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Work-terms and success in postsecondary education

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Abstract

Co-op work-terms, which are more and more popular, can be treated as an alternative source of funding for postsecondary education. In this study we explore the relationship between mechanisms for financing studies in general—and income from co-op work-terms in particular—on the one hand, and success at university on the other hand. To do this we estimate a Tobit model with instrumental variables using data collected at the University of Sherbrooke (Quebec, Canada). Our results demonstrate that income from co-op work-terms positively affects educational success. However, the experience acquired during work-terms seems to contribute more than the associated financial resources.

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1. Introduction

An educated population is vital to the development of any country. In order to support the education of their citizenry, most countries devote a large proportion of their resources to postsecondary education. However, this goal often proves elusive, since many students are unable to persist in their studies until the desired degree has been obtained. Factors that contribute to academic failure include financial difficulties. In fact, according to human capital theory (Becker, 1962), while investment in education yields benefits it is also associated with costs that are both direct (tuition, housing, etc.) and indirect (foregone earnings while attending university). Students thus require adequate sources of income to enable them to undertake and complete studies.

Financial aid to students is an important component of students' income in Canada. However, the "loan" component of this aid may contribute to dropping out, especially in the case of students from the most underprivileged families (Muller, 2007; PRA, 2007). In order to avoid incurring a large debt load, some students prefer to work part time. Studies have revealed that working too many hours is detrimental to perseverance in school (McVicar and McKee, 2002; Dagenais, Montmarquette and Viennot-Briot, 2007). Conversely, co-op work-terms appear to provide a means of reconciling work and studies since, unlike most student jobs, they present the benefit of corresponding to the students' field of study—significantly enhancing their sense of buy-in.

Launched in the early 1900s in the US, the first cooperative program was established in 1957 in Canada. According to the Canadian Association for Co-operative Education (CAFCE), created in 1973, several conditions have to be met for a study program to be recognized as a cooperative education program. For example, the duration of the co-op work terms has to represent at least 30% of the total duration of academic studies¹. Currently, about 80 postsecondary institutions are members of the CAFCE in Canada. The University of Sherbrooke, located in the Province of Quebec in Canada, was the first institution in the Province to initiate cooperative programs in 1966. Nowadays, the university offers a particularly broad range of co-operative study programs (45 programs covering a variety of fields of study including law, engineering, sciences and business), though some of them are offered in other universities as well. In co-op programs, semesters in the classroom alternate with semesters of paid work-terms in non-academic settings.

In addition to providing students with significant income, these work-terms allow them to acquire on-the-job experience. Therefore, we believe that co-op work-terms can provide an alternative to part-time work, from which students can at least partially finance their studies. These work-terms might, thus, provide students with a way to pay for their studies that not only limits their debt load, but also provides an enriching experience on the labour market. This could have an impact on the yield to education as well as on academic success. In this study our goal is to assess the impact of the methods of financing on university studies and academic results. More specifically, we will attempt to discern how income from work-terms affects the academic performance of students. To do this, we estimate an econometric model to explain students' grades in terms of how they finance their postsecondary education, including income from co-op work-terms, and control variables.

The remainder of this article begins by providing some background. We next describe our methodology and the data. This is followed by a presentation and analysis of the study results and a conclusion.

¹ www.cafce.ca. Retrieved 2016-08-15

2. Financial difficulties and success in post-secondary studies

In the literature several elements have been identified that contribute to success in postsecondary studies, while financial struggles are found to undermine it. In a review of the literature on the link between financial difficulties and success in university, Miningou, Vierstraete and Yergeau (2014) demonstrate that three principal components of student's financial situations come into play. The first is problems with financial aid programs. On this subject, Barr-Telford et al. (2003) demonstrate that financial difficulties are at the root of approximately 30% of cases of dropping among Canadians aged between 18 and 24 years. Berger (2007) also finds that, in Canada, approximately 25% of students who drop out do so because of financial problems. According to MacFadgen (2007), financial struggles have an impact on academic success, since they appear to contribute to students' stress and anxiety. Second, we have student employment. According to Oettinger (1999), working while attending school exacerbates students' fatigue levels, which in turn may have repercussions on academic performance. While student employment might contribute significant financial resources, some studies have found that devoting too much time to work has a negative impact on academic success. Choy (2002), McVicar, and McKee (2002), and Dagenais, Montmarquette, and Viennot-Briot (2007) conclude that a job requiring fewer than 15 hours per week has no negative fallout. A third financial factor that is liable to affect success in postsecondary studies is parents' income. Carmichael and Finnie (2008) demonstrate that parents' income has an impact on participation in postsecondary studies. These authors corroborate this relationship, even for students who receive financial aid for their postsecondary studies programs. Norberg-Schonfeldt (2008) identifies a positive relationship between parents' income and the grade point average of Swedish students. According to Kalenkoski and Pabilonia (2010), the number of hours worked increases when transfers from parents decrease. These authors find that this decline in transfers from parents is detrimental to students' success.

Moreover, and as already indicated, co-op work-terms can be considered an alternative source of funding for postsecondary education. To the best of our knowledge, no studies have explored the link between *income* from co-op work-terms and educational success, although several studies point out the effect of cooperative education on persistence, completion or academic performance, for engineering majors (Blair et al. 2004; Gardner et al. 1992; Lindenmeyer, 1967, for example) or for private liberal arts universities (Avenoso and Totoro, 1994; Somers, 1986). In these particular cases, the relationship could be due to self-efficacy change (Raelin et al. 2011). Furthermore, as an additional source of funding for students, these work-terms could contribute to reducing students' unmet needs and positively affect their academic performance, which would contribute to educational success. Our research sheds some light on the relationship between financial difficulties and success in postsecondary studies.

3. Methodology and data

The purpose of this study is to explain students' outcomes as a function of their various sources of funding. To do this, we use an econometric model in which the dependent variable is students' grade point averages (GPAs) and the explanatory variables are income obtained from different sources of funding for postsecondary education and some control variables. Since the GPA is double-censored, the maximum GPA being 4.3 and the minimum being 0, we use a double-censored Tobit, written as follows:

$$Y^* = F \alpha + S \beta + X \delta + Z\gamma + \mu$$

$$\begin{cases} 0 & \text{if} \quad Y^* \le 0 \end{cases}$$

With
$$Y = \begin{cases} 0 & \text{if } Y^* \le 0 \\ Y^* & \text{if } 0 < Y^* < 4.3 \\ 4.3 & \text{if } Y^* \ge 4.3 \end{cases}$$

where F is a matrix of vectors of financial variables other than income earned in co-op work-terms (amount of loans and bursaries obtained, institutional bursaries, employment income, ...), S contains variables related to co-op work-terms (income, number of hours worked per week...), X is a vector of socio-demographic explanatory variables (sex, age, ...) and Z a vector of academic variables (pre-university performance rating, participation in student activities, ...). α , δ , β , and γ are vectors of parameters to be estimated, Y the students' cumulative grade point average, and Y* the latent variable, bounded by 4.3 above and by 0 below.

This model specified above may suffer from endogeneity owing to reverse causality between the dependent variable and co-op work-terms. Since access to co-op programs is often selective, i.e. reserved for students who have done well in their previous studies, participation in co-op workterms can be explained by students' academic records. However, these students' previous academic performances are undoubtedly correlated with their current performance. Therefore, the grade point average may also explain that the student was accepted in a co-op program, giving rise to a reverse causality. Thus, it appears that we need to find an instrument for that variable. The hallmark of a good instrument is that it is only correlated with the dependent variable through the variable it replaces. We believe that the fact that a student chose to study at the University of Sherbrooke because of the co-op programs offered there is a good instrument. Indeed, this variable is without a doubt correlated with students' being enrolled in a co-op program and cannot have an impact on the grade average except over the "co-op work-term" variable. Thus, we consider this a suitable instrument for the variable "co-op work-term." A test of relevance of the instrument reveals that this variable is a good instrument for co-op work-terms. However, since we only have a single instrument available, the model is not susceptible to overidentification and a test of the instrument's impossible.

Our data is from a longitudinal survey, conducted in the fall of 2008 and the fall of 2010, of a population of nearly 3,000 students who entered a bachelor's program in the fall of 2008 at the University of Sherbrooke (in the province of Quebec, Canada). The questionnaire covered sociodemographic characteristics of the students and their friends and family, financial assistance received, elements of university life, and motivation. These data are matched with academic information on the students from the registrar's office (grade average, program, course abandonment, ...). Table 1 presents descriptive statistics for the data we use.

Table 1 Descriptive statistics

	All students			Students who chose University of Sherbrooke because of coop. programs (Instrument)				
Variables	Mea n	Std. error	Min	Max	Mean	Std. error	Min	Max
Dependent variable								
GPA in the fall of 2010	3.16	0.63	0	4.3	3.18	0.67	0.68	4.30
Instrument								
Chose University of Sherbrooke	0.39	0.49	0	1				
because of cooperative programs								
Financial variables	• • •	1.26	0	10.01	c = 2	4.00		10.01
Income from co-op work-terms from Sept. 2009 to August 2010 (log)	2.94	4.26	0	10.24	6.73	4.03	0	10.24
Loans from the government (log)	3.74	3.94	0	9.55	3.24	3.84	0	9.55
Bursaries from the government (log)	2.58	3.78	0	9.39	1.87	3.35	0	9.28
Bursaries from the Fondation Force (log)	0.08	0.74	0	7.7	0.08	0.74	0	7.09
Income from off-campus work (log)	3.66	4.31	0	10.37	2.27	3.8	0	10.37
Income in the form of transfers from spouse (log)	0.39	1.73	0	9.9	0.17	1.12	0	8.07
Income from employment insurance (log)	0.02	0.38	0	8.29	0.05	0.62	0	8.29
Academic variables								
Was on co-op work-terms from Sept. 2009 to August 2010	0.39	0.49	0	1	0.76	0.43	0	1
Hours worked per week during work- term	12.93	18.34	0	65	29.27	17.12	0	65
Weeks of work-terms	6.43	10.01	0	40	14.98	10.78	0	40
Dissatisfaction in relations with peers	1.69	0.68	1	4	1.7	0.7	1	4
Dissatisfaction with prestige of program	1.96	0.8	1	4	1.82	0.79	1	4
Member of cultural centre	0.05	0.22	0	1	0.04	0.21	0	1
Member of student association	0.3	0.46	0	1	0.36	0.48	0	1
Member of board of directors of student association	0.19	0.39	0	1	0.25	0.44	0	1
Member of a university religious	0.01	0.1	0	1	0.02	0.13	0	1
group Member of a research group	0.11	0.32	0	1	0.07	0.26	0	1
Participates in student activities	0.57	0.5	0	1	0.66	0.47	0	1
Uses the carrefour de l'information	0.46	0.5	0	1	0.45	0.5	0	1
Punctual in remitting assignments	3.15	0.88	1	4	3.08	0.91	1	4
Attends class	3.59	0.59	1	4	3.5	0.65	1	4

Number of observations	465			181				
Member of a visible minority	0.03	0.17	0	1	0.02	0.15	0	1
Sex	0.67	0.47	0	1	0.56	0.5	0	1
Age	23.72	2.56	21	38	23.4	2.21	21	38
available) Personal characteristics								
the quality of life Performance in college (when	29.44	3.74	19.68	38.66	29.48	3.45	21.28	38.66
the free bus service Chose University of Sherbrooke for	0.57	0.5	0	1	0.57	0.5	0	1
Chose University of Sherbrooke for	0.52	0.5	0	1	0.56	0.49	0	1
Studying relatives	0.87	0.34	0	1	0.86	0.35	0	1
Indifferent to success	1.15	0.37	1	3	1.18	0.41	1	3

Table 1 reveals that approximately 40% of the individuals in the selected sample were on a co-op work-term between the fall of 2009 and the summer of 2010. A means comparison test shows that students having been on a co-op work-term posted a significantly higher grade point average (3.26) in the fall of 2010 than those who had not (3.11), at the 5% level (not shown). Conversely, and at the same threshold, we find that the GPAs of students who chose the University of Sherbrooke because of its co-op programs do not differ significantly from the GPAs of those who chose the university for other reasons, nor did their performance prior to university (Table 1). This result confirms our assumption that the choice of the University of Sherbrooke for its co-op programs is not directly correlated with the students' grade point average, but is correlated with the variable "co-op work-terms." The following section presents the results of the econometric estimations on the data described above.

Given that co-op work-terms are only offered to bachelor's students at the undergraduate level, we eliminated from our sample students who were enrolled in a certificate program. Furthermore, for reasons of homogeneity individuals aged 40 or older are excluded from the sample.

4. Results and analysis

As mentioned above, the purpose of this study is to assess the relationship between methods of financing university studies and academic outcomes. More specifically, we will attempt to discern how income from work-terms affects the academic performance of students and, by extension, their level of success. Table 2 presents the econometric results of the model described in the previous section. In order to distinguish between the impacts of income from co-op work-terms and other non-income factors associated with these work-terms, on students' academic outcomes, we present four different models. These models are differentiated by how the variable "co-op work-term" is specified. In the first model, we consider income from co-op work-terms; in the second, the mere fact of having been on a co-op work-term; in the third, the length of the work-term in weeks; in the fourth, the number of hours worked per week on the work-terms.

The results in Table 2 reveal that, overall, co-op work-terms have a positive impact on students' academic results, regardless of the variable used to characterize them. In Model 1, we observe that

a 100% increase in income from co-op work-terms increases students' GPA by approximately 0.017 points. Income earned during these work-terms could contribute to reducing students' unmet needs and thus improve their academic performance. However, we observe that the financial impact of co-op work-terms is less significant than the simple fact of having been on one. In Model 2, we see that having been on a co-op work-term increases the GPA by 0.15 on average. This seems to reveal that, aside from the financial effects of co-op work-terms, skills acquired on work-terms allow students to perform better in class. Thus, the experience gained on co-op work-terms fosters success in university studies. Models 3 and 4 indicate that the duration of co-op work-terms in terms of weeks has a greater impact on academic results than the number of hours worked each week. In other words, the more these work-terms are spread out over a long period, the greater the benefit they confer. Thus, we believe that promoting co-op work-terms that last longer in terms of weeks appears to be better for students than work-terms that pack more hours into fewer work weeks.

With a few exceptions, the results of our four models are comparable. However, the main purpose of this study being to examine how income from work-terms affects the academic performance of students, we use Model 1 for the remaining analyses. We see that there is one income source aside from co-op work-terms that has a positive impact on academic results: financial support from the spouse. However, there are also sources of financing that are detrimental to academic success. This is the case for income from off-campus employment. Indeed, the negative impact of student employment on success in postsecondary studies has been reported in a number of studies (e.g. Oettinger, 2005; Van Dyke, Little, and Callender, 2005). According to Oettinger (1999), working while attending school exacerbates students' fatigue levels, which in turn reduces the quality of their academic work. Also, students who receive needed-loans from the government appear to perform poorly. In fact, PRA Inc. (2007) shows that approximately 58% of Canadian student debt is from government financial aid. However, studies appear to establish a negative relationship between student debt and academic success (Muller, 2007). An other result is the negative impact of needed-bursaries offered by the University of Sherbrooke (Fondation Force). Since Fondation Force offers one-time aid to students in financial trouble, we might suspect that a recipient must be in a financially precarious situation, and thus have bad grades. These bursaries are not sufficiently consistent to cover a significant share of students' needs, and so they do not make a big enough difference in their situations to counteract the negative effect of the financial difficulties. This might explain the negative effect. Also, certain personal characteristics, such as not belonging to a visible minority and being a woman, have a positive effect on academic outcomes. Women do better than men academically. Moreover, academic factors, such as being a carrefour de l'information user (a space in the library that offers free access to computers), submitting assignments on time, and regular class attendance have a positive impact on performance. These last three variables can be considered indicators of students' commitment to their studies. Therefore, we can affirm that commitment to studies promotes success in university studies. This result is consistent with findings in other studies (e.g. Astin, 1984; Pirot and De Ketele, 2000). Finally, studying friends and family has a positive impact on academic outcomes.

Table 2 Econometric results

Variable ²	Model 1	Model 2	Model 3	Model 4	
	Marg. effect	Marg. effect	Marg. effect	Marg. effect	
Income from co-op work-terms Sept. 2009-Aug.	0.0168*	CIICCI	CITOCO		
2010 (log)	(0.0095)				
Was on co-op work-term Sept. 2009-August 2010		0.1545*			
		(0.0875)			
Number of weeks on co-op work-term Sept. 2009-August 2010			0.0073* (0.0041)		
Number of hours on co-op work-term Sept 2009-August 2010				0.0039* (0.0023)	
Loans from the government (log)	-0.0139*	-0.0138	-0.0146*	-0.0137	
	(0.0087)	(0.0087)	(0.0087)	(0.0087)	
Bursaries from the government (log)	0.0121	0.0121	0.0124	0.0120	
	(0.0089)	(0.0089)	(0.0089)	(0.0089)	
Bursaries from the Fondation Force (log)	-0.0760***	-0.0759***	-0.0758***	-0.0763***	
	(0.0213)	(0.0211)	(0.0210)	(0.0212)	
Income from off-campus work (log)	-0.0185***	-0.0183***	-0.0191***	-0.0185***	
	(0.0064)	(0.0064)	(0.0062)	(0.0064)	
Income in the form of transfers from spouse (log)	0.0262***	0.0263***	0.0261***	0.0265***	
	(0.0091)	(0.0091)	(0.0091)	(0.0092)	
Income from employment insurance	-0.0928***	-0.0928***	-0.0924***	-0.0937***	
	(0.0238)	(0.0239)	(0.0239)	(0.0239)	
Member of a visible minority	-0.3316***	-0.3303***	-0.3426***	-0.3303**	
Con	(0.1330) 0.0991*	(0.1330) 0.1010*	(0.1291) 0.0909*	(0.1341) 0.1017*	
Sex	(0.0991°)	(0.0556)	(0.0541)	(0.0558)	
Age	0.1146	0.1197	0.1203	0.1199	
Age	(0.1036)	(0.1035)	(0.1030)	(0.1037)	
Age-squared	-0.0017	-0.0018	-0.0019	-0.0018	
Age-squared	(0.0017)	(0.0019)	(0.0019)	(0.0019)	
Uses the <i>carrefour de l'information</i>	0.1133**	0.1162**	0.1134**	0.1179**	
coos the carrejour act information	(0.0508)	(0.0511)	(0.0510)	(0.0513)	
Punctual in remitting assignments	0.1068***	0.1059***	0.1071***	0.1057***	
	(0.0310)	(0.0312)	(0.0309)	(0.0312)	
Performance in college	0.1482***	0.1495***	0.1529***	0.1512***	
J	(0.0528)	(0.0531)	(0.0529)	(0.0531)	
Studying relatives	0.2273**	0.2252**	0.2205**	0.2247**	
	(0.0928)	(0.0929)	(0.0928)	(0.0931)	
Constant	0.0464	-0.0285	-0.0276	-0.0369	
	(1.4342)	(1.4470)	(1.4406)	(1.4489)	
Other academic variables	YES	YES	YES	YES	
Wald test for exogeneity	chi2(1)=1.78	chi2(1)=0.93	chi2(1)=0.83	chi2(1) = 0.67	
	Prob > chi2	Prob > chi2	Prob > chi2	Prob > chi2	
	= 0.1820	= 0.3351	= 0.3629	= 0.4117	
Relevance of instruments	F= 22.24	F= 22.72	F= 18.14	F= 23.63	

² * significant at 10 %; ** significant at 5 %; *** significant at 1 %; standard errors in parentheses

5. Conclusion

In this study, we have examined the impact of co-op work-terms on the academic results of university students. More specifically, we have examined how income from work-terms affects success in studies. The method of instrumental variables was used to correct for the endogeneity of co-op work-terms. Our results reveal that income from co-op work-terms contributes to reducing students' unmet needs and thus improves their academic performance. However, skills acquired during work-terms seem to contribute more to success than the associated financial support. Conversely, other forms of financing, such as loans from the government and income from off-campus jobs, have a negative impact.

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