0036[a]	.0037[a]	.0037[a]
	(2.55)	(2.56)	(2.63)	(2.60)
Establishment size	.0339	.0345	.0346	.0373[c]
	(1.56)	(1.58)	(1.60)	(1.71)
Job location	.1025[a]	.1024[a]	.1044[a]	.1030[a]
SMSA	(4.07)	(4.06)	(4.14)	(4.08)
State of	−.0991[a]	−.0992[a]	−.1001[a]	−.1005[a]
residence	(−4.67)	(−4.67)	(−4.72)	(−4.74)
Occupations,	.1566[a]	.1722[b]	.0951[b]	.0922[b]
joblearn (JL)[2]	(7.10)	(2.35)	(2.35)	(2.26)
Interaction terms				
$G \times JL$	—	−.0091	—	—
		(−0.22)		
$T \times JL$	—	—	.0018[c]	.0038[c]
			(1.81)	(1.90)
$G \times T$	—	—	—	.0012
				(0.96)
$G \times T \times JL$	—	—	—	−.0012
				(−1.11)
Intercept	9.3537[a]	9.3441[a]	9.3791[a]	9.4186[a]
	(96.58)	(88.12)	(95.98)	(78.71)
R^2	.22	.22	.22	.23
n	811	811	811	811

1. Other included variables not reported are vectors for original form of salary data and year of sampling.
2. Occupations include company officer or manager, other supervisory, and advertising and sales; the omitted group includes accountant, professional and other staff.
Significance levels: a = 1 percent; b = 5 percent; c = 10 percent.

B. Initial Earnings

Wise did not observe the employee's initial salary with the firm to be "appreciably" affected by GPA. Lazear interpreted Wise's finding as a problem for the human capital hypothesis but not inconsistent with screening since, according to screening, the education process had not enhanced entry employment productivity.

The university sample included a question for reporting the percentage salary increase since the first job after graduation. A respondent's initial wage was estimated by dividing annual salary of the appropriate earnings category by the term of unity plus the decimal value of the average reported percentage increase of persons in the category. This initial wage variable may have measurement errors because of its derivation from two separately reported variables.

Because first job characteristics are unavailable, the independent variables of the equation of initial salary include only GPA, gender, college major within the business school (a proxy variable for occupation), and the sample descriptors of the annual earnings model.[13] The dependent variable is the natural logarithm of the real value (1977 = 100) of estimated initial salary. The GPA coefficient (.0277, t = 4.41), although smaller than for current earnings, is significant at the one percent level. This finding that grades may index existing productive capacity before the firm begins its investment in workers supports the human capital hypothesis.

Additional information concerning the first job implies that grades may index employment productive capacity acquired in college. Graduates were asked to evaluate on a 5-point scale (1 = very poorly, . . . , 5 = very well) how well their educational experience had prepared them for their first job. A multichotomous probit analysis of the responses upon the independent variable of grades is positive and significant at the 5 percent level.[14] Persons with higher grades felt better prepared for their first job.

C. Establishment Size

Distinguishing workers according to establishment size provides another test of screening's implication that the positive GPA-earnings relationship

13. Major fields of study include accounting, economics, finance, marketing and transportation, and management.

14. The chi-square test uses the value of $-2.0 \times$ log likelihood ratio of the probit equation which is 6.50 (n = 808). The relationship has also been tested with expansion of the independent variable set to include gender, out-of-state residence before attending the university, and the sample descriptors of the source of wage data. In this expanded model, the asymptotic t-statistic for grades and the chi-square test of the equation continue to show significance at the 5 percent level.

shows rewards to ex ante ability. Stigler (1962) attributed the higher wages of large establishments to the higher cost of judging worker quality in a setting where employee performance is more difficult to observe closely. Recent work has extended Stigler's conjecture by proposing that large employers hire more able workers (Barron et al. 1987) and rely more on external judgments of workers such as schooling than on the firm's own evaluation (Garen 1985). The potential for screening by GPA appears in the university sample since average GPA by gender is higher in large establishments although the difference is significant only for men.[15] If employers rely on grades to index ability, the coefficient of an interaction term, *GPA* × *ESTABLISHMENT-SIZE*, would be positive and significant when added to the wage equation. The human capital hypothesis would not anticipate a greater reward in large firms because the skills acquired in business school courses should increment productivity in both large and small establishments.

When the interaction terms is added to Equations 1–3 of Table 1, the term's coefficient is both significant (5 percent level) and positive only for women.[16] For the total sample and for males, grades remain significantly (5 percent level) associated with earnings in both large and small firms as implied by the human capital hypothesis. With the interaction term included, the coefficients of both GPA and establishment size become insignificant for women (the sign of the latter variable is negative), indicating that the higher rewards associated with both variables are generated by the larger GPA earnings increments of larger establishments. This support of screening with respect to women may be encouraged by

15. Grade averages are males, large 1.69 and small 1.58, $t = 2.41$; women, large 1.91 and small 1.86, $t = 0.71$. Data on firm size are for the current job. In order for the reported GPA differences to represent hiring conditions, we must assume that attrition by GPA does not differ by establishment size.

16. Inclusive of the interaction term, the coefficient estimates of grades, establishment size (ES), and the interaction terms are:

	Coefficient (t-value in parentheses)		
Variable	Total	Men	Women
GPA	.0660	.0846	.0432
	(2.27)	(2.28)	(0.93)
ES	−.0154	.0746	−.1428
	(−0.21)	(0.80)	(−1.18)
GPA × *ES*	.0399	−.0216	.1242
	(0.99)	(−0.41)	(2.02)
n	811	567	244

affirmative action plans because of their administrative characteristic of firm size distinction in enforcement. The wage regressions fail to identify significant amounts of on-the-job investment for women, but firms have turnover costs. If government action encourages the larger establishments to place more women on job tracks of greater career enhancement, GPA could serve as a signal of more continuous labor market attachment (and lower turnover costs) for placement into the higher paying job tracks.

V. Conclusions

This study observes a positive and significant relationship between cumulative grade point average and earnings for one academic program of a large, state-supported university. The estimated relationship is larger than in the literature's two comparable studies (Wise 1975; Filer 1981, 1983), but both of these studies may have a downward bias due to sample coverage. There are two new findings from the university sample. First, the grades-earnings relationship is significant for women as well as for men. Second, the relationship is evident for the first job after graduation as well as five years later. Estimates from the university sample have the limitation that the categorical nature of the dependent variable fails to capture the variation between GPA and earnings within earnings categories. Also, there is the limitation that errors in measurement may be introduced with respect to initial earnings because of its derived nature from two variables (earnings five years after graduation and the percent increase in earnings since graduation).

As noted by Wolpin (1977), tests rejecting either human capital or screening as the process by which schooling (or, in this case, grades) enhances earnings are difficult to develop. However, it is possible to investigate whether particular inferences of the hypotheses are empirically supported. Examination of three such inferences extends little substantiation to screening but does provide evidence for not rejecting the human capital interpretation. First, screening's important implication that a firm's investment in an employee increases for persons of higher grades was not supported. Consistent with the human capital hypothesis, higher grades enhance earnings regardless of the firm's level of worker investment. Second, estimation from the university sample does not encounter the problem for the human capital hypothesis found by Wise (1975) of the absence of a relationship between GPA and starting salary. The positive and significant grades-earnings relationship for the first job after graduation indicates differing levels of human capital accumulated in college. The third inference suggests a more prevalent use of grades as a screen in

large establishments with an accompanying larger grades-earnings relationship. Among regressions for the total sample and separately by gender, support of screening based upon the establishment size distinction occurs only for women. This exception is also consistent with large firms conforming to affirmative action plans.

A positive GPA-earnings relationship and the absence of strong confirmation of screening should promote consideration of programs for improving academic achievement among the mix of government expenditures on student aid as well as making awards according to GPA. An initial step toward the latter appears in the requirement of the Higher Education Amendments of 1986 (U.S. Congress 1986) that eligibility for grants, loans, or work assistance include a cumulative "C" GPA by the end of the second academic year. For understanding discrimination, the findings concerning gender differences in the labor market rewards to GPA are mixed. The absence of a significant difference in rewards by gender based upon data from the total sample suggests discrimination in the returns to GPA does not explain the gender gap in earnings. However, the significant grades-earnings coefficient on establishment size for women implies that the apparent absence of discrimination in returns to GPA may result from government-induced affirmative action.

Ethel B. Jones
John D. Jackson
Auburn University

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