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**DO COLLEGES SHORTCHANGE WOMEN? COMPARING GENDER
DIFFERENCES IN THE TRANSITION FROM COLLEGE TO WORK**

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Abstract

Do women get the same out of a college education as men? Data from the National Center for Education Statistics 1993/1994 Baccalaureate and Beyond Surveys suggest that the answer is no. Even though women make-up the majority of college graduates and increasingly choose majors in the sciences and mathematics, women continue to earn less than men in first-jobs out of college. Regression results show that controlling for educational quality, experience, occupation, and industry that women earn an average 14% less than men in first-jobs. Moreover, compared with male college graduates, female college graduates in all majors are segmented into jobs that require less education, provide fewer opportunities for advancement and are less liked by college graduates. The data suggest that women are more likely than men to receive job offers for lower paying and lower quality jobs.

Introduction

According to the Census Bureau, women are for the first time graduating college at higher rates than men in the U.S. In 1997, 29% of women ages 25 to 29 had completed college compared to 26% of men in the same age group (U.S. Census Bureau 1998). In addition, in the past 20 years, women's representation in the sciences, engineering, and mathematics has increased in record numbers. For example, in 1975, women comprised 1/4 of all undergraduate natural science graduates and only 2% of the undergraduate engineering graduates. By 1995, women's representation in the natural sciences had grown to 47% of all undergraduate degree recipients and 17% of the undergraduate engineering recipients (Science and Engineering Indicators, 1998).

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In this paper, I explore what effects, if any this gender integration in higher education has on gender differences in the labor market. In particular, I examine occupational segregation and gender differences in wages from a new angle, the point of transition between post-secondary education and the labor market or graduate education. A key question is whether a college education works the same for men and women: 1) Do women and men choose different majors and how does this translate into occupational, wage and graduate school differences? 2) Are there significant post-college labor market or graduate school differences for men and women and what are the determinants of these differences? And 3) How does job satisfaction vary by gender? By analyzing gender differences in the transformation of human capital into wages and occupations, we can better understand the effects and dynamics of occupational segregation.

For this analysis, I use data from the U.S. National Center for Education and Statistics Baccalaureate and Beyond Longitudinal Study 93/94 (B&B). The B&B tracks the experiences of a cohort of students who graduated college in 1993 and entered the labor force or graduate/professional school in 1994. The data include information on 10,686 students and their parents and the 648 institutions from which students graduated. Variables relevant to this study include college major and transcripts, students' job search strategies and reasons for choosing first jobs, help given to students to find jobs, and jobs and salaries, if any, obtained after graduation. The survey further queries students' satisfaction with their jobs and salaries and future career expectations. Using this data, I hope to shed new light on questions of gender differences in education, wages, occupations, and opportunities.

While significant amount of prior research has examined gender differences in college majors, few studies have examined the effects of college majors on gender differences in wages. A notable exception to this is the work of Brown and Corcoran (1997) who find that differences in major account for a significant part of the wage gap. Their results show that gender differences in majors accounts for about 20% of the total male-female wage gap which is much higher than the within-major wage gap. In contrast to Brown and Corcoran's study, I examine the effect of majors on gender differences in first-jobs. This will allow us to measure the wage effect of college major free from the confounding influences of gender differences in experiences, job changes, and promotions.

Male-Female Differences in Higher Education

A. Major

Several studies of gender differences in college majors have shown that the distribution of men and women among college majors has become more integrated in the past 30 years (Jacobs 1986, Wilson and Boldizar 1990). Turner and Bown (1999) however find that this integration slowed between 1976 and 1989 mainly due to gender differences in preferences versus pre-college qualifications. Additional determinants of gender differences in majors include the effects of fertility (Blakemore and Low 1983), math achievement level and income potential (Wilson and Boldizar 1990) and women's colleges (Stoecker and Pascarella 1991, Solnick 1995). Other studies suggest that women avoid the sciences and mathematics because of inferior prior preparation, lack of innate ability, and biases against women in male dominated subjects (Hanson 1996). With the

increasing importance of technology to our economy, the concern is that women will not be sufficiently trained for success in the changing labor market. It is suggested that occupational segregation in majors underlies labor market segregation and wage differences between men and women.

A key observation in the B&B data is that while majors are segmented by gender, we do not find a clear pattern of male dominance in the sciences and math and women's dominance in the humanities (see Table 1). Almost 50% of women graduated in a major with over 2/3 women. If we define gender segmentation as a major with more than either 2/3 men or women, then in our sample out of 29 major groups, women dominate 10, men dominate 1 while 18 remain gender neutral. However, the gender segregation among majors is more intense than the gender segmentation in the labor market. Recent estimates by Anker (1998) show that 55% of the U.S. labor force works in a gender segmented job. In our sample, 60.2% of the respondents graduated from a major that was gender segregated.

Despite these gender differences in major, women do not seem to shy away from the sciences or math. A considerable 47.4% of women graduated with gender neutral majors and men are more likely to be in the female-dominated and gender neutral majors than the one male-dominated major of engineering. All of the sciences including biology, computer, and physical sciences and math are gender neutral. While women outpace men in education health and languages, the majors of English, history, and religion are gender neutral. 7 out of the 10 top majors for men and women are the same. These majors include business, education, communication, political science, health, agriculture, and art. Also, 8 of the 10 least popular male and female majors are the same. While substantial, the data show that the gender sorting among majors is not absolute, exhibits considerable male-female overlap, and does not conform to the presumed pattern of male dominance in the sciences or math.

B. Courses, Grades, and Credit

Gender differences in performance and preparation are a common explanation for gender differences in wages and occupations. While researchers rarely have this information along with labor market data, these unobserved (to the researcher) quality differences are used to explain men's greater wages and promotions. Fortunately, the B&B data provide some information on performance and qualifications. Data on course grades and course credits can be used to assess gender differences in qualifications. We can use this information to assess whether gender differences, if any, in qualifications accounts for gender differences in wages and occupations.

Table 2 shows the grades men and women received in various subjects by major. For simplicity in this analysis, I collapse the 29 majors into the five categories of business/law, helpers, humanities, science, and social science.¹ While on the whole, men and women earn very similar

¹ Business/law includes business, law and communication. Helpers include education, health, social work, and police. Science includes computer, engineer, biology, math, and physical science. Social science includes ethnic, women, anthropology, economics, geography, history, sociology, and political science.

grades in all subjects, there are some striking differences.² The largest number of grade differences occurs for business/law and the helper majors. In the business/law categories, women earn higher grades than men in the humanities, education, math, advanced math, and languages. In the helpers majors women earn higher grades than men in humanities, business, education, math, advanced math, computer, and languages. In addition, women are more likely than men to earn a GPA greater than 3.25 in all subjects (see Table 3). In summary, the data on grades shows that women are equally qualified, if not better, than men at performing at science, math as well as business, humanities, education, and languages.

Regardless of major, men are more likely than women to take science, math, computer, and statistics courses and women are more likely than men to take humanities, education, and languages courses (results not shown). Credits in the social sciences and business are more mixed. Since these gender differences in credits occur across all majors, for instance female science majors take less science and math than the male science majors, the data suggest that gender differences in preferences play a significant role in course selection. Female science majors are evidently able to perform well in these subjects but for some reason choose fewer courses than men in these subjects. The same holds true for men majoring in the humanities.

C. Graduate School

Before exploring gender differences in occupations and wages, we should note that for all majors except the social sciences men are more likely than women to apply to graduate school. Controlling for major, grades, credits, financial aid, and family income, logistic regression results show that men are more likely than women to apply to graduate school (see Table 4). This illustrates what has been coined the “leaky pipe” problem in the sciences where more women than men drop out of the sciences at each stage of education and career development (Sonnert 1995). Within major estimates of the probability of applying to graduate school show that men science, business and law, and education and health majors are more likely than women to apply to graduate school. For the social sciences and humanities majors, however, no gender difference in the probability of applying to graduate school is found.

It is interesting to explore the reasons why men and women do not apply to graduate school. While the top three reasons for both men and women is the same, significantly more women than men (9.2% vs 5.5%) claim they did not apply to graduate school for financial reasons. More so than men, women also claimed that family responsibilities kept them from applying. This suggests that women may not receive as much financial and familial support for undergraduate and graduate school as men. It also may mean that women either accurately or not expect lower post-graduate returns to education than men. The personal costs of attending school could be the same for men and women but if women expect lower returns, graduate school will seem like a less worthwhile investment.

² I assume that only grade differences greater than .2 are significant. While the weighted grade difference of .1 is statistically significant – given the large number of students in the sample – this is so small that it seems in practice to be irrelevant.

Gender Differences in First Jobs

Compared to female-dominated majors, there are far fewer female-dominated first jobs. As is the convention (see Anker 1998), if we define female-dominated occupations as having more than 2/3 women, we find that women dominate only the medical and teaching occupations (see Table 5). However, a greater number of jobs are male-dominated compared to male-dominated majors. Out of the 19 occupations, men dominate 7. The smallest share of women is found in police work while the smallest share of men is in the professional medical category. While 49% of women majored in a female-dominated major, only 23% of women work if first jobs with more than 2/3 women. 72% of both men and women work in gender neutral first jobs.

Despite the relatively high gender integration of first jobs, significant differences in jobs and job quality persist. It is interesting to note, for example, that with the exception of teaching, women are more likely to enter clerical work than any other occupation regardless of major. While the top 5 occupations by major for men and women are mostly the same, women are much more likely to end up in clerical work and men in management. Female science and business majors, for example, are twice as likely as male science and business majors to enter clerical work. Multinomial logit regression results corroborate this finding and show that even with controls for qualifications, experience, major, job qualities, and job search strategies, that men are more likely than women to enter the sales and technical fields while women outpace men in clerical and teaching jobs. The male advantage in obtaining a managerial position, however, is reduced to zero with the introduction of majors, jobs qualities, grades, total credits, and parents help with finding a job (see Table 6).

On a variety of measures, the first-jobs that women obtain are of lower quality than the first-jobs men obtain. For example, not only are clerical jobs among the lowest paid first jobs, they are also among the least favored. While average full-time female salary is \$22,415, female clerical workers earn only \$17,172 per full-time year. Clerical workers more than other workers want to change careers. Other differences in job qualities are that men business and science majors more than women obtain jobs that require a degree and, for all majors, men have jobs with more self-reported career potential. Men are also more likely than women to obtain full-time work.

When we look at the reasons why men and women choose their particular first job, we find that for most occupations for women more than men it is their only job offer. Women in clerical, service, and professional other jobs were more likely than men to choose these jobs because they offered the best pay. For manager, technical computer and sales, however, men were more likely than women to choose the job for best pay. Since both clerical and service work is low paying, the data suggest that women more than men receive other pay offers which are low. Controlling for interviews, women are more likely than men to be offered only clerical and service work. Respondents in these jobs are also the most likely to desire a long-term career change.

Multiple regression analysis further shows that regardless of major or occupation that men earn more than women in first-jobs. When categories of variables for student's qualifications, major, family background, job qualities, job sector, industry, and occupation are separately added to the regression of the log of full-time salary, the coefficient on the male variable remains significant and positive at around 14% (see Table 7).

Discussion of Results

Do gender difference in majors and qualifications account for gender differences in labor market outcomes? For the overwhelming majority of men and women, the B&B data suggest that the answer is no. Within the majority of majors and occupations, men earn more than women in first jobs. The exception to this is for science and humanities majors where men do not obtain a wage advantage over women. However, even within the sciences, women are more than twice as likely as men to end up in clerical first jobs which are considered by students to be the least satisfactory jobs. Within the occupations of clerical, manager, teaching, and sales, men gain a wage advantage while in the technical computer and service occupations they do not. In management, it appears that gender differences in job qualities explains the male-salary advantage.

Do colleges shortchange women? Overall, the evidence suggests that men obtain more from a college degree, in terms of wages, job satisfaction, and job quality than similarly qualified women. It is significant that for most women, their first job out of college was also their only job offer. The only occupations where women have higher job offers to interview ratios is for clerical and service work. These are two of the lowest paying occupations. For all majors except education and health, the top occupation for women is clerical. Men apparently have more and better selection for first jobs and this contributes to their higher pay and quality. If women had a wider range of offers, they may end up in better jobs and/or higher paying jobs.

The data suggest that gender integration of college majors and experiences alone do not remedy occupational and wage differences of first jobs. What, then, explains women's inability to obtain first job equality with men? Economic theory puts forth the dual theories of gender differences in either preferences or opportunities or some combination of both.³ Women either make inferior economic choices for family or preference reasons or they face some form of labor market discrimination. In either case, it seems as if colleges could play a role in alleviating the unequal outcomes that women face.

Most colleges, for example, provide career counseling and advice to students. Job search, interviewing, and negotiating workshops geared to women, may help them find more and better jobs. Importantly, women could be encouraged to apply for jobs that suit their qualifications and interests. While these steps that colleges could take would not address the demand-side discrimination that may depress women's wages and opportunities relative to men's, it may give women the skills and information to combat some of the barriers to labor market advancement that they face. Without this support, women will continue to be shortchanged by the college education that they receive.

³ However, since Astin (1993) notes that, "Of the freshmen entering college in the fall of 1991, 79% say that getting a better job is a very important reason for their decision to go to college. Fully 75% also say that to make more money is a very important reason," it seems unlikely that women would choose lower paying lower opportunity jobs.

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ANNEX I

Table 4

Logistic Regression: Ever Applied to Graduate School

Variables ¹	Coefficients	Standard Error
Male	.20	.05
Black	.77	.09
Age	-.01	.004
Majors		
Science	.70	.08
Bus/Law	-.31	.10
Social Science	.31	.08
Helpers ²	.18	.08
Humanities	-.31	.10
GPA	.01	.0006
Loans	.0001	.000005
Percent Poverty ³	.0004	.0001

¹ Also included but not shown variables for total credits by subject. Data from the Baccalaureate and Beyond 1993-94 Surveys.

² Includes all education and health related majors.

³ Percent Poverty of family income.

Table 6
Multinomial Logit Regression of Occupation: Coefficients on Male Variable

Model ¹	Coefficients on Male Variable					
	ClericalManager	Sales	TeacherService	Technical		
Black	-.42 ²	.12	.41	.98	-.28	.66
Major	-.48	ns	.35	-.53	-.27	.52
Job Qualities ³	-.38	ns	.47	-.99	ns	.67
Full-time	-.41	ns	.44	-.95	-.30	.66
Choice ⁴ -.	.56	ns	.38	-1.0	-.27	.68
Job Search ⁴	-.58	.12	.43	-1.0	-.31	.68
Total Credits By Course ⁵	-.60	ns	.44	ns	-.29	.20
Grades ⁶ -	.47	ns	.31	-1.0	-.36	.70
Parents Help With Job Search ⁶	-.53	ns	ns	-1	ns	.86

¹ Categories of independent variables added separately to assess effect on estimated male coefficient. Every regression has controls for student race. Omitted occupation is professional other category. Data from the Baccalaureate and Beyond 1993-94 Surveys.

² Coefficients significant at the 95% level unless noted by ns (not significant).

³ Includes dummy variable for other similar job offers, and dummy variable for whether primary job requires a college degree.

⁴ Dummy variables for reason student choose job. Regression run as separate logits since multinomial logit did not converge.

⁴ Includes jobs search strategies taken by graduates. Regressions run as separate logits.

⁵ Regressions run as separate logits.

Table 7**Gender Differences in First-Job Salaries: Estimated Coefficient on the Male Variable**

Model ⁶	Coefficient on Male Variable	t-score	Adjusted R ²	n
Black, Age	.149	12.3	.102	5964
GPA, Majors, SAT quartile	.13	10.5	.110	5959
College Type ⁷	.146	11.8	.106	5960
Parents Education	.175	8.0	.033	2102
Loans, Tuition, % Poverty Level	.151	12.2	.11	5961
Training, Hours per week, Job Qualities ⁸	.138	7.35	.27	2148
Job Search Strategies	.147	12	.113	5950
Job Benefits	.162	14	.305	5273
Job Satisfaction	.144	12	.231	5732
Course credits By Subject	.085	6.7	.155	5835
Job Sector	.134	10.6	.110	5904
Job Industry	.131	10.6	.149	5922
Occupation ⁹	.093	7.7	.18	5933

⁶ Dependent variable is natural log of salary between \$1,000 and \$100,000. Regression carried out on only full-time workers and weighted by the probability of being in sample. Categories of independent variables added separately to assess effect on estimated male coefficient. Data from the Baccalaureate and Beyond 1993-94 Surveys.

⁷ Includes public 4 year, public doctoral, not-for-profit 4 year, and not-for-profit doctoral

⁸ Work experience related to degree, number of training courses, average hours per week, other similar job offers, job requires college degree, career potential of job.

⁹ Selected occupations include dummy variables for clerical manager, sales, teaching, service, technical computer, technical non-computers.

ANNEX II

Table 1
Share of Men and Women in Female, Male and Neutral Majors, Weighted

(1) Female Majors*	(2) Share of Men, %	(3) Share of Women, %	(4) Female Share, %
Women	0	0.1	100
soc. Work	0.3	1.9	90
Agriculture	3	9	80
Education	6	18	80
Health	3.3	10	80
No. Major	1	0.2	76
Psychology	2	5	75
Anthropology	0.3	0.6	72
Languages	0.5	1	72
Sociology	1.7	3.4	72
total	17.2	49.2	
Neutral Majors			
English	2	3	66
Art	3	4	64
Ethnic	0.4	0.5	62
Law	0.4	0.5	62
Communication	5	6	61
Math	1.6	1.6	57
Public Admin.	0.3	0.3	57
Biology	5	4	51
Prof. Science	4.6	3.4	49
Business	23	16	48
Industrial Arts	2.4	1.6	48
History	0.9	1.3	41
Religion	3	0.5	41
Computer	3.3	1.5	39
Economics	0.4	1.2	39
Geography	2	0.2	38
Police	2.3	0.9	37
Phys.Science		0.9	34
total	61.9	47.4	
Male Majors			
Engineer	11	0.02	19
N	4375		

*Majors considered female dominated if more than 2/3 female.

Source: National Center for Education Statistics, Baccalaureate and Beyond, First Longitudinal Study Follow-Up, 1993/94

Table 2
Male and Female Grades by Subject and Major, Weighted

(1) Subject	(2)* Buss/Law		(3) Helpers		(4) Humanities		
	Male	Female	Male	Female	Male	Female	
Humanities	2.93	3.25	2.87	3.11	2.95	3.2	
Social Science	2.83	2.93	2.8	2.99	2.81	2.99	
Science	2.71	2.8	2.66	2.71	2.62	2.71	
Business	2.92	3.04	2.64	2.93	2.69	2.84	
Education	3.39	4.43	2.83	3.48	3.38	3.44	
Math	2.55	2.87	2.37	2.66	2.35	2.55	
Adv. Math	2.59	2.8	2.47	2.75	2.37	2.54	
Computer	3	3.15	2.87	3.14	2.97	3	
Statistics	2.75	2.92	2.89	2.92	2.5	2.7	
Languages	2.91	3.18	2.77	3.14	2.9	3.12	
	Average	2.858	3.137	2.717	2.983	2.754	2.909
		(5) Science		(6) Social Science			
		Male	Female	Male	Female		
Humanities		3.19	3.27	2.87	3.07		
Social Science		3.12	3.1	3.07	2.97		
Science		2.29	2.86	2.61	2.66		
Business		2.96	2.98	2.71	2.84		
Education		3.47	3.43	3.26	3.38		
Math		2.89	2.76	2.54	2.49		
Adv. Math		2.79	2.8	2.48	2.67		
Computer		3.03	3.15	2.93	2.84		
Statistics		2.95	2.97	2.69	2.8		
Languages		3.03	2.24	2.78	3.09		
	Average	2.972	2.956	2.794	2.881		

* Majors clustered as follows: Buss/law = Business, Law, Communications

Helpers = Education, Health, Social Work, Police

Humanities = English, Languages, Art

Science = Computer, Engineer, Biology, Math, Physical Science

Social Science = Ethnic, Women, Anthro, Econ, Geog, Hist, Soc, Polsci

Bold shows grade difference greater than .2

Source: National Center for Education Statistics, 1993/94 Baccalaureate and Beyond Survey

First Follow-Up

Table 3**Share of Men and Women with GPA greater than 3.25, by subject, Weighted**

(1) Subject	(2) Male, %	(3) Female, %	(4) Difference, (3) - (2)
Humanities	33.3	45.5	12.2
Social Science	31.3	37.4	6.1
Science	26.6	27.6	1
Business	31.2	39	7.8
Education	60.2	69.4	9.2
College math	25.2	30.4	5.2
Advanced math	26.5	31.6	5.1
Computer Science	39.4	44.9	5.5
Statistics	30.9	36.1	5.2
Languages	38.1	49.8	11.7

Source: National Center for Education Statistics, 1993/94 Baccalaureate and Beyond Survey First Follow-Up

Table 5
Share of Men and Women in Female Dominated, Male Dominated and Gender Neutral

Occupations, Weighted

(1) Occupation	(2) Share Male, %	(3) Share Female, %	(4) Female Share of Occupation, %
Female Occupations*			
Prof. Medical	2	8	83
Teach	6	15	75
Sum	8	23	
Neutral Occupations			
Clerical	14	23	66
Service	5	6	61
Prof. Legal	0.08	0.1	57
Prof. Art	4	4	55
Prof. Other	10	10	52
Tech. Noncomputer	3	2.8	49
Manager	21	18	47
Sales	9	6	38
Skilled Operative	1	1	34
Tech. Computer	5	2	32
Sum	72	72.4	
Male Occupations			
Militia	1	0.2	18
Prof. Physician	0.07	0.03	16
Police	2	0.5	16
Farmer	2	0.4	14
Laborer	3	0.4	14
Prof. Engineer	8	1	13
Owner	1	0.1	10
Sum	17	3	
N	2368	2935	

*Female occupations have 2/3 or more women. Male occupations have 1/3 or less women.

Source: National Center for Education Statistics, Baccalaureate and Beyond Longitudinal Survey, First Follow-Up, 1993/94