

# Labour market outcomes for university co-op graduates

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The days when a university degree almost guaranteed employment are long gone. Steady enrolment growth has produced an increasing number of university graduates. Consequently, employers seeking highly educated workers can select from a large and expanding recruitment pool. In the face of this heightened competition, it is widely believed that work experience often means the difference between finding a job or continuing the search.

So what are students doing to improve their employment prospects? One option is co-operative education, that is, combining academic courses with work terms during which on-the-job experience is gained in a particular field of study (see *Co-operative programs at Canadian universities*). This article attempts to determine whether graduation from a co-op program is an advantage for university graduates when they enter the job market, by looking at three measures of labour market performance: full-time employment, earnings, and match between job and field of study.

Data on employment outcomes from the 1992 Survey of 1990 Graduates (S90G) (see *Data source and definitions*) are used to compare graduates of university co-op programs at the bachelor's level with their non co-op counterparts. The analysis is limited to the three fields of study that together accounted for 8 out of 10 co-op graduates in 1990: engineering; mathematics and physical sciences; and commerce and economics.

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## Co-operative programs at Canadian universities

The Canadian Centre for Co-operative Education (formerly the Canadian Association for Co-operative Education) defines co-operative education as an academic plan that formally integrates classroom studies with work experience in appropriate fields of business, industry, government, social services, and the professions. Co-operative education began in Canada in 1957 when the University of Waterloo enrolled 75 students in its engineering co-op program. By 1978-79, 11 universities were offering a co-op education, with enrolment exceeding 10,000; by 1993-94, the number of universities with such programs had more than tripled to 39, with enrolment approaching 31,000. Co-op programs are now available in most disciplines and must meet several criteria:

- The educational institution develops and/or approves each work situation.
- Students work rather than merely observe.
- Students receive remuneration for work performed.
- The educational institution monitors students' progress on the job.
- The employer supervises and evaluates students' performance on the job.

## The Class of 1990

According to the S90G, over 95,000 students earned bachelor's degrees in 1990. Of these graduates, 4.4% (about 4,200) had taken co-op programs.

The largest share of co-op graduates (36%) earned their degrees in engineering. Mathematics (including computer science) and physical sciences accounted for

- Total co-operative work experience is usually 50% of the time spent in academic study, and never less than 30%.

## Why students choose co-op programs

A co-op degree takes longer to complete, is more expensive to obtain because of supplemental fees, and often entails additional costs, such as travel and accommodation, during work terms. Nevertheless, enrolment in co-op programs is growing in popularity, as a rising number of educational institutions offer this option in an increasing variety of study areas. Many students enrol in a co-op program to gain work experience and to develop a network of contacts, both of which help improve employment prospects after graduation. Co-op programs also help ease the transition from school to the workplace (Ryan, 1992). And some students may need work terms to help finance their studies (AUCC, 1990).<sup>1</sup>

Co-op programs also benefit employers (Shaw, 1988). They receive the relatively inexpensive services of students, who may be replacing regular workers on holiday or other temporary leave; they can also assess potential employees, and possibly reduce recruitment costs in the future.

another 29%, and commerce and economics, 20%. The remaining 15% graduated from a variety of other fields.<sup>2</sup>

Both co-op and non co-op programs in the three fields examined were male-dominated. In 1990, men accounted for 86% of co-op graduates in engineering, 73% of those in mathematics and physical sciences, and 57% of those in com-

## Data source and definitions

### Survey of 1990 Graduates

The data are from Statistics Canada's Survey of 1990 Graduates (S90G), conducted in June 1992. The S90G used a representative sample of people who had graduated from universities, community colleges and trade schools in 1990. Questions focused on their employment history in the two years since they had earned degrees or diplomas. This article examines employment outcomes for university graduates with bachelor's degrees only (persons who obtained graduate degrees in 1990 or specialized certificates and diplomas from universities are excluded, as are graduates from colleges and trade schools).

Although this study focuses on co-op graduates, the S90G was not specifically designed to gather data related to these programs. Consequently, a very small sample size restricted the scope of this analysis and required some modification of statistical techniques (see *Statistical techniques for modelling*).

### Definitions

Graduates who reported that they usually worked 30 or more hours a week at the time of the survey were considered to be employed **full time**.

The **full-time employment rate** is the number of graduates from a particular field of study working full time expressed as a percentage of all graduates in that field. For example, the full-time employment rate of 1990 co-op engineering graduates is the percentage of these graduates employed full time in June 1992.

**Previous work experience** is measured in terms of the total number of months of full-time employment, both within and outside co-op programs, accumulated before university graduation. All full-time work experience is included, regardless of the nature of the work performed (for example,

summers spent working full time in fast-food outlets when a graduate was a high school student).

**Relationship of job to field of study** is based on the graduates' perception. Those who described their job as directly or partially related to their studies were considered to have a "related" job.

Respondents who were working in June 1992 were asked to estimate what their 1992 **earnings** would be if they worked at that job all year at the June 1992 rate of pay. This article considers the earnings of full-time workers only. A small number of responses fell into the high range – over \$100,000. These "outliers" were excluded in the earnings model.

The three **fields of study** examined in this article correspond to the categories used in the University Student Information System developed by the Education, Culture and Tourism Division of Statistics Canada. These categories were modified to include only those disciplines that the S90G identified as having co-op graduates:

**Engineering:** includes architecture, chemical engineering, civil engineering, design/systems engineering, electrical engineering, industrial engineering, mining engineering, mechanical engineering, metallurgical engineering, other engineering, engineering science, and engineering (general).

**Mathematics and physical sciences:** includes computer science, mathematics, chemistry, and physics (excluding astronomy and aerospace sciences).

**Commerce and economics:** includes commerce, management, business administration, administrative studies/sciences, and economics.

For further information on the Survey of 1990 Graduates, contact Mike Sivyer, Special Surveys Division at (613) 951-4598, or fax (613) 951-0562.

merce and economics – virtually the same proportions as among non co-op graduates.

### Graduating into a declining job market

Finding work was particularly challenging for the Class of 1990.<sup>3</sup> Their entry into the labour market coincided with the start of a recession – a period when employers were more likely to reduce their workforce than to recruit. Given this economic climate and the level of competition for a diminishing number of jobs, was a co-op education an advantage?

The three measures of performance examined in this study – full-time employment, earnings, and match with field of study – are associated with many factors besides graduation from a co-op program, such as age, sex, previous work experience, and geographic region. To determine whether a co-op degree provided some advantage, these other factors were held constant through a multivariate model developed for each measure of job market performance. (See *Statistical techniques for modelling*.)

### Working full time?

A simple descriptive analysis of the data showed that co-op graduates from the three fields of study were more likely than their non co-op counterparts to be working full time in June 1992. More complex analysis using a multivariate model, however, revealed that the possession of a co-op degree significantly increased the likelihood of full-time employment for graduates in mathematics and physical sciences only. According to the model estimates, graduates of co-op programs in this field were 12% more likely to have full-time jobs in 1992 than were their non co-op counterparts. The effect of a co-op

### Statistical techniques for modelling

The three measures of labour market performance – annual earnings, full-time employment and working in a job related to one’s field of study – rarely depend on one factor alone, although a single factor can have a significant effect. To isolate the effect of one factor or “independent” variable (for example, graduation from a co-op program) on one or more “dependent” variables (earnings, full-time employment, related job), the effects of other independent variables must be “controlled.” This involves holding the value of those variables constant by statistically adjusting the data to nullify differences in the estimated effects of each variable in the model (except graduation from a co-op program). Similarly, the impact of each of the other independent variables is determined while controlling for the effects of all other independent variables.

As the S90G was not specifically designed to capture information on co-op graduates, a sub-grouping of available independent variables was selected to test for a relationship with each of the three dependent variables. In addition to graduation from a co-op program, the variables tested were full-time work experience, job satisfaction, satisfaction with pay, usual weekly hours of work, whether the graduate would select the same program of study again, age at graduation, province of residence at the time of the survey, and sex. These potential independent variables were screened to determine whether they significantly correlated with any of the dependent variables. Those showing a significant correlation were used in the final models. Interaction between independent variables was checked to confirm their independence (that is, to be sure that one was not working through another).

The validity of these techniques depends on the models containing all of the important independent variables. In practice, the variables available from the S90G limited the analysis. The small number of sampled students graduating from co-op programs relative to non co-op programs was another constraint. (The

modelling process was limited to bachelor’s degree graduates since they account for the vast majority (93%) of graduates from co-op programs.) All models were run separately by field of study using the statistical software SUDAAN (Survey Data Analysis Software, Release 6.34, Research Triangle Institute, Research Triangle Park, NC 27709), which can accommodate the stratified sampling design of the survey. A significance level of .05 was used to determine whether an effect was significant (that is, P-value < .05).

#### Earnings

Multiple linear regression was used to assess the impact of graduating from a co-op program on graduates’ annual earnings (the dependent variable), independent of any other effect. This modelling technique is appropriate when there is evidence of a linear relationship between a continuous dependent variable and at least one other continuous independent variable. After the independent variables found to have no significant impact on annual earnings were screened out, the model was adjusted for each of the three fields of study. In addition to graduation from a co-op program, only previous work experience and usual hours worked per week were retained. Table 1 shows regression results from the earnings model for the three fields examined.

**Table 1  
Results from earnings model**

	Beta coefficient	P-value
<b>Mathematics and physical sciences</b>		
Co-op program	5.49	0.00*
Previous work experience	0.08	0.00*
Usual hours worked per week	0.30	0.00*
<b>Engineering</b>		
Co-op program	0.91	0.16
Previous work experience	0.06	0.00*
Usual hours worked per week	0.19	0.00*
<b>Commerce and economics</b>		
Co-op program	3.70	0.02*
Previous work experience	0.12	0.00*
Usual hours worked per week	0.50	0.00*

\* Statistically significant at the .05 level

### Full-time employment and relationship to field of study

Logistic regression analysis was used to assess the impact of graduating from a co-op program on the probabilities of getting a full-time job, and of getting a job related to the field of study – independent of the influences of other factors.

**Table 2  
P-values from full-time employment model**

	Mathematics and physical sciences	Engineering	Commerce and economics
Co-op program	0.01*	0.91	0.36
Previous work experience	0.06	0.36	0.68
Sex	0.21	0.39	0.13

\* Statistically significant at the .05 level

After an initial statistical screening of potential independent variables, only previous work experience and sex were retained (in addition to participation in a co-op program) for both the full-time employment model (Table 2) and the job-related-to-studies model (Table 3).

**Table 3  
P-values from job-related-to-studies model**

	Mathematics and physical sciences	Engineering	Commerce and economics
Co-op program	0.09	0.35	0.24
Previous work experience	0.23	0.45	0.29
Sex	0.17	0.60	0.92

education in engineering or in commerce and economics was not statistically significant – differences in employment rates for graduates of these fields were attributable to other factors.

### Earnings – experience is the key

Among full-time workers in 1992, co-op graduates' average earnings differed from those of non co-op graduates in the three major fields of study. A multivariate model showed that a co-op education had a significant effect on earnings for mathematics and physical science graduates, as well as degree holders in commerce and economics: an estimated \$5,490 and \$3,700 advantage in average expected annual earnings, respectively.<sup>4</sup> By contrast, participation in a co-op program made little difference to the average earnings of graduates in engineering.

According to the model, the crucial factor in graduates' earnings was work experience, whether or not it was gained in a co-op program. On average, university co-op programs provided graduates with two years' work experience. The earnings model showed that each month of experience yielded an estimated \$90 in additional annual earnings. Non co-op graduates with work experience equivalent to that obtained in a co-op program enjoyed a similar earnings advantage.<sup>5</sup>

### A good match?

Relatively high proportions of both co-op and non co-op graduates in the three fields who were working full time two years after graduation were employed in jobs related to their studies: 93% of graduates in engineering, 85% of those in mathematics and physical sciences, and 83% of those in commerce and economics. Indeed, the multivariate model showed that the likelihood of having a job in one's field was as good for non co-op as for co-op graduates.

## Summary

The Class of 1990 faced a particularly tough labour market. Their job search coincided with the beginning of a recession during which employment prospects for all workers declined. For a small percentage of these graduates a co-op education provided employment during their academic studies and relevant work experience that might otherwise have been much more difficult to obtain.

A co-op education was a significant advantage in terms of increased earnings for graduates in mathematics (including computer science) and physical sciences, as well as those in commerce and economics. In addition, a co-op education in mathematics and physical sciences was more likely to result in full-time employment.

The possession of a co-op degree in engineering, however, did not significantly affect the subsequent labour market performance of these graduates. This result is perhaps not surprising since the labour market demand for engineering graduates tends to be high relative to the demand for degree holders with other specializations (Clark, 1991).

Data used in this study were gathered two years after graduation. Efforts to measure performance during the first few years of labour market participation may not reveal the true value of co-op programs, especially in professional occupations. Results five or more years after graduation would provide a better reflection of their effect on graduates' careers.

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## Notes

1 Although some students may choose to obtain their bachelor's degree through a co-op program for economic reasons, 69% of all 1990 co-op graduates reported taking a loan to help finance their studies, compared with 61% of non co-op graduates. The average amounts borrowed were \$11,400 and \$12,100, respectively.

2 Most of the remaining co-op graduates had obtained degrees in the social sciences; education, physical education, sports, recreation and leisure; agriculture; or, fine and applied arts.

3 Although some graduates would have pursued further studies, most would have entered the job market at this time.

4 Observations used to calculate the mean were the same as those used in the earnings model. Outliers identified by the modelling process and all persons earning more than \$100,000 were excluded.

5 Co-op graduates in two of the three fields examined actually had less work experience upon graduation than non co-op graduates. Co-op graduates in mathematics and physical sciences reported, on average, 2.1 years of work experience, compared with 2.4 for their non co-op counterparts. An even greater discrepancy was found between co-op and non co-op graduates in commerce and economics, who reported an average of 1.5 and 3.3 years of experience, respectively. However, in engineering, co-op graduates had more years of work experience (2.4) than their non co-op counterparts (2.1).

This apparent anomaly – co-op graduates reporting less work experience than non co-op graduates – may reflect the younger age structure of the former. When they completed their programs, the average age of co-op graduates was 24, versus 26 for non co-op graduates. The age gap suggests that they were less likely than non co-op graduates to have interrupted or carried out their studies with periods of labour market participation. Indeed, the data show that co-op graduates were less likely than their non co-op counterparts to have obtained their degrees on a part-time or combination full-time/part-time basis. Only 5% of co-op graduates in mathematics and physical sciences and 5% of those in commerce and economics earned their degrees on a non full-time basis. The corresponding proportions were much greater for non co-op graduates in mathematics and physical sciences (22%) and in commerce and economics (23%). In engineering, the proportions were small for both co-op and non co-op graduates (7% and 9%, respectively).

## ■ References

Association of Universities and Colleges of Canada (AUCC). "Co-op students value money, job experience." *University Affairs* 31, no. 7 (August-September, 1990): 34.

Canadian Association for Co-operative Education. *1994/95 National Co-operative Education Directory*. Toronto: CAFCE [1994].

---. *Co-op Program Directory 1989-90*. Edited by Nancy Chiang. Toronto: CAFCE [1989].

Clark, W. *The Class of 1986: A Compendium of Findings of the 1988 National Graduates Survey of 1986 Graduates, with Comparisons to the 1984 National Graduates Survey*. Ottawa: Employment and Immigration Canada and Statistics Canada, 1991.

Ryan, D. "Co-op plans may ease education woes." *Calgary Herald*. 29 September, 1992: A5.

Shaw, L.R. "Co-operative education: good for business, good for Canada." *Canadian Speeches* 2, no. 5 (August-September, 1988): 17-20.

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