PEER AND SOCIAL NETWORKS IN JOB SEARCH

David Marmaros
Dartmouth College

Bruce Sacerdote
Dartmouth College and NBER
bruce.sacerdote@dartmouth.edu

August 1, 2001

Abstract

We examine how Dartmouth College seniors use social networks to obtain their first jobs. Social networks utilized differ for men and women and for white and non-white students. Networking differs greatly across different types of careers. Those students networking with fraternity and sorority members and alumni are also the most likely to obtain high paying and prestigious jobs. There is also a strong connection between own employment outcomes and outcomes for randomly assigned freshmen hallmates.

I. Introduction

The simplest models of career choice assume that people choose a career from a large set of options using full information and simple models of job search assume that workers search for a job until some reservation wage is met. In reality, it seems likely that people use social networks of friends, peers, parents, and teachers to obtain career advice and information on jobs. This paper uses data from a survey of Dartmouth College seniors to examine careers chosen, jobs obtained, starting salaries and how these outcomes correlate with the various forms of networking that were used in the job search process.

The results are largely descriptive rather than causal and the data are all self reported by the students. For this group of college students, networking is perceived to be quite important in finding a job. Furthermore, the type of networking differs by job type, by gender, and by race. One of the most robust results is that students obtaining high paying jobs are likely to have solicited help and advice from current and alumni members of their fraternity or sorority. This is an interesting finding given that many lawsuits against single sex organizations focus on the notion that social clubs provide economic benefits for their members.[1]

If networking is important to the job search process, and if selective private universities provide better networking opportunities than competing schools, then the private schools might be able to charge a large price premium. The value of networking may also explain students' willingness to incur the cost of attending highly selective MBA programs. This hypothesis contrasts somewhat with Dale and Krueger [1998] who

find that the return to attending a highly selective school is the same as the return to attending a less selective school.

Recent research has supported the existence of peer effects among college roommates as in Sacerdote [2001], Zimmerman [2001], Kremer and Levy [1999], and Stinebrickner and Stinebrickner [2001] and among elementary school students as in Hoxby [2000]. More broadly, there is a rich and growing literature that finds evidence for peer effects among elementary school students as in Hoxby [2000], and junior high and high school students as in Gaviria and Raphael [2001], and Evans, Oates and Schwab [1992].[2] This paper extends the literature by focusing on employment outcomes for graduating seniors and using survey data to examine student's own perceptions of the importance of peer influences.

The peer effects measured in this paper cannot be interpreted as causal due to the identification problems discussed in Manski [1993]. Specifically, the selection issues may be quite severe. For example, we find that students who receive job help and advice from other fraternity (sorority) members are much more likely to enter the high paying fields of investment banking and financial sales and trading. It is likely that such correlation does not come purely from the treatment effect of fraternity help on career choice. Students who join fraternities (sororities) may be inherently more outgoing and socially able people. The prevalence of high paying jobs among such students may be a return to a skill or the result of underlying preferences which drive certain students both to join fraternities and to search for high paying jobs.

---

[1] For example, the successful lawsuits brought against single sex eating clubs at Princeton were based in part upon the economic benefits of club membership.

[2] These authors consider a wide range of outcomes including test scores, grades, smoking, and teenage pregnancy. This short list of school related peer effects papers is in no way exhaustive.

The rest of the paper is organized as follows: Section II presents a description of the data. Section III presents results and Section IV concludes.

II. Data Description

The data come from a survey of Dartmouth's class of 2001. The entire class was surveyed via email in April of 2001 which was the spring of senior year for these students. The email sent to the students included a cover letter that explained the nature of the survey and offered students a free Hersey Bar (sent via campus mail) in exchange for filling out the survey. The email directed the students to our survey web page. Respondents logged in to the web page and answered the short series of questions using the radio buttons, check boxes and drop down menus provided. The survey required only five to ten minutes to complete.

590 out of 1056 students responded. We do not have exact calculations of non-response bias, but we do not believe that the problem is severe. In Marmaros [2001] we compare the means in our data for college majors and various careers to the same means for the full sample for the class of 2000 as collected by Dartmouth's Career Services.[3] Few differences are statistically significant. In our sample, 49 percent of respondents are male, 55 percent are members of fraternities or sororities, and the mean reported GPA is 3.38.[4] Thirty three percent of students held a leadership position in either student government, a fraternity/sorority, an athletic team or another campus organization.

The first employment related questions asked whether the student would be working, not working, attending school upon graduation, or is undecided. 53 percent of

[3] For graduating seniors, Career Services collects basic background information on college major and intended career. They do not ask about social networks in job search.

the class plans on working next year and 18 percent plan on attending graduate school.[5] The next series of questions determined field or career. 10.5% of students plan on entering one of various jobs within finance including investment banking, sales and trading, and money management. Another 10% of students planned on entering management or technical consulting and 4% intended to become software engineers. Based on reported starting salaries, we label finance, consulting, and software engineering as "prestigious" jobs and create a dummy variable to indicate whether or not a student plans on taking such a job. In addition to being standouts in terms of salary, these prestige jobs are also the ones receiving the most applicants per job during on campus recruiting.[6]

Thirty five percent *of the full sample* have job offers at the time of the survey (April) implying that 66 percent *of those who intend to work* had offers. The mean starting salary is $40,177. If we exclude the lowest 10 percent of salaries (which includes some research assistants and volunteer workers at non-profit organizations), the mean starting salary is $43,855.

The final section of the survey asked students where they obtained advice and assistance in careers. For this paper we focus on answers to the following question: "Who was/is influential in helping you find a full time job or career? Check all that apply."[7] Possible responses to these questions include: Career services, a member or

---

[4] The Registrar reports that the mean GPA for the entire class is also 3.38.

[5] In the interest of space, we report the unconditional means in the text but not in a table. Means conditional on gender are contained in Table III.

[6] Our prestige category does not include students who are entering law school and medical school, though such degrees often lead to high paying jobs. Our main results in the next section are robust to limiting the sample to only those students who are actually working next year, or to switching the prestige dummy to include the law and medical students.

[7] In hindsight, we wish that we had tried to separate out which social networks were important for *deciding on a career* versus which social networks actually led to job.

alumnus of one's fraternity or sorority, other Dartmouth alumni, a roommate, a parent, a relative, a Dartmouth professor, a contact from a previous job/internship, a pre-Dartmouth friend, help from another source, or no help.

We find that 30 percent of students obtained help from career services, 11 percent from professors, 19 percent from a parent, and 6 percent from a relative. Additionally, 12 percent of people obtained help from a Dartmouth Alumnus outside of their fraternity or sorority and 7 percent of people obtained help from an alumnus or current member of their fraternity or sorority. Only 3 percent of people report being helped by a roommate. When we limit the sample to students who plan to be working next year, 47 percent of the students used help from Career Services, 16 percent used help from professors, and 13 percent used help from fraternity or sorority members or alumni.

III. Results

Table I shows the mean of the dummy for prestigious (high pay) job by the type of networking used. For example, among students who did not rely on help from fraternity and sorority members and alumni, 22 percent accepted or plan on accepting a prestige job. In contrast, 63 percent of students who did use fraternity or sorority help plan on entering a prestige job.[8] The t-stat for this difference in means is 5.89. The association with use of the Career Services office and "prestige job" is equally strong. Forty four percent of students using Career Services take prestige jobs versus 16 percent among those not using Career Services.

Obtaining help from a Dartmouth professor has the opposite relationship with prestige job. Twenty six percent of those who did not rely on a faculty member take

prestige jobs versus 17 percent for those who do. Clearly none of these differences can be interpreted in a causal manner. We view it as unlikely that use of frat help actually causes a 41 percent increase in the chance of obtaining a prestige job. Clearly people select into different methods of networking depending on their preferences for obtaining a prestige job. But the relationship between job type and networking type is quite striking, and it is certainly plausible that some portion of the relationship is causal.

We provide further descriptive statistics in Table II where we look at the mean of "frat help" (obtaining help from a sorority or fraternity member or alumnus), "relative help", and "professor help" by specific job type. The means confirm the fact that different networking strategies are used for different types of job search. Thirty four percent of students entering education or teaching rely on help from a professor versus 8 percent for students entering finance. Students entering finance rely heavily on frat help and help from relatives. In deciding upon careers, law and medical students make little use of professor help or frat help, but are likely to rely on relatives.

Table II also shows that networking strategies differ by gender and race. Men are more than twice as likely than women to use frat help. The difference in mean use of frat help has a t-statistic of 2.5. Nonwhite students are less likely than white students to use frat help, and much less likely to use help from relatives (1 percent for non-whites versus 6 percent for whites). (The non-white group includes black, hispanic and native american students.) The frat help result is easily understood given that a much lower percentage of non-white students are in fraternities. The failure to use help from relatives might indicate that the nonwhite students have fewer relatives who are in a position to help. Surprisingly, non-white students are also much less likely to use help from professors.

[8] The mean of the prestige dummy for the whole sample is .25 with a standard deviation of .43.

This might indicate that non-white students are less likely to have a comfortable working relationship with faculty outside of the classroom.

Table III shows the means of some additional variables conditional on gender. Men are much more likely to enter a prestigious job and finance in particular. Average starting salaries for the men are $45,473 for the men versus $35,166 for the women. Women have higher GPAs and are less likely to use frat help. Women are just as likely as men to use help from roommates, non-frat alumni, relatives, and professors.

It seems likely that much of the differences in salary and careers between the men and women can be explained by observable factors like college major. We explore this hypothesis in Table IV. We regress outcomes for salary and the dummy for prestige job on gender, GPA, major and other student characteristics. Column (1) shows that the raw gender difference in "prestige job" is 12 percent. But in column (2) we can eliminate this difference by including a set of 39 dummies for different majors.[9]

The gender difference on salary is more difficult to understand. Salary is only reported by students who plan on working next year and have accepted a job. The raw difference is shown in column (3). This difference can be reduced from $10,300 to $3,750 by including dummies for college major (column 4). But neither controlling for major dummies nor occupation as in column (5) eliminates the difference. In examining the raw data more closely, we find that the gender pay gap is not caused by any one particular career or a few outliers in self reported salary. The fact that there is a pay gap even within fields probably indicates that our career categories are too coarse. For instance, it may be that within finance men are more likely to take the most demanding

[9] For simplicity, we show results from a linear probability model, but results from probit models are similar.

investment banking jobs with the highest paying firms. Or maybe men are simply more likely to overstate their salary in a survey.

Table V explores the effect of frat help on salary and the likelihood of obtaining a prestige job. Here we limit the sample to only those 311 students who plan on working. In column (1) we show that students using frat help are 27 percent more likely to accept a prestige job and this effect is highly significant. Column (2) controls for major, GPA, other forms of networking, gender, and campus activities and leadership positions. But, the effect of frat help on prestige job only falls to .21. The connection between using frat help and obtaining prestige jobs is so strong that controlling for all the observables does not eliminate the effect. Column (4) limits the sample to those students who plan on working but have not accepted a job offer. For this subset, there is no effect of fraternity help on prestige job. Apparently the connection between frat help and prestige jobs arises mostly from students who accept jobs by the spring of their senior year.

In the raw data there is a connection between frat help and salary. But, as shown in column (3), the effect is not significant controlling for major and other student characteristics.

In Table VI we return to the methodology of the existing literature on peer effects from freshmen roommates. We explore the connection in outcomes between a student and her roommates and her hallmates. Because rooms and dorms are randomly assigned at Dartmouth, these coefficients can not be driven by selection into rooming groups. But they might be driven by some form of common shocks rather than by what Manski calls endogenous peer effects.

In column (1), we see that freshman roommate's decision to take a prestige job has no effect on own decision. But, there appears to be a very large correlation in outcomes at the hall level. We calculate the means of prestige, salary, and working for all of the other classmates on a student's freshman hall. (We exclude own observation from the calculation of means and we correct the standard errors for within group correlation.) If 100 percent of my freshman hallmates enter prestige jobs, I am 25 percent more likely to do so myself as compared to a baseline of 0 percent of my hallmates entering prestige jobs. Column (3) shows that if my hallmates are all working, I am 27 percent more likely to be working myself versus a situation in which none of my hallmates are working. In column (2) we show that a $1,000 increase in mean salary on a student's freshman hall is associated with a $276 increase in own salary.

So there is a large correlation in employment outcomes among randomly assigned freshmen hallmates. We cannot be certain that this is caused by a peer effect.[10] But the correlation in outcomes is suggestive of the notion that Dartmouth students exert a large peer influence on each other's employment decisions. The null hypothesis is that there would be no relation between own outcomes and hallmates outcomes. The fact that the relationship is so strong proves either that all hallmates are being subjected to some outside common shocks or that they are influencing each other a great deal.

IV. Conclusion

The survey data explored in this paper demonstrate that students perceive networking with peers, alumni, faculty and relatives to be an important part of the job

[10] Even if we knew it was caused by peer effects, teh coefficients in Table IV cannot be labeled the "size" of the effect since outcomes are being determined endogenously.

search process. Students entering different careers use different forms of networking. The data also show that men and women and white and non-white students use different networking strategies.

There is a very strong connection between obtaining help from fraternity and sorority members and obtaining prestigious, high paying jobs. Some of this connection might be causal in the sense that a given student using frat help would do worse on employment if he is denied the opportunity to network with fraternity brothers and alumni. Exploring the causality of this difference would most likely require a good instrument for fraternity participation.[11]

Overall the data provide good evidence that the job search process involves collecting information and receiving assistance from a variety of social networks including peer networks. The availability of networks may partially explain why admission to certain colleges and universities is considered so desirable. Hopefully future work will be able to say something about causal links between the availability of such networks and employment outcomes and whether a lack of networks could explain poor outcomes for certain groups of people.

[11] Our attempts to instrument for own fraternity participation using freshman roommate characteristics have been inconclusive and uninformative.

References

Evans, William N., Wallace E. Oates, and Robert M. Schwab, "Measuring Peer Group Effects: A Study of Teenage Behavior," *Journal of Political Economy,* C (1992), 966-991.

Dale, Stacy and Alan Krueger, "Estimating the Payoff to Attending a More Selective College: An Application of Selection on Observables and Unobservables," Princeton University Industrial Relations Section Working Paper Number 409, 1998.

Gaviria, Alejandro and Stephen Raphael, "School Based Peer Effects and Juvenile Behavior," *Review of Economics and Statistics*, v.83 (2001), 257-68.

Hoxby, Caroline M., "Peer Effects in the Classroom: Learning from Gender and Race Variation," National Bureau of Economics Working Paper Number 7866, 2000.

Kremer, Michael and Daniel Levy "Peer Effects from Alcohol Use Among College Students," mimeo, 2000.

Manski, Charles F., "Identification of Endogenous Social Effects: The Reflection Problem," *Review of Economic Studies,* LX (1993), 531-542.

Marmaros, David, *An Analysis of Peer and Social Effects on Employment Opportunities*, Dartmouth Senior Honors Thesis, 2001.

Sacerdote, Bruce I., "Peer Effects With Random Assignment, " *Quarterly Journal of Economics*, CXVI (2001), 681-704.

Stinebrickner, Todd and Ralph Stinebrickner, "Peer Effects Among Students From Disadvantaged Backgrounds," mimeo, 2001.

Zimmerman, David J., "Peer Effects in Academic Outcomes: Evidence from a Natural Experiment," Williams Project on the Economics of Higher Education Discussion Paper No. 52, 1999.

Table I
Prevalence of High Pay (Prestige) Fields By Type of Networking Used

	Mean(prestige) if no	Mean(prestige) if yes	T-stat for diff in means (yes-no)
Fraternity brother/ sorority sister	.22	.63	5.89
Roommate (current or past)	.24	.42	1.78
Other member of 2001 class	.23	.34	2.20
Other Dartmouth Alumni	.23	.37	2.48
Career Services Office	.16	.44	7.60
Professor (Dartmouth Faculty Member)	.26	.17	-1.48
No networking at all	.39	.07	-2.30

Mean is taken over the group of 590 Dartmouth seniors responding to the survey. Prestige jobs are based on starting salaries and include consulting (management, strategy, technical), software engineer, and finance (investment banking, sales and trading, asset management). The variable is (0-1) for each student. Mean of "prestige" in whole sample is .25 with sd of .43.

Table II
Use of Networking By Field, Gender, Race

	Mean(Frat Help)	T-stat (versus a high pay field)	Mean (Relative Help)	Mean (Professor Help)
Arts/entertainment (studio & performing)	0.05	-1.40	0.15	0.15
College/University teaching or research	0.00	-1.92	0.06	0.11
Education, teach/admin (primary, secondary)	0.11	0.99	0.18	0.34
Government, politics, public policy	0.12	0.47	0.19	0.25
Law	0.07	-1.78	0.22	0.04
Medical Doctor	0.03	-2.00	0.16	0.06
Computer programming, technology, IT	0.16		0.28	0.12
Consulting	0.19		0.25	0.05
Finance	0.16		0.26	0.08
Men	0.09		0.06	0.09
Women	0.04		0.06	0.12
Nonwhite	0.04		0.01	0.03
White	0.07		0.06	0.12

For men versus women, t-stat for difference in mean of frat help is -2.5.
For non-white versus white, t-stat for difference in mean of prof help is -2.2. T-stat for difference in relative help is -1.6.

Table III
Mean Outcomes and Peer Inputs For Men and Women

Variable	Men Mean	Men Std. Dev.	Women Mean	Women Std. Dev.	T-stat (women versus men)
prestige job	0.31	0.46	0.19	0.39	-3.4
finance job	0.14	0.34	0.08	0.27	-2.6
salary	45,473	19,767	35,166	14,328	-5.4
offer (0-1)	0.34	0.48	0.36	0.48	0.3
help from fraternity member	0.09	0.29	0.04	0.20	-2.5
help from roommate	0.03	0.18	0.03	0.17	-0.3
help from Dartmouth Alum	0.14	0.34	0.11	0.31	-1.1
help from relative	0.06	0.23	0.06	0.24	0.2
help from professor	0.09	0.29	0.12	0.33	1.1
help from Career Services	0.28	0.45	0.33	0.47	1.4
No help	0.47	0.50	0.45	0.50	-0.5
GPA	3.33	0.35	3.43	0.35	3.4

N is 287 men, 301 women. For salary, N is 159 and 168

Table IV
Male Salary and Field Differentials

Column (1) shows the raw gender difference in prestige jobs. Column (2) controls for major and gpa. Column (3) shows the raw difference in salary. Columns (4) and (5) add dummies for major and field of job respectively.

	(1) high paying job	(2) high paying job	(3) salary	(4) salary	(5) salary
male	0.121	0.025	10,306.587	3,754.749	5,272.217
	(3.42)**	(0.71)	(5.42)**	(2.22)*	(3.50)**
grade point average		0.074		2,609.166	-1,376.056
		(1.48)		(0.91)	(0.52)
active in academic orgs				695.133	2,354.198
				(0.34)	(1.24)
active in student gov't				7,916.026	4,955.100
				(3.60)**	(2.38)*
athlete				3,755.294	1,178.251
				(2.16)*	(0.70)
held leadership position				-3,039.083	-1,509.918
				(1.42)	(0.76)
Constant	0.189	-0.010	35,166.369	27,774.956	40,719.510
	(7.67)**	(0.06)	(26.52)**	(2.80)**	(4.41)**
Includes dummies for major	no	yes	no	yes	no
Includes dummies for job field	no	no	no	no	yes
Observations	588	588	321	321	321
R-squared	0.02	0.30	0.08	0.54	0.58

Absolute value of t-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table V
Regression of Outcomes on Networking Via Fraternities and Sororities

Column (1) shows the raw difference in prestige when frat help is used. Column (2) shows effect of frat help controlling for major and other covariates. Column (3) shows the effect of frathelp on salary. Column (4) shows the effect of frat help on field choice only for those students that do not have a job offer as of April '01.

	(1) high paying job	(2) high paying job	(3) salary	(4) high paying job
fraternity brother/sister helped find job	0.270 (3.25)**	0.212 (2.70)**	3,865.357 (1.33)	-0.094 (0.94)
Dartmouth alum helped job search		-0.047 (0.68)		0.064 (0.86)
career services helped job search		0.139 (2.56)*		
active in academic orgs		-0.041 (0.62)	-3,062.855 (1.22)	-0.030 (0.43)
active in student gov't		0.107 (1.49)	6,675.215 (2.42)*	-0.012 (0.15)
athlete		0.042 (0.72)	2,473.176 (1.12)	-0.103 (1.54)
grade point average		0.245 (2.45)*	6,360.241 (1.76)	-0.178 (1.74)
held leadership position		0.011 (0.15)	1,520.493 (0.57)	-0.043 (0.56)
male		0.029 (0.51)	9,748.303 (4.86)**	0.146 (2.49)*
Constant	0.371 (12.65)**	-0.543 (1.57)	12,508.630 (1.00)	0.659 (1.88)
Includes dummies for major	no	yes	no	no
Observations	311	311	264	101
R-squared	0.03	0.38	0.13	0.13

Absolute value of t-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table VI
Own Outcomes Regressed on Average Outcomes For Freshman Hallmates

Column (1) shows effect of freshman hall mean of 'prestige job' on own prestige job. Columns (2) and (3) repeat for salary and working status. Freshman roommates and hallmates are randomly assigned as in Sacerdote (2001).

	(1) high paying job	(2) salary	(3) working
freshman roommate has high pay (prestige) job	-0.001 (0.03)		
mean of prestige for freshman hallmates	0.254 (2.74)**		
mean salary for freshman hallmates		0.276 (2.34)*	
mean of 'working' for freshman hallmates			0.266 (3.29)**
fraternity brother/sister helped find job	0.314 (3.98)**	2,485.713 (0.79)	0.396 (7.18)**
male	0.124 (3.46)**	10,367.584 (5.12)**	-0.013 (0.38)
grade point average	0.131 (2.68)**	2,563.467 (0.74)	0.039 (0.68)
active in student gov't	0.119 (1.96)	8,645.180 (2.69)**	0.101 (1.84)
active in academic orgs	-0.029 (0.77)	-631.248 (0.27)	0.059 (1.34)
athlete	0.056 (1.42)	2,108.916 (1.08)	0.040 (0.93)
held leadership position	0.002 (0.05)	-294.511 (0.09)	-0.067 (1.39)
career services helped job search	0.269 (6.02)**	5,100.131 (2.34)*	0.383 (8.58)**
Dartmouth alumnus helped job search	-0.052 (0.67)	-291.229 (0.09)	0.075 (0.98)
Constant	-0.439 (2.64)**	10,849.653 (0.85)	0.083 (0.40)
Observations	546	296	546
R-squared	0.19	0.18	0.23

Robust t-statistics in parentheses
* significant at 5% level; ** significant at 1% level