

# The Impact of Education Funding Sources on Labor Market Earnings among Canadian Graduates

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## Abstract

This study examines how educational financing mechanisms influence the earnings of Canadian postsecondary graduates. Using microdata from the 2020 National Graduates Survey (NGS) and constructing continuous earnings measures with support from the 2023 Labour Force Survey, the analysis estimates log-linear OLS models to assess the association between financing sources and labour-market outcomes. The results show that reliance on government loans and government grants is associated with significantly lower earnings, while savings or work income, bank loans, and employer funding correspond to higher earnings. These patterns remain robust after controlling for demographic, educational, and regional characteristics. The findings provide insight into how financing structures shape human-capital development and labour-market trajectories in Canada.

## 1 Introduction

In modern economies, education functions as one of the most important forms of human-capital investment, enabling individuals to enhance their productivity and economic potential. From this perspective, labour-market earnings can be interpreted as a practical and observable indicator of the economic return generated by educational investments. Higher earnings reflect greater productivity, stronger labour-market attachment, and larger contributions to economic output and tax revenues. For governments, this connection creates a strong incentive to understand which forms of educational financing yield the highest economic returns, since substantial public resources—through loans, grants, and research funding—are allocated to support postsecondary education each year. Evaluating how these different funding mechanisms translate into labour-market outcomes is therefore both an academic priority and a policy necessity.

The importance of this topic is further underscored by the diversity of financing structures available to Canadian students. Individuals rely on government loans, grants, scholarships,

research and teaching assistantships, employment earnings, and family support to finance postsecondary education. These financing structures shape students' academic experiences and skill development through several key channels. A first channel relates to time allocation and academic engagement. Empirical evidence shows that students who work more than 15–20 hours per week experience reduced study time, weaker academic performance, and limited access to high-impact educational activities such as research projects and internships (Darolia, 2014; Scott-Clayton, 2012). Because academic performance and skill acquisition are closely associated with later earnings, these constraints place loan-dependent or work-dependent students at a structural disadvantage.

A second channel operates through human-capital formation. Students supported by scholarships, grants, or family resources experience fewer financial barriers and can devote more time to coursework, research involvement, and experiential learning—activities that are well documented to improve analytical ability, problem-solving skills, and labour-market readiness (Oreopoulos and Petronijevic, 2018). Research assistantships and teaching assistantships (RA/TA) represent particularly effective forms of support because they combine financial resources with professional training and faculty mentorship. Evidence shows that RA/TA positions increase research productivity, enhance professional preparedness, and facilitate smooth transitions into research-intensive or higher-skilled occupations (Kim et al., 2022; Mena et al., 2013).

A third channel concerns debt burden and post-graduation job choice. Graduates who rely heavily on student loans face immediate repayment obligations, which shape their early-career decisions. High debt loads are associated with shorter job searches, a preference for higher-paying jobs regardless of long-term fit, and reduced flexibility to pursue advanced study or research opportunities (Rothstein and Rouse, 2011; Minaya and Scott-Clayton, 2017). These behavioural responses illustrate how financial pressure can constrain human-capital investment even after graduation.

Historical Canadian evidence reinforces these mechanisms. Earlier analyses of Canadian cohorts demonstrate that substantial borrowing is associated with slower financial stabilization, delayed career development, and a stronger tendency to prioritize short-term earnings over long-term occupational fit (Hiscott, 1996). Together, these insights highlight that financing structures have far-reaching implications for both individual economic outcomes and broader patterns of productivity and income distribution.

Despite these important findings, empirical research in Canada remains limited in examining how specific forms of financing—rather than debt alone—affect post-graduation earn-

ings. Most studies focus narrowly on general debt levels or academic performance, without distinguishing the heterogeneous effects of scholarships, loans, RA/TA positions, employment income, or family support. Given the significant variation in financing patterns among Canadian graduates, and the economic importance of earnings as a proxy for productivity, this gap represents a meaningful limitation in the literature. The present study addresses this gap by using microdata from the 2020 National Graduates Survey to analyze how detailed categories of educational financing are associated with labour-market earnings. By interpreting earnings as an indicator of individual productivity, this research provides evidence relevant to both educational policy design and broader economic-development strategies.

To address this question, this study uses microdata from the 2020 National Graduates Survey (NGS), which provides detailed information on graduates' educational financing, demographic characteristics, and labour-market outcomes approximately three years after graduation. Earnings are measured in logarithmic form, and ordinary least squares (OLS) regressions are estimated to examine the association between different funding sources and post-graduation earnings. The analysis compares a baseline specification including only financing variables with a full specification that controls for demographic, educational, regional, and family-background characteristics. Robust standard errors are used to account for heteroskedasticity.

The results indicate that reliance on government student loans and government grants is associated with lower earnings, even after controlling for observable characteristics. In contrast, financing through personal savings or employment income, bank loans, and employer funding is associated with higher earnings. These findings suggest that educational financing mechanisms play an independent role in shaping early-career labour-market outcomes, beyond differences in individual background characteristics. By interpreting earnings as a proxy for individual productivity, the study provides evidence relevant to the design of student funding policies and broader economic-development strategies in Canada.

## 2 Literature Review

The relationship between educational financing and labour-market outcomes has been examined across several strands of research, with most studies emphasizing how financial constraints, debt burdens, and work effort during studies influence educational attainment and subsequent earnings. Early contributions in the human-capital literature argue that individuals invest in education when the present costs are outweighed by expected future returns,

with earnings representing the primary measurable outcome of these investments (Becker, 1964). This framework underlies much of the empirical work examining how financing structures affect skill accumulation, academic performance, and post-graduation job choices.

A first body of literature focuses on the effects of student employment during postsecondary study. Evidence consistently shows that working more than 15–20 hours per week has negative consequences for academic performance, study time, and engagement in high-impact learning opportunities (Darolia, 2014; Scott-Clayton, 2012). These findings suggest that students who rely heavily on employment income—often because of insufficient grants, scholarships, or family support—may face structural disadvantages that affect their human-capital formation and, ultimately, their labour-market earnings. Reduced access to research opportunities, internships, and experiential learning can further compound these disadvantages, given that such experiences are positively associated with productivity, job readiness, and career advancement (Oreopoulos and Petronijevic, 2018).

A second strand of research examines the role of grants, scholarships, and assistantships in shaping academic and labour-market outcomes. Students who receive scholarships or family support typically face fewer financial barriers and are able to dedicate more time to academic and professional development activities. Research assistantships (RA) and teaching assistantships (TA) play a particularly important role because they combine financial compensation with professional skill development, faculty mentorship, and research exposure. These positions improve research productivity, strengthen technical skills, and facilitate transitions into high-skilled occupations (Mena et al., 2013; Kim et al., 2022). In STEM fields specifically, RA support is strongly associated with higher publication rates, greater participation in faculty-led research, and smoother transitions into postdoctoral or research-intensive employment. These findings demonstrate that the type of financial support received during graduate study has meaningful implications for both educational experiences and subsequent labour-market outcomes.

A third area of research considers the effects of student debt on early-career decisions. High debt burdens shorten job searches, shift preferences toward higher-paying but potentially less suitable occupations, and discourage graduates from pursuing advanced degrees or research opportunities that may offer higher long-term returns (Rothstein and Rouse, 2011; Minaya and Scott-Clayton, 2017). These behavioural responses to debt indicate that financial pressure can restrict valuable forms of human-capital investment even after graduation. Debt is also linked to delayed household formation, reduced geographic mobility, and slower accumulation of financial assets, all of which may indirectly influence labour-market

outcomes.

Canadian evidence, although more limited, supports these mechanisms. Early work by (Hiscott, 1996) finds that graduates with higher borrowing levels experienced slower financial stabilization, delayed career development, and greater reliance on short-term earnings. More recent evidence by (Essilfie and Mueller, 2024) shows that academic performance, GPA, and labour-market earnings are closely linked in Canada, reinforcing the importance of the academic channels affected by financing structures. Other studies examining Canadian higher education financing note that reliance on loans is more prevalent among lower-income families and under-represented groups, raising equity concerns regarding how financing structures shape long-term earnings (Hiscott, 1996). Despite this, the literature has not systematically examined the differential impacts of detailed financing categories—such as bank loans, credit-card borrowing, personal savings, or employer assistance—on post-graduation earnings.

Overall, existing research highlights several mechanisms through which financing structures influence labour-market outcomes, including time allocation, academic performance, research engagement, skill development, and post-graduation job choice. However, gaps remain in understanding these relationships in the Canadian context, particularly regarding the heterogeneous effects of specific financing sources. The present study contributes to this literature by providing detailed empirical evidence from the 2020 National Graduates Survey, focusing on how individual financing mechanisms relate to labour-market earnings shortly after graduation. This contributes to filling a meaningful gap in the Canadian evidence base and provides new insight for policymakers responsible for designing funding systems that enhance student success and economic productivity.

### 3 Data and Methodology

This study relies on microdata from the 2020 National Graduates Survey (NGS), released by Statistics Canada in 2023. The dataset contains nationally representative information on graduates’ demographic backgrounds, educational histories, financial resources during their studies, and labour-market outcomes three years after graduation. To ensure consistency in measuring labour-market performance, the analytical sample is restricted to respondents reporting valid and strictly positive annual earnings.

Individuals reporting zero or missing earnings are excluded from the analysis. This restriction is required because the dependent variable is defined as the natural logarithm of earnings, which is undefined for non-positive values. Consequently, the analysis focuses on

wage determination conditional on employment rather than labour-force participation. To assess the robustness of this restriction, all models are estimated using heteroskedasticity-robust (HC1) standard errors, with results remaining stable across specifications.

Table 1 reports summary statistics for the final estimation sample. The sample consists of 12,672 individuals with strictly positive reported annual earnings three years after graduation. Average log earnings equal 10.96, indicating substantial dispersion in labour-market outcomes across graduates.

Educational financing patterns exhibit considerable heterogeneity. The most common source of financing is personal savings or employment income, used by approximately 26% of graduates. Government student loans represent the second most prevalent financing mechanism (21.5%), followed by family financial support (15.9%). Scholarships and RESP withdrawals each account for roughly 10% of financing sources. Government grants are used by about 5.9% of individuals, while bank loans, employer funding, and credit-card financing are relatively uncommon.

Because financing variables are coded as binary indicators, their sample means can be interpreted as proportions. These summary statistics highlight substantial variation in how Canadian graduates finance their education, providing a meaningful basis for examining how different financing mechanisms are associated with post-graduation earnings.

Table 1: Summary Statistics of the Estimation Sample

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>
Log earnings	10.962	0.584
Government loan	0.215	0.411
RESP	0.095	0.294
Government grant	0.059	0.235
Non-government grant	0.018	0.131
Scholarship	0.101	0.301
Savings / work income	0.260	0.439
Family support	0.159	0.3652
Bank loan	0.065	0.247
Credit card financing	0.015	0.123
Employer funding	0.020	0.139

*Notes:* The table reports summary statistics for the final estimation sample. Financing variables are binary indicators; means therefore represent the share of graduates using each financing source. The sample includes individuals with strictly positive reported earnings.

## Dependent Variable

The outcome variable is the natural logarithm of annual earnings. Because the NGS reports earnings as categorical ranges rather than continuous values, category midpoints were assigned to each bracket. For the open-ended income groups—below \$30,000 and above \$90,000—median annual earnings were obtained from the 2023 Labour Force Survey (LFS) to produce more accurate estimates. Observations with missing or zero reported earnings were removed before the log transformation.

Formally, the dependent variable is defined as:

$$\ln(\text{earnings})_i,$$

which allows coefficient estimates to be interpreted as approximate percentage differences in earnings.

## Financing Variables

The main explanatory variables capture the mechanisms graduates used to finance their education. Each financing category is coded as a binary indicator. These include: government student loans, RESP withdrawals, government grants, non-government grants or scholarships, merit-based scholarships, personal savings or employment income, family financial support, bank loans, credit-card financing, and employer funding.

The omitted reference category is *Other Funding*.

## Control Variables

To isolate the association between financing mechanisms and post-graduation earnings, the full model incorporates controls for: gender, age category, province of study, citizenship or immigration status, highest level of education prior to the program, parental education, field of study, and prior work experience.

All categorical characteristics are represented using mutually exclusive dummy variables.

## Econometric Specification

Two regression specifications are estimated. The baseline model includes only financing variables:

$$\ln(\text{earnings})_i = \alpha + \beta G_i + \mu_i.$$

The full model adds demographic, educational, and regional controls:

$$\ln(\text{earnings})_i = \alpha + \beta G_i + \gamma X_i + \mu_i.$$

Both models are estimated using ordinary least squares (OLS). Because cross-sectional earnings data typically exhibit heteroskedasticity, results are reported using both standard and heteroskedasticity-consistent (HC1) standard errors. Coefficients in the log-earnings model can be interpreted as approximate percentage differences relative to the omitted funding category.

## 4 Results

This section presents the estimated associations between educational financing sources and post-graduation earnings. Table 2 reports the baseline OLS estimates without controls, while Table 3 presents the full specification including demographic, educational, regional, parental, and work-history controls. Robust (HC1) standard errors are used for inference in the full model, and results are compared to ensure stability across specifications.

### 4.1 Baseline Model

Table 2 shows that several financing sources are significantly associated with log earnings in the baseline specification. Reliance on government student loans is associated with approximately 3.3% lower earnings relative to the omitted funding category. RESP funding is linked to about 4.6% lower earnings, and government grants show the largest negative association, roughly 8.9%. Credit-card borrowing is also negatively related to earnings, with an estimated reduction of about 10%.

In contrast, financing through personal savings or work income is associated with about 7.9% higher earnings, while bank loans correspond to approximately 14.4% higher earnings. Employer funding displays the strongest positive association, implying an earnings premium of roughly 31.8%. Other sources of funding are not statistically distinguishable from the reference category in the baseline model. As expected for a specification without controls, the explanatory power is limited ( $R^2 = 0.017$ ).



## 4.2 Full Model with Controls

Table 3 reports results after adding the full set of controls. The explanatory power rises substantially ( $R^2 = 0.212$ ), confirming that observable demographic and educational characteristics account for a large share of earnings dispersion. Importantly, several financing effects remain statistically significant and economically meaningful.

Government loans continue to be negatively associated with earnings (about 2.9%), and government grants retain a sizable negative relationship (around 7.3%). On the positive side, savings or work income remains associated with higher earnings (about 3.8%), as do bank loans (approximately 6.9%). Employer funding remains a strong predictor of higher earnings, though the magnitude declines to roughly 15.8% once controls are included. The baseline negative relationships for RESP and credit-card financing are no longer statistically significant in the full model, indicating that those associations were driven by compositional differences captured by the controls.

Robust HC1 standard errors yield inference that is nearly identical to conventional standard errors, indicating that heteroskedasticity does not materially affect the key conclusions. Overall, certain financing sources retain independent associations with earnings even after controlling for rich observable characteristics.

Table 2: Baseline OLS Regression (No Controls)

Variable	Coefficient	Std. Error	p-value
GovLoan	-0.0331**	0.013	0.011
RESP	-0.0459**	0.018	0.010
GovGrant	-0.0894***	0.024	0.000
NonGovGrant	0.0106	0.039	0.788
Scholarship	0.0254	0.018	0.167
Savings	0.0788***	0.012	0.000
FamilySupport	0.0053	0.037	0.713
BankLoan	0.1436***	0.021	0.000
CreditCard	-0.0995**	0.042	0.015
EmployerFunding	0.3183***	0.037	0.000

Notes: Dependent variable is  $\ln(\text{earnings})$ .

\*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Reference category: OtherFunding.

$R^2 = 0.017$ .

Table 3: Full OLS Regression with Controls (Robust HC1 Standard Errors)

Variable	Coefficient	Std. Error	p-value
GovLoan	-0.0291**	0.012	0.017
RESP	-0.0073	0.017	0.674
GovGrant	-0.0728***	0.022	0.001
NonGovGrant	-0.0293	0.040	0.463
Scholarship	-0.0247	0.017	0.157
Savings	0.0379***	0.011	0.000
FamilySupport	0.0087	0.032	0.790
BankLoan	0.0690***	0.021	0.001
CreditCard	-0.0582	0.036	0.105
EmployerFunding	0.1580***	0.022	0.000

Notes: Dependent variable is  $\ln(\text{earnings})$ .

Robust HC1 standard errors reported.

\*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Reference category: OtherFunding.

$R^2 = 0.212$ .

## 5 Conclusion

This study examined how different sources of educational financing are associated with the labour-market earnings of Canadian postsecondary graduates. Using microdata from the 2020 National Graduates Survey (NGS), supplemented with Labour Force Survey medians to construct continuous income measures, the analysis estimated log-linear OLS models to evaluate whether financing mechanisms influence earnings three years after graduation. Two specifications were estimated: a baseline model including only financing variables, and a full model including demographic, educational, regional, and parental characteristics. Robust HC1 standard errors were used to ensure inference was not affected by heteroskedasticity.

Several key findings emerged. Government student loans and government grants were consistently associated with lower earnings, even after controlling for observable characteristics. These negative associations suggest that graduates relying heavily on government support may experience structural constraints during their studies—such as reduced time for coursework, fewer opportunities for experiential learning, and higher levels of financial stress—that ultimately influence labour-market outcomes. In contrast, financing through personal savings or employment income, bank loans, and employer funding showed positive associations with earnings. These mechanisms likely reflect greater financial stability, stronger labour-market attachment during studies, or access to work environments that build relevant human capital.

Although the explanatory power of the baseline model was modest, the inclusion of con-

trols substantially increased the R-squared, indicating that demographic and educational characteristics explain a large share of variation in earnings. Nonetheless, the fact that several financing variables remained statistically significant even in the full model highlights the independent role of financing mechanisms in shaping economic outcomes. This reinforces the idea that how students finance their education—beyond their background characteristics—plays a meaningful role in their post-graduation trajectories.

The findings point to several policy implications. First, reliance on government loans and grants appears associated with lower earnings, suggesting that financial support systems may need to better account for the non-monetary constraints faced by loan-dependent students. Second, the strong positive relationship between employer funding and earnings highlights the value of integrating work-based learning opportunities and partnerships between institutions and employers. Third, the results underscore the importance of early access to financial stability, as students with savings or steady work income during their studies appear to develop stronger labour-market outcomes.

Overall, this study provides new evidence on how educational financing structures shape the economic returns to postsecondary education in Canada. By interpreting earnings as a proxy for individual productivity, the results contribute to understanding how public and private investments in education translate into long-term economic outcomes. Future research may further explore causal pathways, the role of unobserved heterogeneity, and the evolution of financing effects over longer periods after graduation.

## **Limitations and Endogeneity Concerns**

Several limitations should be acknowledged when interpreting the results. First, the analysis relies on cross-sectional data and therefore cannot fully establish causal relationships between educational financing sources and post-graduation earnings. A primary concern is endogeneity arising from unobserved individual characteristics such as ability, motivation, and career orientation. These traits are likely correlated with both the type of financing students obtain and their subsequent labour-market earnings. For example, higher-ability or more motivated students may be more likely to receive scholarships or employer funding and also earn higher wages after graduation, which could bias estimated coefficients upward for these funding sources.

Second, financing choices may be influenced by individuals' expectations about future earnings, generating potential reverse causality. Graduates who anticipate stronger labour-market outcomes may be more willing to rely on private financing or employer support, while

those expecting lower earnings may depend more heavily on government loans. In this case, estimated associations partly reflect earnings expectations rather than the causal impact of financing mechanisms.

Third, the measurement of financing sources is limited by the survey design. Funding variables are reported as binary indicators and do not capture the intensity, duration, or relative importance of each financing source. Classical measurement error may therefore attenuate estimated coefficients toward zero.

Finally, the analysis conditions on positive earnings, focusing on wage determination among employed graduates rather than labour-force participation. If educational financing affects both employment probabilities and wages, sample selection may introduce additional bias. While this approach is standard in earnings regressions, it remains an important limitation.

Taken together, these considerations imply that the estimated coefficients should be interpreted as associations rather than causal effects. Future research could address these limitations by exploiting longitudinal data, instrumental-variable strategies, or structural models that jointly account for education financing, employment selection, and earnings determination.

# Appendix

Table A1: **Table A1: Baseline OLS Regression Without Controls (Robust HC1 SEs)**

Variable	Coef.	Robust SE	z	p-value
const	10.9405	0.007	1478.004	0.000
GovLoan	-0.0331	0.013	-2.562	0.010
RESP	-0.0459	0.018	-2.555	0.011
GovGrant	-0.0894	0.024	-3.724	0.000
NonGovGrant	0.0106	0.043	0.247	0.805
Scholarship	0.0254	0.018	1.382	0.167
Savings	0.0788	0.012	6.655	0.000
FamilySupport	0.0053	0.014	0.372	0.710
BankLoan	0.1436	0.019	7.372	0.000
CreditCard	-0.0995	0.041	-2.438	0.015
EmployerFunding	0.3183	0.032	10.054	0.000
Obs = 12672      R <sup>2</sup> = 0.017      Adj. R <sup>2</sup> = 0.016				

Table A2: Table A2: Full OLS Regression With Controls (Robust HC1 SEs)

Variable	Coef.	Robust SE	z	p-value
const	10.3142	0.138	74.862	0.000
GovLoan	-0.0291	0.012	-2.391	0.017
RESP	0.0073	0.017	0.421	0.674
GovGrant	-0.0728	0.022	-3.272	0.001
NonGovGrant	-0.0293	0.040	-0.734	0.463
Scholarship	-0.0247	0.017	-1.417	0.156
Savings	0.0379	0.011	3.491	0.000
FamilySupport	0.0126	0.013	0.973	0.331
BankLoan	0.0689	0.018	3.761	0.000
CreditCard	-0.0582	0.036	-1.621	0.105
EmployerFunding	0.1580	0.027	5.773	0.000
Male	0.1020	0.010	9.878	0.000
Ontario	0.0522	0.017	3.156	0.002
Quebec	0.0436	0.015	2.897	0.004
WesternProv	0.0414	0.014	3.001	0.003
ageUnder25	0.0533	0.081	0.658	0.510
age25to29	0.0941	0.081	1.161	0.246
age30to39	0.1776	0.081	2.189	0.029
age40more	0.2077	0.082	2.536	0.011
status_ctz_birth	0.2500	0.023	10.972	0.000
status_ctz_nature	0.2058	0.025	8.263	0.000
status_immigrant	0.1568	0.025	6.373	0.000
edu_college	-0.1767	0.105	-1.677	0.094
edu_bachelor	0.0799	0.105	0.759	0.448
edu_graduate	0.3134	0.105	2.978	0.003
fieldOfStudy_edu	0.0156	0.025	0.621	0.535
fieldOfStudy_human	-0.2834	0.030	-9.465	0.000
fieldOfStudy_social	-0.1161	0.025	-4.679	0.000
fieldOfStudy_business	0.0741	0.022	3.363	0.001
fieldOfStudy_lifeScience	-0.1131	0.031	-3.629	0.000
fieldOfStudy_math	0.2037	0.028	7.213	0.000
fieldOfStudy_engineering	0.1994	0.023	8.507	0.000
fieldOfStudy_health	0.0878	0.024	3.664	0.000
WorkBeforeProgram	0.0017	0.000	6.985	0.000
Parent1Edu_higher	-0.0278	0.033	-0.854	0.393
Parent1Edu_same	-0.0323	0.034	-0.963	0.336
Parent1Edu_lower	-0.0353	0.034	-1.048	0.295
Parent2Edu_higher	0.0893	0.025	3.543	0.000
Parent2Edu_same	0.1158	0.028	4.078	0.000
Parent2Edu_lower	0.0460	0.030	1.536	0.125
Obs = 12441	$R^2 = 0.212$	Adj. $R^2 = 0.210$		

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