THE ECONOMIC REWARD FOR STUDYING ECONOMICS

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Undergraduate advisors in economics departments suggest that the study of economics is good preparation for a variety of careers, including economics, consulting, analysis, and administration, and they argue that economics is a solid prelaw or pre-MBA major. In this article we provide some empirical evidence about each of these contentions. We find that among college graduates who do not *earn advanced degrees, economics majors generally earn more than similar individuals with other majors. We show also that among individuals who pursue graduate degree programs in business and law, economics majors earn more than undergraduate majors in most other academic disciplines.* (*JEL* J31)

I. INTRODUCTION

Each year, college students must select a major from a bewildering array of choices. Academic advisors extol the aesthetic beauty, social value, intellectual rigor, and inherent interest of the various disciplines, and they emphasize the value of their own department's major as preparation for students' future career paths. Economists in particular point to the economics major as providing solid grounding for a variety of real-world careers—from public policy analyst to executive—and as a good background for further graduate work in economics, business, and law.

The information we pass on to our students is based largely on a collection of anecdotes, and this advice is often met with well-founded skepticism. Students and parents understand that academic advice often comes from individuals who have an incentive to steer students toward majoring in their own departments. Little concrete information is provided about the actual economic success of graduates based on their choice of college major.

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In this article, we use a unique data set of over 85,000 college-educated respondents to calculate the wages of college graduates by their major. We focus on two broad issues. First, we consider college graduates who do not pursue postbachelor's education. We ask how thewages of the economics majors compare to demographically similar individuals who choose other college majors. We also provide evidence about the occupations held by economics majors. Second, we consider evidence about graduate-level education for economics majors. We find that over 40% of economics majors have earned graduate degrees, most commonly in business or law. We examine the wages of workers who have obtained a master's degree in business or a law degree and ask how wages of the economics undergraduate majors differ from those of other majors.

Our results can be summarized as follows: Among college graduates with no advanced degrees, economics majors generally fare well, earning significantly more than graduates with the most popular major, business administration, and more than other social science majors, humanities majors, and arts majors. Only engineering majors earn significantly more than economics majors. Among individuals who pursue a master's degree in business or a professional degree in law, those who have

ABBREVIATIONS

NSCG: National Survey of College Graduates
NSF: National Science Foundation
OLS: Ordinary Least Squares

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an undergraduate economics major generally earn more than individuals with other majors (the only exception being the chemical engineering major as a background for the MBA).

II. DATA DESCRIPTION AND METHODOLOGY

We use the 1993 National Survey of College Graduates (NSCG) to examine the college majors of full-time workers. The NSCG stems from an initiative of the National Science Foundation (NSF) that compiled information on scientists and engineers in the United States. The NSF and the Bureau of the Census conducted a survey based on the 1990 Decennial Census Long Form sampling frame, with the sample limited to those with at least a baccalaureate degree and who were age 72 or younger as of 1 April 1990. The Census Bureau drew a stratified sample of 214,643 respondents, first contacting individuals with a mail survey and then, if necessary, with a telephone or in-person interview. In the collection of these data, a great deal of attention was paid to the accuracy of the education responses, and detailed information was gathered about the majors of the respondents for up to three degrees.

From the original 1990 sample, a few members had emigrated from the United States (2,132), died (2,407), were institutionalized (157), or were over 75 years old (211) and were hence out of the survey's scope. Surprisingly, 14,319 respondents were also excluded from the sample because they had no four-year college degree despite reporting a four-year degree on the 1990 Census.[1] Another 46,487 declined to participate.[2] This results in a (weighted) response rate of 80%, or a sample of 148,928 respondents. We are interested in individuals who were age 25 to 55 in the 1990 Census (which reduces the number of observations by 28,656); who had nonimputed gender, race, age, and ethnicity (which reduces the number of observations by 2,417); who worked at least 1,365 hours in 1989 and had positive, nonimputed income, weeks worked, and hours per week (which reduces the number of observations by another 29,583). In addition, another 2,167 respondents reported no bachelor's degree or major, and we dropped these respondents from the sample, resulting in a working sample of 86,105 respondents. The NSCG provides over 140 different majors, which we aggregate to roughly 85 majors to avoid small cell sizes.[3] In an appendix table we provide a count of the undergraduate majors of the 86,105 respondents. There are over 1,700 economics majors, but other majors are also well represented. The smallest major is ethnic studies, and the largest is business administration.

Because the sampling frame of the NSCG is the 1990 Census, anyone not having a degree by 1990 would not be included in the sample. As a result, we restrict the sample to those at least 25 years of age (in 1990) to ensure that most individuals would have had the opportunity to complete their undergraduate education. Similarly, to avoid any complications with differential retirement ages, we restrict the sample to workers age 55 and under.

In our discussion of wage differences by college major, we report estimates from the regression model

$$\text{(1)} \qquad \ln(y_i) = g(X_i) + M^T\beta + u_i,$$

where $\ln(y_i)$ is a the natural log of the ith worker's wage; X_i is a vector of demographic covariates that includes age, race, and ethnicity (Asian, black, nonblack Hispanic, Native American, and non-Hispanic white) and gender; M is a vector of education covariates (e.g., college majors), β indicates the parameters of interest; and u_i is an error term.[4] As is standard practice when using census data, we calculate the wage as the earnings last year divided by the product of weeks worked last year and hours worked per week. Importantly, compared to Public Use Microdata Sample, our measure of earnings is top coded at \$999,999 rather than \$150,000. The NSCG data also contain a measure of 1993 earnings, but this measure is top coded at \$150,000. We prefer the census

1. A small number of individuals who were "too old" apparently gave incorrect responses to the age question in the 1990 Census. The very high level of measurement error in education in the 1990 Census (and, by extension, for any other similar surveys, such as the Current Population Survey) poses a more interesting problem. See Black, Sanders, et al. (2002) for detailed analysis.

2. Respondents were considered refusals unless they provided information about their last degree and field of study.

3. This required combining several small major groups. Details are available from the authors.

4. Because the data have extensive demographic information, they are well suited for studying race/ethnic wage differentials among the well educated. See Black, Haviland, et al. (2002).

TABLE 1
1990 Occupational Distribution for Six Undergraduate Majors, Individuals Aged 25 to 55, 1993 NSCG

Occupation	Economics	Accounting	Business Administration	Electrical Engineering	History	Political Science
Administrators and officials, public administration	1.32	1.15	1.55	0.12	1.97	3.12
Financial managers	3.63	9.53	2.70	0.11	0.70	2.01
Managers, marketing, advertising, & public relations	4.40	0.84	2.46	1.45	1.70	2.03
Managers and administrators, n.e.c.	14.23	7.87	15.70	14.22	7.34	10.46
Accountants and auditors	5.02	48.83	4.48	0.00	3.23	2.18
Other financial officers	4.88	3.94	3.24	0.58	1.07	3.31
Aerospace engineers	0.12	0.02	0.11	3.28	0.03	0.10
Electrical and electronic engineers	0.35	0.11	0.40	34.41	0.18	0.12
Engineers, n.e.c.	0.32	0.07	0.24	7.31	0.30	0.03
Computer systems analysts and scientists	2.04	0.62	1.45	3.96	0.86	1.16
Teachers, elementary school	0.83	0.37	0.71	0.06	9.68	3.58
Teachers, secondary school	0.50	0.10	0.23	0.02	4.32	0.77
Electrical and electronic technicians	0.11	0.04	0.22	4.01	0.13	0.06
Supervisors and proprietors, sales occupations	7.51	2.27	8.19	1.60	4.59	3.81
Real estate sales occupations	3.34	0.81	1.74	0.44	0.92	1.31
Sales rep., mining, manufacturing, & wholesale	5.51	0.81	4.97	1.94	1.26	3.88
Total	52.79	77.38	48.39	73.39	36.31	34.81

Source: Authors' calculation, NSCG.

Notes: All occupations that employ at least 3% of one of the six majors is listed. Respondents are full-time workers. n.e.c. is not elsewhere classified.

measure because it allows us to better estimate the returns to lucrative majors and occupations.[5]

We do not specify the function $g(X_i)$ parametrically. Rather, we demean the data for each point, or cell, in X. We then estimate the impact of each major by regressing the demeaned wage data on the vector of college majors.[6] Thus, identification of the wage differential associated with college majors comes from comparing workers with identical demographic characteristics (say, non-black Hispanic females aged 32) but with differing majors. We estimate the model with Stata statistical software and report robust standard errors allowing the variances to differ at each cell using Stata's cluster command. This accounts for the heteroscedasticity associated with difference in cell sizes. Finally, all estimations weights to account for the NSCG's sample stratification.

To implement the model, we must of course exclude one of the 85 majors. We use economics majors as the excluded group, because this facilitates easy comparison with other majors.

III. WHAT DO ECONOMICS MAJORS DO, AND HOW MUCH DO THEY EARN?

Our first set of analyses is of full-time workers who have earned a bachelor's degree but no further graduate degrees. As one would expect, among the college educated, the undergraduate major is a significant determinant of an individual's occupation. Table 1 provides a list of the most common occupations for economics majors and five additional majors in 1990: two other popular social science majors, history and political science; two professional business majors, accounting and business administration; and for contrast, electrical engineering. The table lists all occupations

5. Only 0.03% of the earnings in our sample are top coded.

6. This would be equivalent to a fixed effect estimator if the covariates were independent of college major.

TABLE 2

1990 Wage Gaps Relative to Economics by College Major of Full-Time Workers Aged 25 to 55 with a Bachelors Degree, 1993 NSCG

Major	Wages Relative to Economics Major (%)	Major	Wages Relative to Economics Major (%)
Science		***Other professional degrees***	
Biology	−16.23***	Agricultural & environmental design	−17.37***
Chemistry	−4.15	Communication	−15.66***
Geology	−14.99***	Conservation	−28.27***
Math	2.45	Criminology	−17.69***
Physics	−2.20	Home economics	−25.43***
		Journalism	−15.71***
Engineering and CS		Social work	−27.81***
Aerospace engineering	8.88**		
Chemical engineering	21.49***	***Health***	
Civil engineering	4.13	Medical technology	−4.56*
Computer science	8.49***	Nursing	5.24**
Electrical engineering	15.87***		
Industrial engineering	2.07	***Social science***	
Mechanical engineering	10.54***	***Economics***	***0.00***
Electric technology	2.62	History	−18.21***
Mechanical technology	1.71	Political science	−13.41***
		Psychology	−17.98***
Education		Sociology	−18.67***
Elementary	−17.69***		
Physical	−19.68***	***Humanities***	
Secondary	−23.85***	English	−15.56***
		Foreign languages	−15.95***
Business		Philosophy & theology	−47.56***
Accounting	−0.79		
Business administration	−10.74***	***Arts***	
Finance	−1.17	Fine arts	−27.72***
Marketing	−6.89***	Music	−37.31***
Other business	−14.04***		

Source: Authors' calculation, NSCG.

Notes: Dependent variable is the natural log of wage in 1990. The regression nonparametrically controls for race-ethnicity (white, black, Hispanic, Asian, and Native American), age, and gender. There are 85 different major controls, but only selected ones are reported. Huber-white standard errors are used to calculate significance levels with clustering for each cell. There are 55,422 observations used in the regression. Each reported major has at least 350 observations. Sample weights are used for these calculations.

*Indicates significance at 0.10 level.

**Indicates significance at 0.05 level.

***Indicates significance at 0.01 level.

that employ at least 3% of one of the six listed majors.

We notice that the electrical engineering majors are, not surprisingly, highly concentrated in engineering occupations (with more than 53% working in computer science or engineering). Similarly, 49% of accounting majors work as accountants. By way of comparison, the social science and business administration majors are distributed broadly over a variety of occupations. The occupation distribution of economics and business administration majors are similar, with concentrations of employment in top- and midlevel management positions, accounting and financial specialties, and sales. The political science and history majors are more likely to be elementary or secondary school teachers.

In Table 2 we present estimates from our wage regression. This specification is restricted

TABLE 3
1990 Wage Gaps Relative to Economics by College Major and Gender or Age of Full-Time Workers Aged 25 to 55 with a Bachelor's Degree, 1993 NSCG

	Gender		Age Category		
	Women	Men	Under 35	35 to 44	45 to 55
Sciences					
Biology	–12.64***	–18.69***	–16.99***	–14.56***	–19.62***
Math	8.72**	–1.06	1.90	5.14	–1.83
Computer science	15.99***	5.57*	12.34***	4.32	—
Education					
Elementary	–16.62***	–26.96***	–21.23***	–18.85***	–13.16**
Physical	–14.41***	–23.27***	–23.36***	–18.02***	–17.95***
Secondary	–20.74***	–27.85***	–20.76***	–25.68***	–23.96***
Business					
Accounting	0.35	–1.40	–0.60	–0.48	–2.02
Business administration	–9.71***	–11.09***	–11.33***	–11.59***	–8.57*
Marketing	–10.69***	–5.22*	–9.58***	–3.81	0.74
Other business	–15.95***	–13.22***	–14.42***	–12.38***	–15.50
Social science & humanities					
Economics	***0***	***0***	***0***	***0***	***0***
History	–16.74***	–18.90***	–23.40***	–17.46***	–14.57**
Political science	–7.44*	–15.76***	–16.64***	–8.86*	–15.14
Psychology	–19.51***	–16.58***	–19.81***	–16.64***	–18.65***
Sociology	–17.62***	–20.30***	–18.40***	–18.03***	–21.58***
English	–13.21***	–19.44***	–16.98***	–20.13***	–6.14
Foreign languages	–11.20***	–28.31***	–20.71***	–14.77***	–10.56

Source: Authors' calculation, NSCG.

Notes: Dependent variable is the natural logarithm of wage in 1990. The regression nonparametriccally controls for race-ethnicity (white, black, Hispanic, Asian, and Native American), age, and gender. There are 85 different major controls, but only selected ones are reported. Huber-White standard errors are used to calculate significance levels with clustering for each cell. There are 55,422 observations used in the regression. Each reported major cell has at least 100 observations. Sample weights are used for these calculations.

*Indicates significance at 0.10 level.

**Indicates significance at 0.05 level.

***Indicates significance at 0.01 level.

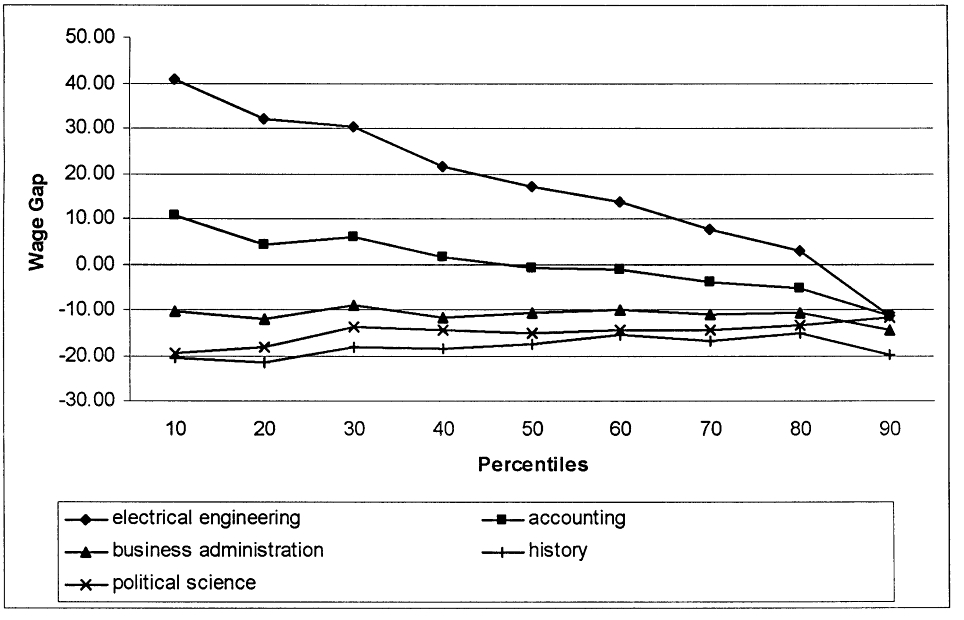
to college graduates who have no advanced degree, a sample of 55,422 workers, or about 64% of the sample. We include all majors in our estimation but report only the estimated coefficients for majors for which we have 350 or more observations.

Economics majors fare quite well in the labor market. Majors in other social sciences earn at least 13% less than demographically comparable economics majors. Similarly, education, humanities, and arts majors earn substantially less than economics majors. Business administration majors earn 11% less than economics majors, as do majors in a variety of other "professional degree" programs. Wages of economics majors are comparable to those of "hard science" majors, such as chemistry, math, and physics, and are similar also to accounting and finance majors.[7] Among the

7. One could try similar empirical exercises, focusing on wage variation within specific occupations. We notice, for example, from Table 1 that a substantial fraction of individuals in each major are "managers and administrators." To satisfy curiosity we estimated the regression that forms the basis of Table 2 (using college graduates with no advanced degrees) but for the 3,055 individuals in this occupational category. We estimate coefficients as follows: –14.60 for history (not significant), –14.15 for business administration (significant at 0.05), –21.62 for political science (not significant), –3.84 for accounting (not significant), and –0.19 for electrical engineering (not significant). Point estimates are reasonably similar to those reported for the entire sample in Table 2 because the unweighted correlation between the two sets of coefficients is 0.50.

FIGURE 1

1990 Wage Gaps Relative to Economics of Full-Time Workers Aged 25 to 55 with a Bachelor's Degree by Selected Major, 1993 NSCG



Notes: Authors' calculation, NSCG. Dependent variable is the natural log of wage in 1990. The regression nonparametrically controls for race-ethnicity (white, black, Hispanic, Asian, and Native American), age, and gender. There are 13,970 observations used in each regression. Sample weights are used for these calculations.

majors listed, only engineering majors earn substantially more than economics majors.[8]

In Table 3, we stratify our sample of bachelor's only respondents by gender in the first two columns and by broad age categories (25 to 34, 35 to 44, and 45 to 55 years) in the last three columns. To avoid the imprecision associated with small cells, we report only selected majors that have at least 100 observations. Economics is seen to be a lucrative major for both men and women.[9] Some interesting patterns emerge in the examination of age cohorts. The "penalty" (relative to the economics major) for majoring in elementary education, history, English, and foreign languages appears to have increased for the younger cohort. We notice that the "premium" earned by computer science majors is driven primarily by the relatively high wages of young workers.[10] The major finding is that the economics was a lucrative field for each cohort.

Finally, we provide some evidence about the distributions of returns across majors. For the six majors listed in Table 1, we estimated the returns using quantile regressions for each decile.[11] This allows us to examine how, say, majoring in electrical engineering relative to economics affects earnings at the 20th percentile of the wage distribution. We depict the results in Figure 1.

For business administration, political science, and history, the wage gap is relatively

8. Because we do not "clean" our wage variable (see Bollinger and Chandra [2001] for strong arguments for not "cleaning" data) and our earnings data is top coded at $999,999, we were concerned that our results might be sensitive to outliers. We reestimated our equation using median regression, however, and our results were essentially unchanged. The unweighted correlation coefficient between the ordinary least squares and median regression coefficients was 0.96.

9. The sets of coefficients for men and women are quite similar, with an unweighted correlation coefficient of 0.70.

10. Again, the sets of coefficients are reasonably stable across cohorts. The unweighted correlation coefficient between the coefficients for the under-35 and 35-to-44 cohorts is 0.80. The unweighted correlation coefficient between the 35-to-44 and the 45-to-55 cohorts is 0.54 and for the under-35 and the 45-to-55 cohorts is 0.60.

11. Our approach is similar to the approach of Heckman et al. (1997) and Black, Smith, et al. (2002) using experimental data.

TABLE 4
Propensity for Pursuing Advanced Degrees by Undergraduate College Major, Full-Time Workers Aged 35 to 55, 1993 NSCG

	Bachelor's Only	Master's	Professional Degree	Ph.D.
Science				
Biology	41.32	25.91	20.69	12.08
Chemistry	37.67	22.14	13.04	27.15
Maths	50.07	37.70	2.61	9.62
Physics	33.53	32.43	2.34	31.70
Engineering and computer science				
Chemical engineering	51.89	33.64	3.22	11.26
Civil engineering	62.83	32.23	0.74	4.20
Computer science	78.69	19.67	0.06	1.57
Electrical engineering	59.37	32.47	1.55	6.61
Mechanical engineering	63.25	29.68	1.92	5.16
Education				
Elementary	57.22	40.65	0.70	1.43
Physical	54.81	41.79	1.41	1.99
Secondary	51.15	43.88	2.62	2.36
Health				
Nursing	71.72	24.46	1.61	2.21
Business				
Accounting	80.06	16.27	2.52	1.16
Business administration	81.74	15.05	2.24	0.96
Marketing	80.65	17.63	1.15	0.57
Other professional degrees				
Social work	60.59	36.60	1.79	1.02
Social science				
Economics	***55.41***	***29.84***	***8.95***	***5.80***
History	48.85	34.59	11.52	5.04
Political science	46.10	24.40	24.68	4.82
Psychology	48.43	33.67	7.21	10.70
Sociology	59.47	32.12	4.10	4.32
Humanities				
English	47.37	38.35	7.00	7.28
Foreign languages	48.34	37.20	6.07	8.39
Philosophy & theology	39.10	40.25	9.81	10.83
Arts				
Fine arts	68.65	27.24	2.48	1.64

Source: Authors' calculation, NSCG.
Notes: There is a minimum of 700 observations for each major. Sample weights are used for these calculations.

constant across the wage distribution, roughly ranging from –20% to –10%. In contrast, there are substantial differences across wage distributions for electrical engineering and accounting. Accounting majors at the 10th percentile earn 10.7% more than economists, but at the 90th percentile accounting majors earn 11.4% less than economics majors. At the median, there is virtually no difference between the earnings of the two majors (with accounting

TABLE 5
Highest Degree Obtained for Four Undergraduate Majors (%), Individuals Aged 25 to 55, 1993 NSCG

Highest Degree	Economics	Electrical Engineering	History	Political Science
Bachelor's	**62.40**	**66.34**	**52.79**	**51.38**
Master's	**24.67**	**27.61**	**30.67**	**20.35**
Distribution of students obtaining the degree				
Own discipline	22.79	53.69	18.57	17.68
Education	6.22	0.48	49.79	19.62
Business	53.04	22.33	12.69	23.81
Public administration	3.78	0.50	3.67	16.01
Professional degree	**8.77**	**1.41**	**12.42**	**24.69**
Distribution of students obtaining the degree				
Medicine	6.32	29.18	6.93	1.14
Law	88.29	49.34	84.57	96.02
Ph.D.	**4.17**	**4.64**	**4.12**	**3.57**
Distribution of students obtaining the degree				
Own discipline	61.06	63.71	47.26	62.84
Education	4.67	1.03	21.05	13.94
Business	11.07	1.31	2.13	2.76
Public administration	0.34	0.00	0.93	3.46

Source: Authors' calculation, NSCG.

Notes: Respondents are aged 25 to 55, inclusive. Percentages in bold give the overall percentage of the given major. The indented percentages give the percentage of students study in selected field for that degree.

majors earning only 0.7% less than economics majors). The results for electrical engineering majors are more striking. At the 10th percentile of earnings, electrical engineering majors earn 40.7% more than economics majors, but at the 90th percentile of earnings, the electrical engineering majors actually earn 11.4% *less* than the economics majors. Interestingly, the median estimate (a 17.0% gap) is quite close to the ordinary least squares (OLS) gap (a 15.9% gap).[12] For both accounting and electrical engineering, the gap declines quite smoothly, but clearly this figure also presents a stunning rejection of the constant impact of college major across the wage distribution. Our exercise also illustrates the value of avoiding overly restrictive assumptions about the functional form of the regression equation.

IV. THE ECONOMICS MAJOR AS A PREPARATION FOR GRADUATE SCHOOL

Within each major, a substantial fraction of college graduates pursue advanced degrees. In Table 4 we confirm that the rate at which students attend graduate education differs substantially by undergraduate major.[13] (We restrict attention to workers who are old enough that they have likely completed their graduate education—respondents aged 35 to 55.) For example, about two-thirds of physics majors earn an advanced degree, including 32% who earn a Ph.D. As an extreme contrast, fewer than 20% of business administration majors pursue any graduate degree. Economics majors are somewhere in the middle of the pack; about 45% of economics majors pursue graduate degrees. These differences are not the result of demographic differences across majors; when we estimate a logit model

12. The same holds true for the other majors. For political science the median coefficient is 15.1%, compared to the OLS coefficient of 13.4; for history the median coefficient is 17.5%, compared to the OLS coefficient of 18.2; and for business administration the median coefficient is 10.5% compared to the OLS coefficient of 10.7.

13. When respondents have both a professional degree (e.g., a J.D. or M.D.) and a Ph.D., we assume that the Ph.D. is the more advanced degree.

TABLE 6

1990 Wages Gaps Relative to Economics by Undergraduate College Major of Full-Time Workers Aged 25 to 55 with a Master's Degree in Business, 1993 NSCG

Undergraduate Major	Wages Relative to Undergraduate Economics Major (%)	Undergraduate Major	Wages Relative to Undergraduate Economics Major (%)
Science		***Business***	
Biology	–22.35***	Accounting	–18.91***
Chemistry	–16.84**	Business administration	–19.76***
Maths	–5.37	Finance	–14.52**
Physics	–20.67***	Marketing	–17.97***
		Other business	–19.76*
Engineering and CS			
Aerospace engineering	–3.42	***Social sciences***	
Chemical engineering	8.23	***Economics***	***0.00***
Civil engineering	–10.52	History	–29.71***
Computer science	–11.83	Political science	–7.91
Electrical engineering	–1.03	Psychology	–22.61**
Industrial engineering	–10.06*	Sociology	–27.59**
Mechanical engineering	–17.31***		
		Humanities	
		English	–8.81
		Foreign languages	–31.20*

Source: Authors' calculation, NSCG.

Notes: Dependent variable is the natural log of wage in 1990. The regression nonparametrically controls for race-ethnicity (white, black, Hispanic, Asian, and Native American), age, and gender. There are 84 different major controls, but only selected ones are reported. Huber-White standard errors are used to calculate significance levels with clustering for each cell. There are 4,012 observations used in the regression. Each reported major has at least 30 observations. Sample weights are used for these calculations.

*Indicates significance at 0.10 level.

**Indicates significance at 0.05 level.

***Indicates significance at 0.01 level.

controlling for age, race-ethnicity, and gender, these general patterns persist.

Table 5 provides a more detailed breakdown of the highest degree earned by undergraduate economics majors and by students in three comparison majors: electrical engineering, history, and political science. Among electrical engineering majors, those who pursue graduate study are most likely to stay in their own discipline, with a modest number also entering MBA programs. The social science majors, in contrast, are quite likely to enter graduate programs in disciplines that differ from their undergraduate major, especially education (for history majors), business, and law. The fraction of political science majors who enter law is particularly striking.

How does the undergraduate major affect earnings after graduate school? Tables 6 and 7 allow an evaluation of a claim often heard in economic advisors' offices—that economics is good preparation for a subsequent MBA or J.D. degree. The NSCG data contain 4,012 respondents who have a master's degree in a business discipline. In Table 6, we report the results from estimating our wage regression using a sample of workers who have a master's degree in a business discipline but conditioning on undergraduate majors. We estimate coefficients for 84 different undergraduate majors (no audio-speech therapy major in the sample received an MBA), but report results only for majors in which there are at least 30 individuals. The relative success of economics majors among this group is clear. Among undergraduates who pursue MBAs, economics majors rank second in terms of wages out of the 23 most common prebusiness majors. Economics

TABLE 7
1990 Wages Gaps Relative to Economics by Undergraduate College Major of Full-Time Workers Aged 25 to 55 with a Law Degree, 1993 NSCG

Undergraduate Major	Wages Relative to Undergraduate Economics Major (%)
Other professional degrees	
Criminology	–20.33*
Business	
Accounting	–9.40
Business administration	–23.89**
Finance	–8.76
Social sciences	
Economics	***0.00***
History	–16.23**
Political science	–14.77**
Psychology	–17.05
Sociology	–35.53***
Humanities	
English	–16.89**
Foreign language	–2.26
Philosophy & theology	–30.13**

Source: Authors' calculation, NSCG.

Notes: Dependent variable is the natural log of wage in 1990. The regression nonparametrically controls for race-ethnicity (white, black, Hispanic, Asian, and Native American), age, and gender. There are 78 different major controls, but only those with 30 or more observations are reported. Huber-White standard errors are used to calculate significance levels with clustering for each cell. There are 2,152 observations used in the regression. Sample weights are used for these calculations.

*Indicates significance at 0.10 level.

**Indicates significance at 0.05 level.

***Indicates significance at 0.01 level.

majors trail only chemical engineering majors. Other majors earn less, though the differences in many cases are not statistically significant.

Table 7 provides results for an analogous exercise among individuals who attend law school. Although we consider all 78 majors for which someone attends law school, we report only those majors that have at least 30 people in our sample receiving law degrees. We find that among the law school graduates previously receiving one of the 12 most common prelaw majors, economics majors have the highest wages.

V. CONCLUDING REMARKS

Readers who look at our tables will no doubt form a variety of hypotheses of their own for explaining the observed wage differentials. There are likely at least three elements at work.

The first factor concerns the value added of the degree programs themselves. In a good undergraduate economics program, students develop an ability to think critically: They gain broadly applicable analytic and quantitative skills that improve decision making in a wide range of tasks. In short, it may be that economics majors are better trained than many other majors in skills that have high returns in the marketplace.

A second factor is compensating differentials. Many artists and musicians cannot imagine spending their life doing anything other than pursuing their art, and the relevant marginal student (say, a student choosing between studying economics or music performance with the bassoon) may be willing to "pay" for the privilege of following her passion in the form of lower lifetime earnings. Because college major and occupation are correlated, these compensating differentials will appear in the form of varying returns to college major.

Finally, there is certainly a considerable amount of self-selection across majors in terms of innate ability—intelligence, talent, ambition, and drive. The large difference in wages between, say, undergraduate physics majors and most undergraduate social science majors might stem in large measure from the fact that students who tackle the traditionally challenging physics major are generally among the smartest and most intellectually ambitious students. To the extent that such sorting does occur, college major may serve as a useful signal to employers, even in cases in which the skills acquired in the undergraduate program are largely irrelevant to the job for which an individual is being considered. Such signaling would only serve to reinforce the tendency of talented students to select challenging majors.

There are patterns that seem explicable only by such selection. The low rate of return of business majors who pursue MBAs (relative to economics majors who also earn MBAs) is difficult to explain unless there is substantial selection into undergraduate business majors. Similarly, the low rates of return to an undergraduate science major are difficult to understand unless one looks at the rate at which these students pursue advanced degrees.

Selection is probably not the whole story, however. For example, on average, physics and math majors are probably at least as smart and hard working as engineering students. Indeed, among high school seniors in 2001, Scholastic Aptitude Test scores (math/verbal) are *higher* among those intending to major in mathematics (625/549) and physical sciences (588/568) than among those planning to major in engineering (572/523).[14] The relatively high wages of engineering majors likely stem from the highly valued skills that these students acquire in their degree programs. This brings us back to the first of our explanations about the value of majors—that the measured differentials reflect in part real differences in the market returns to the field of study. If so, our article provides evidence that there is indeed a substantial economic reward to studying economics.

14. See the College Board, www.collegeboard.org/sat/cbsenior/yr2001/pdf/NATL.pdf, accessed on 30 December 2001. The College Board provides only very rough major grouping (e.g., it aggregates all social sciences). It is interesting to note that the total SAT score (M + V) among seniors planning to enter the most poorly compensated major, philosophy/religion/theology (539/561), is slightly higher than for those planning to enter the best compensated major, Engineering (572/523).

APPENDIX TABLE A1
Counts of Undergraduate College Majors, Full-time Workers Aged 25 to 55, 1993 National Survey of College Graduates

Major	Count	Major	Count
Physics	1,157	Nursing	1,496
Chemistry	2,236	Pharmacy	413
Geology	703	Physical therapy	249
Earth sciences	358	Other health	505
Biochemistry & biophysics	340	Agricultural business	324
General biology	2,999	Animal science	272
Botany & plant science	318	Other agricultural science	167
Micro- & molecular biology	428	Agricultural architecture & environmental	787
Nutrition	248		
Zoology	476	Accounting	3,357
Other biology	469	Business administration	6,181
Applied math	400	Marketing	1,674
Math	1,935	Finance	912
Statistics & other math	308	Other business	861
Aerospace engineering	577	Criminology	759
Architecture	243	Journalism	630
Civil engineering	2,414	Communication	1,084
Chemical engineering	1,455	Public administration	256
Electrical engineering	4,174	Social work	1,032
Science engineering	263	Home economics	685
General engineering	211	Leisure	419
Industrial engineering	569	Conservation	640
Mechanical engineering	3,112	Anthropology	290
Mineral & materials engineering	328	**Economics**	1,789
Other engineering	580	English	2,474
Electrical technology	642	Ethnic studies	137
Industrial technology	381	Foreign languages	1,073
Mechanical technology	434	Geography	266
Other technology	268	History	2,036
Computer science	2,840	Liberal arts	794
Other computer science	348	Philosophy	948
Education—administration	208	Political science	1,930
Education—science	559	Prelaw	195
Education—elementary	3,709	Clinical psychology	421
Education—physical	1,193	General psychology	2,212
Education—secondary	1,399	Other psychology	794
Education—special	525	Sociology	1,942
Education—social science	275	Other social sciences	556
Education—other	1,889	Drama	266
Audio-speech therapy	249	Fine arts	1,066
Premedicine	547	Music	688
Premedicine	547	Other arts	331
Medicine	220	Other	515

Source: Authors' calculation, 1993 NSCG.
Note: Sample weights are not used for these calculations.

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