Quantifying the Benefits of Cooperative Education

Benjamin F. Blair, Ph.D., Associate Professor of Economics
Meghan Millea, Ph.D., Associate Professor of Economics
Mississippi State University

Abstract

Cooperative education professionals have called for empirical evidence to support the claims of benefits to cooperative education. This study identifies these benefits in terms of GPA and starting salaries of 5,506 graduates. Overall co-op students outperform non-co-op students in terms of GPA and salary. The sample is broken down by major. Business and engineering majors who coop earn higher GPAs; for other majors, co-op has a positive affect on starting salaries.

Cooperative education administrators have suspected for some time that there are benefits to participating in cooperative education. However documenting these benefits has been a shortcoming of cooperative education research. Stull, Crow, and Braunstein (1997) surveyed cooperative education administrators and members of the Cooperative Education Association (CEA) Research Committee about the relative importance of a variety of research topics relevant to cooperative education. Of the 22 topics provided in the survey, research that "provides quantitative data on the impact of cooperative education participation on recruitment, retention, academic performance, and graduation (time and rate) of students" ranked as the second most important topic, receiving an average score of 4.14 on a 5-point Likert scale. The data presented here provides statistical evidence of academic and market benefits associated with cooperative education.

Previous research quantifying the effects of participating in cooperative education programs have examined various measures of program effectiveness and have yielded mixed results. Gardner, Nixon, and Motschenbacker (1992) estimated that the co-op experience added nearly $300 to starting salaries. Wessels and Pumphrey (1996) found that co-op participation only raised wages for female graduates. Both Gardner, Nixon and Motschenbacker (1992) and Van Gyn, Cutt, Loken, and Ricks (1997) found that the grade point averages of co-op students were higher than those of nonco-op students. Blair and Millea (2004) found that completion of a three-semester cooperative education program positively affected both GPA and salary, while adding two semesters to a student's time in school. Blair, Millea, and Hammer (2004) found similar results for engineering majors. However, Van Gyn, Cutt, Loken, and Ricks (1997) found no differences between co-op and nonco-op students when comparing the scores on the objective form of the College Outcomes Measure Program exam. Lindermeyer (1967) found that co-op students had higher academic averages and retention rates. Our study compares GPA and salary of students who participated in cooperative education to their cohorts who did not participate.

Using data from Mississippi State University, we compare 5,506 co-op and nonco-op students who graduated between the Fall 2000 and Spring 2002 semesters. MSU is a public university, enrolling approximately 16,000 students. Its student body is diverse comprising over 45 percent female, 20 percent minorities, and 5 percent international students.

Academic and personal information for the students were compiled by MSU's Registrar's Office and matched to reported salaries on exit surveys collected by MSU's Office of Career Services *(the Office of Career Services collected two exit surveys, one from graduating seniors who have secured employment and a second survey from all cooperative education students. Of the 5,506 graduates, salary data were available for 523 students. Due to the nature of the data collection, we suspected*

there may have been sampling bias. However the Heckman (1979) test for selectivity bias confirms that this was not the case, thus our sample of 523 is representative of the full sample.) All local and national regulations regarding informed consent for human subjects were followed.

Our sample of 5,506 graduates was representative of the university population. Variable specifications and descriptive statistics for the sample are provided in Panel A of Table 1. The average age of these students upon entering MSU was 20.3 years, the average final GPA was 3.06, and 45.7 percent were female. Over 80 percent of the graduates were white and 13 percent were black. Upon graduation, the average salary of employed students was $39,762. Fourteen percent of the graduates participated in cooperative education.

The cooperative education students were somewhat different from their graduating cohorts; see Panel B of Table 1 for summary statistics. Only 18.7 percent of the co-op students were women. The average age of co-op graduates when they enrolled at MSU was 23.2 years; their final average GPA was 3.16; and their average starting salary was $41,738.

MSU has active participation in the cooperative education program by engineering and business students. Table 2 describes the composition of the sample by major and co-op participation. Engineering majors comprise only 14% of all graduates from the Fall 2000 to the Spring 2002; however, they represent 56.1% of the co-op graduates over that period. While business majors made up 25.2% of the graduating class, they only made up 17.6% of the co-op graduates. Within these categories of majors, the majority of engineering majors participated in co-op (56.7%), but less than 10% of business majors earned co-op credit. Only a small percentage of the other majors participated in cooperative education (6.1%).

Analysis

We begin by examining the effect of the cooperative education experience on the entire population of students graduating between Fall 2000 and Spring 2002. In Table 3, we compare the average GPAs and starting salaries across all COOP and NONCOOP students. The average GPA of COOP students was 3.16, which was significantly higher than the average GPA of non-co-op students (3.04). Co-op students earned significantly more than non-co-op students, a difference of $6,302.

While there were measurable benefits associated with cooperative education for the student body at large, these benefits may not have be distributed uniformly across the different majors. Table 4 compares GPA and salary outcomes for engineering, business, and all other majors.

Among the engineering majors, co-op graduates earned higher GPAs than did their non-co-op cohorts— 3.16 compared to 3.04. In terms of salary, the mean difference between co-op engineers and non-co-op engineers was close to $2,000, but this difference was not significant. This lack of statistical significance may be due to the relatively low number non-co-op engineers who reported starting salaries (only 33).

For the business majors, co-op students outperformed non-co-op students in terms of GPA. However, the co-op experience did not translate into higher starting salaries for these majors. Co-op business students actually earned $5,165 less than non-co-op business majors. This may be an institutional artifact. The professional golf management program, in the business school, requires completion of the co-op program for all of its majors. Since this is a relatively low paying field, their participation may be pulling the salary average of co-op business students down.

Among the remaining majors, cooperative education does not have a significant affect on GPAs upon graduation. However, students in the other majors who earned co-op credit earned $2,352 more than their non-co-op cohorts.

Conclusions and Extensions

Our results quantify the relationship between the cooperative education program and academic performance and job placement. Among all graduates, students who participated in the cooperative education program graduated with higher GPAs, 0.12 points higher, and higher starting salaries, $6,302 higher. These positive effects differed across majors. For the engineering students, co-op participation significantly affected GPAs upon graduation. Among the business majors, co-op graduates earned higher GPAs, but less money upon graduation. For the remaining majors, co-op participation increased starting salaries by over $2,000 dollars. Certainly the results of this cooperative education study may be specific to Mississippi State University. The cooperative education program is dominated by engineering majors who tend to earn higher salaries than the rest of the student body. Within the business majors, a large proportion of the co-op students represent the Professional Golf Management/Marketing major which is typically a lower paying major than the other business degrees. Future research should examine similar academic and salary outcomes across multiple cooperative education programs.

References

Blair, B.F. and Millea, M (2004). Student academic performance and compensation: The impact of cooperative education. *College Student Journal*, forthcoming.

Blair, B,F., Millea, M. and Hammer J (2004). The impact of cooperative education on academic performance and compensation of engineering majors. *Journal of Engineering Education*, 93(4): 333-338.

Gardner, P.D., Nixon, D. and Motschenbacker (1992). Starting salary outcomes of cooperative education graduates. *Journal of Cooperative Education*, 27(3): 16-26.

Heckman, J. (1979). "Sample Selection Bias as a Specification Error." *Econometrica*, 47: 153-161.

Lindermeyer, R. (1967). A comparison of the academic progress of the cooperative and the four-year student. *Journal of Cooperative Education*, 3(1): 8-18.

Stull, W.A., Crow, D. and Braunstein, L.A. (1997). An investigation to identify needed research in cooperative education. *Journal of Cooperative Education*, 32(2): 30-35.

Van Gyn, G., Cutt, J., Loken, M., and Ricks, F. (1997). Investigating the educational benefits of cooperative education: A longitudinal study. *Journal of Cooperative Education*, 32(2): 70-85.

Wessels, W. and Pumphrey, G. (1996). The impact of cooperative education on wages. *Journal of Cooperative Education*, 30(1): 42-52.

Table 1: Variable Definitions and Descriptive Statistics for Total Sample and Co-op Graduates

Variable	Definition	**Panel A:** All Graduates Fall 2000 to Spring 2002		**Panel B:** Cooperative Education Graduates Fall 2000 to Spring 2002	
		N	Mean[1] (Stand. Dev.)	N	Mean (Stand. Dev.)
FEMALE	Student's gender 1= Female, 0=Male	4703	0.46 (0.50)	780	0.18 (0.39)
AGE	Student's age upon entering MSU	5506	20.34 (4.13)	780	23.21 (2.26)
BLACK	Student's race; 1= Black, 0=Other	5506	0.13 (0.34)	780	0.09 (0.28)
WHITE	Student's race; 1= White, 0=Other	5506	0.83 (0.38)	780	0.86 (0.34)
COOP	Coop participation, 1= successful completion of at least one semester of coop, 0=otherwise	5506	0.14 (0.35)	780	*****
ACT	Student composite score on American College Test	5506	22.77 (4.64)	719	24.95 (4.47)
GPA	Student's cumulative college grade point average; 4-point scale	5506	3.06 (0.50)	780	3.16 (0.43)
SALARY	Salary reported by students to the Office of Career Services on the graduation exit surveys	523	39,762 (11,124)	359	41,738 (10,719)

[1] For dichotomous variables such as FEMALE and COOP the value of the mean represents the percentage of students in that category.

Table 2: Distribution of Cooperative Education Experience by Major

MAJOR	% OF ALL GRADUATES BY MAJOR	% OF ALL GRADUATES WITH COOP EXPERIENCE	% OF MAJOR PARTICIPATING IN COOP
ENGINEERING	14.0%	56.1 %	56.7 %
BUSINESS	25.2%	17.6%	9.9 %
ALL OTHER	60.8%	26.3%	6.1 %

Table 3: Comparison of Means Between Co-op and Nonco-op Students

	N	GPA Mean (S.D)	N	SALARY Mean (S.D)
COOP	780	3.16 (0.43)	359	$41,738 (10,719)
NONCOOP	4726	3.04 (0.51)	164	$35,436 (10,795)
Difference t-value		0.12 6.79*		$6,302 6.22*

*Statistically significant at the 95 percent level.

Table 4: Comparison of Means Between Coop and Noncoop Students by Major

		N	GPA Mean (S.D)	N	SALARY Mean (S.D)
ENGINEERING MAJORS	COOP	438	3.22 (0.43)	232	$47,363 (6,784)
	NONCOOP	335	3.01 (0.58)	33	$45,388 (9,658)
	Difference t-value		0.21 5.85*		$1,975 1.48
BUSINESS MAJORS	COOP	137	3.13 (0.38)	48	$32,695 (10,099)
	NONCOOP	1,251	3.01 (0.49)	63	$37,859 (8,682)
	Difference t-value		0.12 2.86*		-$5,165 -2.89*
ALL OTHER MAJORS	COOP	205	3.04 (0.44)	79	$30,715 (7,878)
	NONCOOP	3,140	3.06 (0.51)	68	$28,362 (8,008)
	Difference t-value		-0.02 -0.64		$2,352 1.79**

* Statistically significant at the 95 percent level.
** Statistically significant at the 90 percent level.