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Do Layoffs Increase Transitions to Postsecondary Education Among Adults?

by Wen Ci, Marc Frenette, and René Morissette

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...	not applicable
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0^s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p}	preliminary
^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E}	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

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Table of contents

Abstract

Faced with job loss, displaced workers may choose to return to school to help them reintegrate into the labour force. Job losses in a given local labour market may also induce workers who have not yet been laid off to pre-emptively enrol in postsecondary (PS) institutions, as a precautionary measure. Combining microdata and grouped data, this study examines these two dimensions of the relationship between layoffs and PS enrolment over the 2001-to-2011 period.

Using individual-level longitudinal microdata and controlling for the unobserved heterogeneity of workers in a flexible way, the study finds that laid-off male and female workers are 2 to 4 percentage points more likely than other men and women to transition to PS education in the year of the layoff or the following year (from a baseline rate of about 3%). For both sexes, full-time PS enrolment accounts for most of the increase in enrolment. Statistically significant correlations between layoffs and full-time PS attendance are detected between two years before job loss and two years after job loss.

The study also takes advantage of the fact that the 2008-2009 recession increased layoff rates in a differentiated way across Canada and, thus, generated exogenous variation in layoff rates at the regional level. Using grouped data models that allow economic regions to display distinct trends in their rates of transition to PS institutions, the study finds that for every additional 100 adult men laid off in an economic region in a given year, there is an additional 2 to 6 men who enrol in PS education institutions on a full-time basis in the following year. The study also detects a positive relationship between regional layoff rates and regional PS transitions for unmarried women. In line with the notion that some non-laid-off workers may pre-emptively enrol in PS institutions, the study finds evidence that movements in regional layoff rates are positively correlated with short-term transitions to PS institutions for adult male workers aged 35 to 44 who have not been laid off yet.

Executive summary

Every year, thousands of workers lose their job in many industrialized countries (Organisation for Economic Co-operation and Development [OECD] 2013). These displaced workers may adjust to job loss by searching for a new job, migrating, temporarily exiting the labour force or retiring. They may also upgrade their skills through government-sponsored training or by enrolling in postsecondary (PS) institutions.

While it is well documented that many displaced workers experience substantial and persistent earnings losses, the extent to which they enrol in PS institutions after job loss remains—to a large extent—unknown. One reason is that while layoffs involve a large number of workers, they remain relatively rare events. For this reason, household surveys usually do not have the sample size required to support credible analyses of the link between job displacement and the enrolment of adults in PS institutions. To analyze this link, large administrative datasets with information on layoffs and PS attendance are required.

This study takes advantage of such a dataset and assesses the relationship between job displacement and the enrolment of adults in PS institutions. Using a unique administrative dataset that links firm-level identifiers to 100% of records from the T1 Income Tax Returns, T4 Statements of Remuneration Paid, and Records of Employment (ROEs) of Canadians, the study estimates the degree to which layoffs are associated with increased transitions to PS education among adult workers.

The study considers the possibility that, at the regional level, increased layoff rates may increase adult education through three distinct channels. First, job losses might induce some laid-off workers to return to school. Second, in distressed firms, workers who have not yet been laid off might anticipate subsequent job losses as they gather information about impending layoffs. Third, workers whose employers sell intermediate goods to distressed firms might also be worried about their job and enrol in PS institutions as a precautionary measure.

Using individual-level longitudinal microdata, the study finds that laid-off adult male and female workers are 2 to 4 percentage points more likely than other adult male and female workers to transition to PS education in the year of the layoff or the following year (from a baseline rate of about 3%). For both sexes, full-time PS enrolment accounts for most of the increase in enrolment. Statistically significant correlations between layoffs and full-time PS attendance are detected between two years before job loss and two years after job loss. This finding suggests that some laid-off workers start enrolling in PS institutions as soon as they gather information about impending layoffs and that, in some cases, their enrolment lasts more than one year.

Using grouped data, the study finds that for every additional 100 adult men laid off in an economic region in a given year, there is an additional 2 to 6 men who enrol in PS education institutions on a full-time basis in the following year. A positive relationship between regional layoff rates and regional PS transitions is also detected for unmarried women. In line with the notion that some non-laid-off workers may pre-emptively enrol in PS institutions, the study finds evidence that movements in regional layoff rates are positively correlated with short-term transitions to PS institutions for adult male workers aged 35 to 44 who have not been laid off yet.

1 Introduction

Every year, thousands of workers lose their job in many industrialized countries (Organisation for Economic Co-operation and Development [OECD] 2013). These displaced workers may adjust to job loss by searching for a new job, migrating, temporarily exiting the labour force or retiring. They may also upgrade their skills through government-sponsored training or by enrolling in postsecondary (PS) institutions.

While it is well documented that many displaced workers experience substantial and persistent earnings losses,[1] the extent to which they enrol in PS institutions after job loss remains—to a large extent—unknown. One reason is that while layoffs involve a large number of workers, they remain relatively rare events. For this reason, household surveys usually do not have the sample size required to support credible analyses of the link between job displacement and the enrolment of adults in PS institutions. To analyze this link, large administrative datasets with information on layoffs and PS attendance are required.

This study takes advantage of such a dataset and assesses the relationship between job displacement and the enrolment of adults in PS institutions. Using a unique administrative dataset that links firm-level identifiers to 100% of records from the T1 Income Tax Returns, T4 Statements of Remuneration Paid, and Records of Employment (ROEs) of Canadians, the study estimates the degree to which layoffs increase transitions to PS education among adult workers.

The study contributes to the literature on job displacement and adult education in two ways.

First, using individual-level longitudinal microdata, the study provides recent evidence on a potentially important margin of adjustment to job loss: enrolment in PS institutions. In doing so, the study helps shed light in understanding the determinants of adult education, about which relatively little is currently known.[2] The study uses regression models that control for the unobserved heterogeneity of workers—and, thus, potential selectivity—in a flexible way and that allow laid-off workers to adjust their behaviour prior to job loss, as well as after job loss.

Second, the study takes advantage of exogenous spatial and temporal variation in layoff rates induced by the 2008-2009 recession to identify layoff effects on adult education. The study considers the possibility that, at the regional level, increased layoff rates may increase adult education through three distinct channels. First, job losses might induce some laid-off workers to return to school. This is the focus of the aforementioned regression models based on individual-level longitudinal microdata. Second, in distressed firms, workers who have not yet been laid off might anticipate subsequent job losses as they gather information about impending layoffs. Third, workers whose employers sell intermediate goods to distressed firms might also be worried about their jobs and enrol in PS institutions as a precautionary measure.

These mechanisms have testable implications in grouped data. Taken together, the three channels suggest that regions that experience high layoff rates in some years—relative to their own average layoff rate—should, all else being equal, experience relatively high rates of PS attendance during those years. The last two channels suggest that movements in regional layoff rates should be positively correlated with PS attendance for those groups of workers who have not been laid off yet.

The study tests these two hypotheses by grouping microdata at the economic-region level over the 2001-to-2011 period. Because this period includes the 2008-2009 recession, which increased

1. See Jacobson, Lalonde and Sullivan (1993) for the United States; Hijzen, Upward and Wright (2010) for the United Kingdom; Eliason and Storrie (2006) for Sweden; Huttunen, Møen and Salvanes (2006) for Finland; and Morissette, Qiu and Chan (2013) for Canada.
2. In contrast, a massive literature has assessed the causal impact of numerous factors—for example, classroom size, teacher quality and peer effects—on the school achievement of children and teenagers.

layoff rates in a differentiated way across Canada,[3] the study takes advantage of exogenous variation in layoff rates at the regional level when using grouping estimators. Using flexible models that allow economic regions to display distinct trends in their rates of transition to PS institutions, the study quantifies the degree to which economic regions that experienced increases in layoff rates from 2001 to 2011 displayed increases in PS transitions. It also assesses whether groups of workers who had not yet been laid off increased their transitions to PS institutions in the short term as regional layoff rates increased. To the knowledge of the authors, no study has performed this task to date.

Using individual-level longitudinal microdata, the study finds that laid-off adult male and female workers are 2 to 4 percentage points more likely than other adult male and female workers to transition to PS education in the year of the layoff or the following year (from a baseline rate of about 3%). For both sexes, full-time PS enrolment accounts for most of the increase in enrolment. Statistically significant correlations between layoffs and full-time PS attendance are detected between two years before job loss and two years after job loss. This finding suggests that some laid-off workers start enrolling in PS institutions as soon as they gather information about impending layoffs and that, in some cases, their enrolment lasts more than one year.

Using grouped data, the study finds that for every additional 100 adult men laid off in an economic region in a given year, there is an additional 2 to 6 men who enrol in PS education institutions on a full-time basis in the following year. A positive relationship between regional layoff rates and regional PS transitions is also detected for unmarried women. In line with the notion that some non-laid-off workers may pre-emptively enrol in PS institutions, the study finds evidence that movements in regional layoff rates are positively correlated with short-term transitions to PS institutions for adult male workers aged 35 to 44 who have not been laid off yet.

Taken together, these results provide strong evidence that job loss is one determinant of adult education (i.e., it may cause an increase in transitions to PS education among adults).

The paper is organized as follows. Section 2 reviews previous work investigating the link between job loss and adult education. Data and methods are presented in Section 3, and results are shown in Section 4. Section 5 concludes the paper.

2 Background

In response to job loss, workers can choose to upgrade their skills through government-sponsored training or by enrolling in PS institutions.[4] To date, the degree to which displaced workers increase their PS enrolment after job loss has been the subject of few empirical analyses.

To the knowledge of the authors, the only study that examines this issue is by Frenette, Upward and Wright (2011). Using Canadian administrative data, they find that job displacement from firm closures and mass layoffs is associated with a 1-percentage-point increase in PS attendance (on a base of 10%). Since job losses from firm closures or mass layoffs account for less than one-third of all layoffs in Canada (Morissette, Zhang and Frenette 2007), their analysis is—contrary to the present study—restricted to a subset of job losses.

A priori, it is unclear whether many laid-off workers will go back to school after job loss. In many industrialized countries, half of displaced workers find a job within one year of being displaced

3. For example, permanent layoff rates increased more in Windsor–Sarnia than in Ottawa from 2007 to 2009.

4. A sizeable literature investigates the relationship between government-sponsored training for recently displaced workers and labour-market outcomes (e.g., Heckman, Lalonde and Smith 1999; Leigh 1994; Decker and Corson 1995; Dar and Gill 1998; Heinrich, Mueser and Troske 2008). In general, these studies find little to no relationship, possibly for three reasons: studies are usually short-term, the training offered is too specific or too general, and the training targets low-skilled workers (i.e., there is likely a negative selection bias).

(OECD 2013). For this group, the incentives for making a transition into PS education are fairly low. In contrast, displaced workers who become unemployed after displacement face, at least in the short term, a relatively low opportunity cost—in terms of foregone earnings—of going back to school. In addition, some of them might see their earnings rise as a result of additional education.[5] Hence, their likelihood of enrolling in PS institutions might be relatively high.

Yet, other factors might restrict the propensity of displaced workers to go back to school. Parental responsibilities and the non-monetary costs of pursuing more schooling (e.g., the energy and effort required to study and write exams) might limit the degree to which they enrol in PS institutions. In addition, if firms selectively lay off workers who have lower-than-average productivity, and if productivity and learning ability are positively correlated, laid-off workers might have a relatively low ability to learn new concepts. Hence, whether adult displaced workers have a relatively high or a relatively low likelihood of going back to school after job loss is an empirical question.

The goal of this study is to answer this question using a unique administrative dataset that links firm-level identifiers to 100% of records from the T1 Income Tax Returns, T4 Statements of Remuneration Paid, and ROEs of Canadians. Because this dataset tracks workers over an 11-year period, it enables longitudinal microdata analyses that control for the unobserved heterogeneity of individuals in a flexible way. Because this dataset covers virtually all Canadian taxfilers, it allows for the use of grouping estimators that have the power to detect even small layoff effects on PS enrolment.

3 Data and methods

A simple way to model the decision of adults to go back to a postsecondary institution is to consider the following individual-level equation:

$$Y_{iart} = \theta_i + \theta_t + \lambda_i * t + \sum_{k=a}^{b} L^k_{it} * \beta_{1,k} + \beta_2 * URATE_{art} + X_{it} * \beta_3 + \varepsilon_{it}, t = 2001, ...2011, \qquad (1)$$

where Y_{iart} is a binary indicator that equals 1 if worker i in age group a and economic region r attends a PS education institution in year t, and 0 otherwise. L^k_{it} is a vector of binary indicators that equals 1 if worker i is laid off k years prior to year t, and 0 otherwise. The parameters a and b are set to −2 and 5, respectively, thereby allowing job loss to affect transitions to adult postsecondary education between up to two years before layoffs and up to five years after layoffs. $URATE_{art}$ is a gender-specific unemployment rate for individuals in age group a in economic region r during year t, X_{it} is a vector of individual-level characteristics observed in year t, θ_i is a vector of individual-level fixed effects, θ_t is a vector of year effects, and ε_{it} is a random error term.[6]

5. There is evidence that displaced workers ultimately benefit from returning to PS studies. In the United States, Jacobson, Lalonde and Sullivan (2005) find that one year of community college attendance is associated with an increase in earnings of about 9% for men and about 13% for women. In Canada, Frenette, Upward and Wright (2011) find that attending a PS institution shortly after displacement is associated with additional earnings growth of $6,400 for men (on a base of $30,000) and $7,100 for women (on a base of $20,000).
6. As individuals become older (for example, as they move from the 35- to 44-year-old age group to the 36- to 45-year-old age group) or move to a new economic region, they are assigned the gender-specific unemployment rate associated with their new age group or their new economic region.

Equation (1) controls for the unobserved heterogeneity of workers in a flexible way. The vector θ_i accounts for time-invariant unobserved abilities, as well as time-invariant factors such as the first degree, diploma and field of study of individuals.[7] The term $\lambda_i * t$ allows individuals to display person-specific trends in their propensity to attend PS institutions. As a result, the likelihood of attending PS institutions may fall or rise over time at a different pace for laid-off workers and other workers. If it is assumed that $\lambda_i = 0$, then Equation (1) is a fixed-effects model.[8]

Equation (1) uses individual-level longitudinal microdata and tracks individuals over the 2001-to-2011 period to answer the following question: among individuals who face similar labour-market conditions (as measured by $URATE_{art}$), to what extent are those who experience job loss more likely than others to make a transition into PS education?

An alternative question considers the link between regional movements in layoff rates and regional changes in rates of transition to PS education. It acknowledges the possibility that, at the regional level, increased layoff rates may lead to increases in adult education through three distinct channels. First, job losses might induce some laid-off workers to return to a postsecondary institution. This is the focus of Equation (1). Second, in distressed firms, workers who have not yet been laid off might anticipate subsequent job losses as they gather information about impending layoffs. Third, workers whose employers sell intermediate goods to distressed firms might also be worried about their job and enrol in PS institutions as a precautionary measure.[9]

This alternative question can be answered by estimating the following model using data grouped at the economic-region level:

$$Y_{rt} = \lambda_r + \lambda_t + \gamma_r * t + \gamma_1 * L_{rt} + \gamma_2 * U'_{rt} + X_{rt} * \gamma_3 + \varepsilon_{rt}, t = 2001,...2011; r = 1,...66, \quad (2)$$

where Y_{rt} measures the percentage of adult employees in region r who make a transition into PS education from year t to year $t+1$. The coefficient γ_1 captures the impact that the layoff rate L_{rt} may have on these transitions through the three aforementioned channels. Y_{rt} can also be measured for the subset of adult employees who have not been laid off in year t. Doing so allows an implication of the last two channels to be tested (i.e., whether movements in regional layoff rates are positively correlated with short-term transitions to PS institutions for adult male workers who have not been laid off yet).

Regional fixed effects (λ_r), nationwide year effects (λ_t), and region-specific linear time trends ($\gamma_r * t$) are included in Equation (2).[10] X_{rt} is a vector of region-specific characteristics observed in year t, and ε_{rt} is an error term. The intuition behind Equation (2) is simple: if layoffs induce some adults to enter PS education through the three aforementioned channels, then, in those years where economic regions experience high layoff rates relative to their own average layoff rate, economic regions should also display relatively high rates of transition to PS education.

7. The absence of individual-level information on the education level and field of study of workers in the administrative datasets used in the study precludes the estimation of separate versions of Equation (1) by education level or field of study.
8. When person-specific trends are included, Equation (1) is estimated by taking first differences of the dependent variable and of the time-varying regressors included in the right-hand side of Equation (1).
9. Conversely, some workers who were planning to enrol in PS institutions as a means of being promoted might postpone their enrolment if the likelihood of being promoted drops as a result of the difficulties faced by their employers.
10. Region-specific quadratic time trends are also considered.

The variable U'_{rt} measures movements in the unemployment rate of region r in year t that are orthogonal to L_{rt}. More precisely, U'_{rt} is equal to the residuals from a regression in which the unemployment rate in region r in year t is regressed on L_{rt}.[11] The rationale underlying the inclusion of U'_{rt} as a control variable in Equation (2) is the following: economic regions may differ not only in terms of cyclical unemployment (captured by L_{rt}), but also in terms of other types of unemployment. For example, some regions might have greater mismatch unemployment than others, because of a lack of concordance between the skills required for vacant positions and the skills of unemployed individuals. Including U'_{rt} as a control variable in Equation (2) allows the grouped data models to answer the following question: considering regions that are similar in terms of non-cyclical unemployment, to what extent do those experiencing high layoff rates (relative to their own mean) also display relatively high rates of transition to PS education?

Equation (1) is estimated using the Canadian Employer–Employee Dynamics Database (CEEDD), a linked longitudinal administrative dataset that includes data from 2001 to 2011 and that consists of the T1 Personal Master File, the T4 file, the Longitudinal Employment Analysis Program (LEAP) database and the ROE. These files are essentially combined into a 100% longitudinal worker file. This file has been used to track the long-term outcomes of laid-off individuals by Morissette, Zhang and Frenette (2007); Frenette, Upward and Wright (2011); Bonikowska and Morissette (2012); and Morissette, Qiu and Chan (2013).

The sample used for Equation (1) consists of individuals aged 35 to 44 in 2001 who filed a T1 Income Tax Return every year during the 2001-to-2011 period and who, during the 2001-to-2003 period, had positive wages and salaries, no self-employment income and did not experience a permanent layoff. Eight treatment groups are considered. They represent workers whose first permanent layoff after 2003 occurred in year t, where $t = 2004, 2005, \ldots 2011$.[12] The control group consists of individuals who were employees throughout the 2001-to-2011 period (i.e., who had positive wages and salaries and no self-employment income during that period) and who were never permanently laid off during that period.

The dependent variable Y_{iart} is a binary variable indicating PS attendance (either full-time or part-time). It is computed by looking for the presence of federal non-refundable full-time or part-time education deduction credits on the T1 Personal Master File. Although these may be transferred to another family member for tax purposes, it is possible to identify the student to whom the claims apply for the period examined. These credits and deductions apply to any PS attendance, with only a few exceptions (e.g., university or college preparatory courses). They exclude programs that were paid for by another body (e.g., the government). In other words, only self-financed PS schooling is reported in the tax data.

The layoff indicator L_{it}^{k} is built using information on permanent layoffs. Permanent layoffs can be identified through the ROE, which contains the reason for job separation. A permanent layoff occurs if the employee separates from the firm because of a shortage of work and does not return to that firm in the year of the layoff or the year after. To determine this, the longitudinal enterprise identifier available in the LEAP dataset is used.

11. Both the unemployment rate and the layoff rate in this regression are gender-specific and age-group-specific. When groups of workers are defined based on their age group, gender and marital status, both the unemployment rate and the layoff rate in this regression are gender-specific, age-group-specific and marital-status-specific.
12. The treatment groups are selected sequentially. This means that individuals whose first permanent layoff after 2003 occurred in 2004 are included in the 2004 treatment group, regardless of whether they experienced other permanent layoffs in subsequent years.

The other regressors in Equation (1) include year indicators, the age of workers and their age squared, and a gender-specific economic-region unemployment rate of age group a in year t, obtained from the Labour Force Survey (LFS). Equation (1) is estimated separately for men and women. Since Equation (1) is a worker-level model that uses information from economic regions (their unemployment rate), standard errors are clustered at the economic-region level during estimation.

The sample used for Equation (2) consists of employees who are not students in year t. The main sample focuses on those aged 35 to 44 in year t, but, for robustness, results are also shown for those aged 45 to 54. Microdata are aggregated at the economic-region level. In total, there are 66 economic regions in each year, pooled across 11 years. The three territories (Yukon, the Northwest Territories and Nunavut) are excluded, and some small economic regions are grouped together to obtain larger sample sizes.[13]

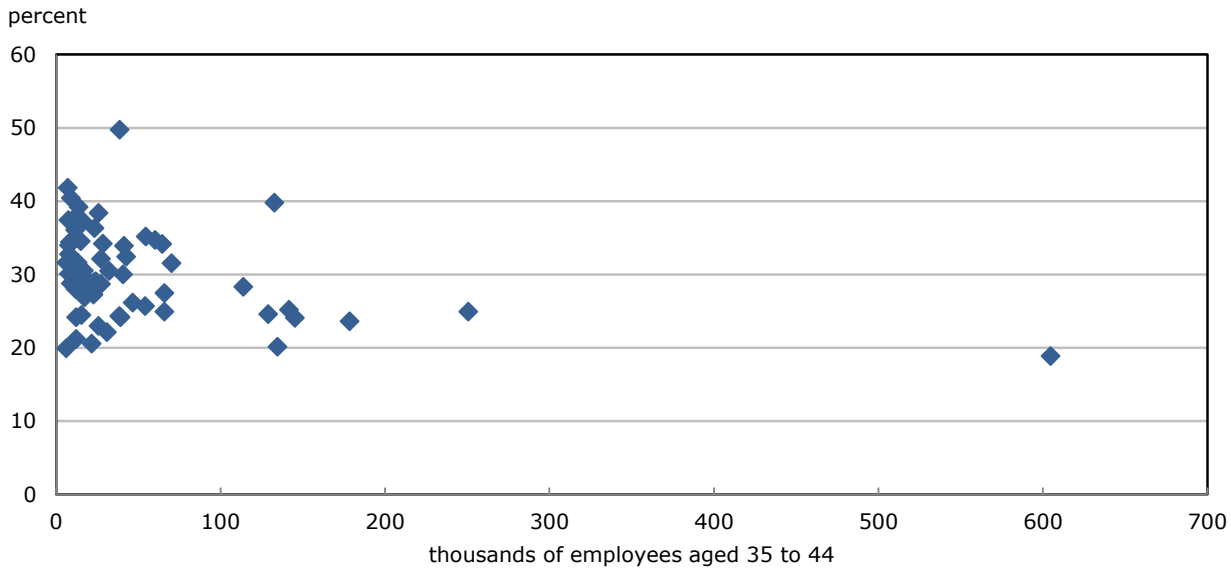
Microdata from the CEEDD and the LFS are used for estimating Equation (2). A transition into PS education is identified through a movement from non-enrolment in one year to enrolment in the next year, using CEEDD data. Aggregating these individual-level transitions across all workers aged 35 to 44 (or 45 to 54) within an economic region yields Y_{rt}, the percentage of adult employees of a given age in region r who make a transition into PS education from year t to year $t+1$. Likewise, CEEDD microdata on permanent layoffs are aggregated into L_{rt}, the percentage of workers of a given age in region r who are permanently laid off in year t.

The other regressors used in Equation (2) include average real hourly wages (in 2002 dollars) of employees aged 35 to 44 (or 45 to 54) in a given economic region in a given year, as well as the percentage of employees of the age group who (a) are immigrants, (b) have a bachelor's degree or more, (c) are employed full time in their main job, (d) are married and have a spouse who is employed full time, and (e) are aged 35 to 39 (for the sample of 35- to 44-year-olds) or 45 to 49 (for the sample of 45- to 54-year-olds). While the percentage of immigrant employees comes from the CEEDD, all other regressors are obtained from the LFS. Like Equation (1), Equation (2) is estimated separately for men and women and uses standard errors that are clustered at the economic-region level.

Even though Equation (2) is estimated by aggregating microdata from the 100% versions of the T1, T4 and ROE files, measurement error might still affect estimates of the key regressor, L_{rt}. This could happen if some of the longitudinal firm-level identifiers—for example, those in education, health care, social assistance and public administration—were somewhat imprecise, thereby leading some temporary layoffs to be labelled as permanent layoffs and vice versa.[14] Since the relative importance of the public sector is generally greater in small economic regions than in larger ones (Chart 1), imprecise firm-level identifiers in education, health care, social assistance and public administration will likely affect L_{rt} more in small economic regions than in larger ones. Since women are employed in the public sector to a greater extent than men, measurement error issues might be more salient for them than for their male counterparts. If so, one strategy to minimize concerns with measurement error in layoff rates is to estimate versions of Equation (2) in which greater weights are given to larger economic regions.[15] For this reason, grouped data results will be shown using both weighted and unweighted versions of Equation (2).

13. Using the 1996 Census of Population, Frenette (2003) finds that 97.3% of the Canadian population resided within 80 kilometres (in straight-line distance) of a college or university.
14. Ci, Morissette and Schellenberg (2016) find evidence that longitudinal firm-level identifiers in education, health care, social assistance and public administration are more subject to measurement error than those in other industries.
15. Weights equal population counts in a given economic region in a given year.

Chart 1
Percentage of jobs in education, health care, social assistance and public administration, by size of economic region, 2001-to-2011 averages



Note: Numbers computed for employees aged 35 to 44 who are not students.

Source: Statistics Canada, Labour Force Survey, 2001 to 2011 (March and September).

4 Results

4.1 Descriptive evidence

In general, relatively few adult workers attend PS institutions. Over the 11-year period during which they were tracked, between 2.4% and 4.1% of the adults who were aged 35 to 44 in 2001 and who were selected in the sample used for Equation (1) attended PS education institutions in a given year (Appendix Table 1). Part-time enrolment among female adults averaged 3.0%, almost twice the rate of 1.6% observed among their male counterparts.[16] Full-time enrolment among female adults averaged 1.4%, compared with 1.0% for male adults.

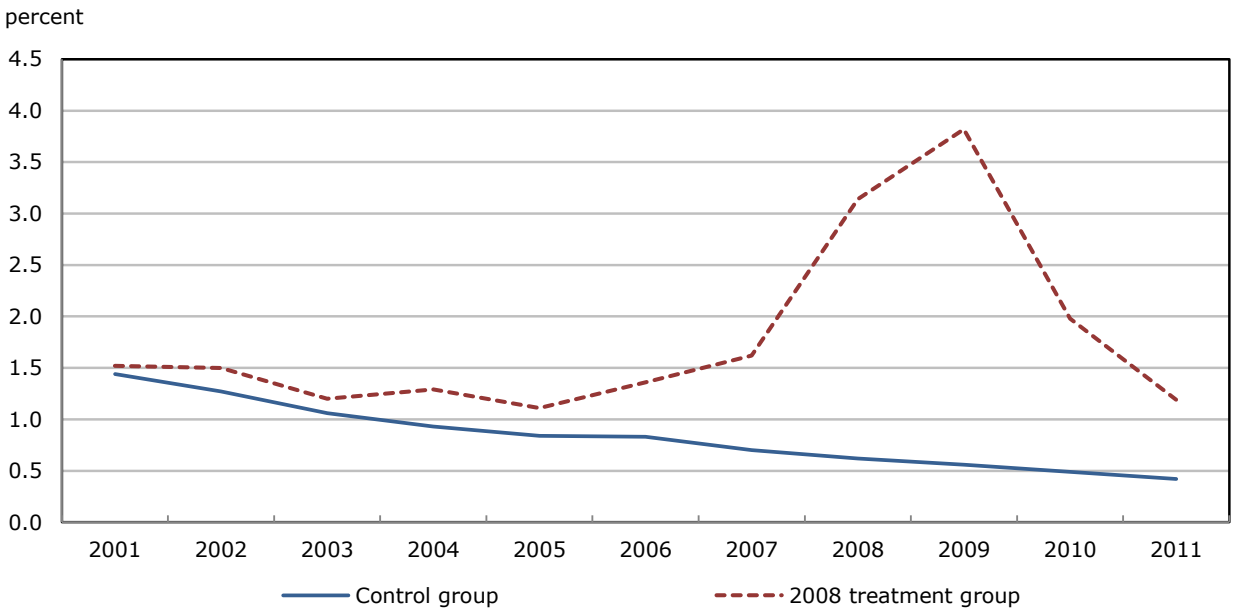
For the samples used for Equation (2), between 1.9% and 2.8% of adult employees who were aged 35 to 44 in year t and were not students that year made a transition into PS education the following year (Appendix Table 2). The corresponding percentages vary between 1.0% and 1.6% for their counterparts aged 45 to 54.[17]

While the average rates of enrolment of adults into PS education institutions are relatively low, the temporal patterns laid-off workers display are markedly different from those of other workers. For instance, as they move from ages 35 to 44 to ages 45 to 54, male adults in the control group

16. On average, 1.2% of male adults selected in the aforementioned sample experienced at least one permanent layoff during the 2001-to-2011 period, a percentage fairly similar to the rate of about 1.0% observed for female adults. During the 2001-to-2011 period, these adults faced an unemployment rate in their economic region that averaged between 5.6% and 6.1%.
17. In Appendix Table 2, the percentage of adult workers who are permanently laid off in a given year varies between 3.2% and 5.8% and, thus, is higher than that shown in Appendix Table 1. The difference largely stems from the fact that the control group included in Appendix Table 1 and used for estimating Equation (1) is a relatively large group of individuals who have experienced no permanent layoffs over the 2001-to-2011 period.

used to estimate Equation (1) saw their rates of full-time enrolment drop almost linearly from about 1.4% in 2001 to 0.4% in 2011 (Chart 2). In contrast, their counterparts who were permanently laid off in 2008 experienced a sharp increase in full-time enrolment, from 1.6% in 2007 to almost 4.0% in 2009. The same qualitative patterns are observed for female adults (Chart 3). The substantial increases in full-time enrolment observed among men and women displaced in 2008 suggest that adult workers respond to job loss by enrolling full time in PS institutions. To assess whether this conclusion holds in a multivariate setting, regression results are presented.

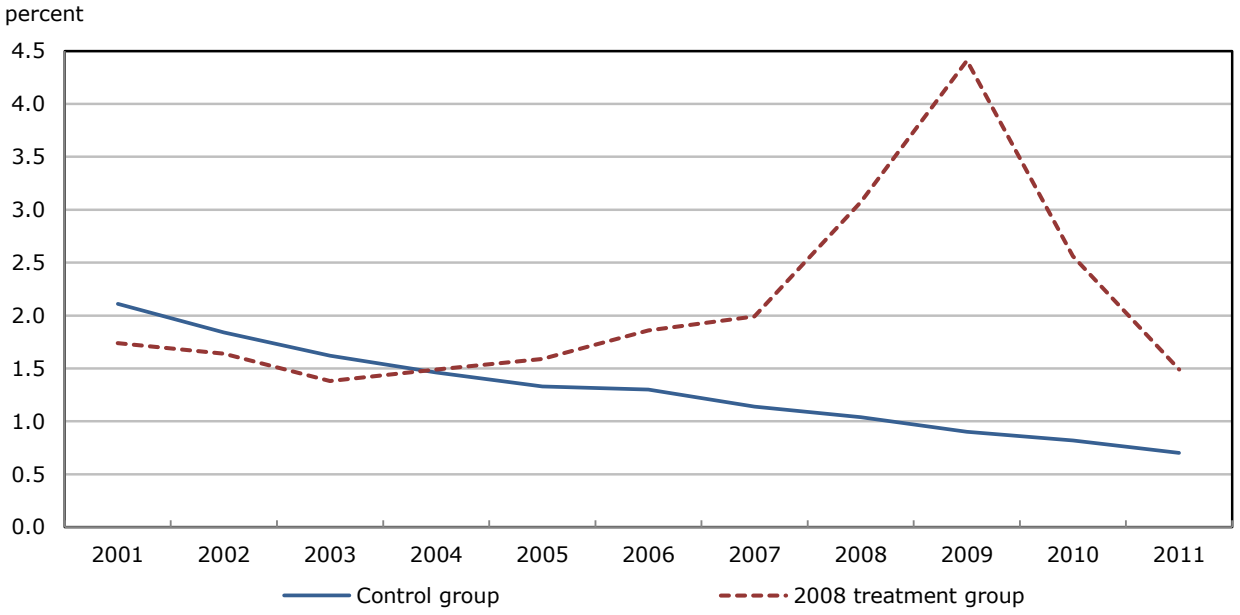
Chart 2
Percentage of male adults attending postsecondary institutions full time, 2001 to 2011



Note: Male employees aged 35 to 44 in 2001 who, during the 2001-to-2003 period, had positive wages and salaries, had no self-employment income, and did not experience permanent layoffs.

Source: Statistics Canada, Canadian Employer–Employee Dynamics Database.

Chart 3
Percentage of female adults attending postsecondary institutions full time, 2001 to 2011



Note: Female employees aged 35 to 44 in 2001 who, during the 2001-to-2003 period, had positive wages and salaries, had no self-employment income, and did not experience permanent layoffs.

Source: Statistics Canada, Canadian Employer–Employee Dynamics Database.

4.2 Regression results

4.2.1 Microdata

Table 1 shows the results of Equation (1) for men. Marginal effects of being laid off are shown from ordinary least squares (OLS) models, fixed-effects models and probit models, for total enrolment, full-time enrolment and part-time enrolment. The probit models are included because they might produce different marginal effects than the OLS models (Wooldridge 2010; Lewbel, Dong and Yang 2012). However, neither the OLS models nor the probit models account for individual-level fixed effects. Thus, the preferred model is the fixed-effects model, and this is the one that will constitute the main focus of the discussion.[18]

The results generally point to a positive relationship between the occurrence of a layoff and the attendance of PS education institutions by adults. This is particularly the case during the year of the layoff (t) or the year after ($t+1$). For example, the fixed-effects model shows that experiencing a layoff is roughly associated with a 2.5-percentage-point increase in the probability of men transitioning into PS education during the year of the layoff or the year after (Table 1). Most of the increase is driven by full-time PS attendance (1.9 to 2.0 percentage points),[19] as opposed to part-time attendance (0.6 to 0.7 percentage points). Both the full-time and part-time enrolment effects are statistically significant at the 0.1% level. Results from the OLS models and probit models are similar.

18. With probit models, the marginal effects shown are average partial effects.
19. Recall that the incidence of full-time PS enrolment among the control group varies between roughly 0.5% and 1.5%, depending on the year considered (Chart 2).

Male enrolment in PS institutions also tends to increase prior to layoffs, as well as several years after layoffs. For example, men who experience a layoff are 0.8 percentage points more likely to attend PS institutions two years before the layoff than other men (according to the fixed-effects model). Five years after the layoff, they are 0.5 percentage points more likely than other men to attend PS institutions. The positive estimates obtained before layoffs are likely the result of pre-emptive enrolment among men who eventually experienced a layoff, while delayed enrolment may have followed a period of job search for displaced male workers.[20]

The results for women are similar in most cases. For example, the estimated marginal effect on total PS attendance is 3.1 percentage points in year t and 3.7 percentage points in year $t+1$, according to the fixed-effects model (Table 2). Once again, most of the increase in attendance is associated with an increase in full-time attendance.

As is the case for men, statistically significant effects are estimated in the years leading up to job loss, as well as for several years after job loss. According to the fixed-effects model, women who experience a layoff are 0.8 percentage points more likely than other women to attend PS institutions two years before the layoff. Five years after the layoff, they are also 0.8 percentage points more likely than other women to attend PS institutions. Regardless of the models used, statistically significant correlations between layoffs and full-time attendance are detected between two years before layoffs and four years after layoffs, for both sexes.[21]

Whether higher unemployment in a given economic region is associated with higher rates of enrolment in PS education institutions differs for adult men and women. The fixed-effects model suggests that a 1-percentage-point increase in unemployment is associated with a 0.025-percentage-point increase in the probability of full-time enrolment among men (Table 1), from a baseline rate of 1.0% (Appendix Table 1). Parameter estimates from OLS models and probit models are smaller and statistically significant only at the 10% level (Table 1). In contrast, none of the marginal effects of unemployment shown in Table 2 for women are statistically significant.

Turning to models that include person-specific trends, Table 3 shows that statistically significant correlations between layoffs and full-time attendance are detected between two years before layoffs and two years after layoffs for both sexes. For example, male and female laid-off workers are, one year after job loss, 1.6 percentage points and 2.5 percentage points, respectively, more likely to attend PS institutions than other male and female workers.

20. Alternatively, the positive estimates in the years after the layoff may reflect enrolment that lasts several years.
21. When gender-specific versions of Equation (1) are estimated separately for married individuals (those married or in common-law relationships) and other individuals, statistically significant correlations between layoffs and full-time attendance are detected between two years before job loss and three years after job loss.

Table 1
Marginal effects of layoffs on enrolment in postsecondary education institutions, men aged 35 to 44 in 2001

	Total enrolment			Full-time enrolment			Part-time enrolment		
	OLS	Fixed-effects	Probit	OLS	Fixed-effects	Probit	OLS	Fixed-effects	Probit
	regression coefficients								
Number of years prior to job loss									
Two	0.008 ***	0.008 ***	0.008 ***	0.008 ***	0.005 ***	0.009 ***	0.000	0.003 ***	-0.0001
One	0.013 ***	0.012 ***	0.014 ***	0.012 ***	0.009 ***	0.014 ***	0.001	0.004 ***	0.002
None	0.025 ***	0.025 ***	0.029 ***	0.023 ***	0.019 ***	0.027 ***	0.004 **	0.007 ***	0.004 **
Number of years after job loss									
One	0.025 ***	0.024 ***	0.030 ***	0.023 ***	0.020 ***	0.029 ***	0.003 **	0.006 ***	0.004 **
Two	0.011 ***	0.010 ***	0.014 ***	0.011 ***	0.007 ***	0.015 ***	0.0002	0.004 ***	0.000
Three	0.007 ***	0.007 ***	0.010 ***	0.008 ***	0.004 ***	0.011 ***	-0.0004	0.003 ***	-0.001
Four	0.006 ***	0.006 ***	0.008 ***	0.006 ***	0.002 *	0.009 ***	0.000	0.004 ***	-0.0001
Five	0.005 ***	0.005 ***	0.008 ***	0.005 ***	0.001	0.008 ***	0.0003	0.004 ***	0.0004
Unemployment rate	-0.012	0.0001	-0.012	0.018 †	0.025 *	0.015 †	-0.031 †	-0.020	-0.031 †

* significantly different from reference category ($p < 0.05$)

** significantly different from reference category ($p < 0.01$)

*** significantly different from reference category ($p < 0.001$)

† significantly different from reference category ($p < 0.10$)

Notes: OLS: ordinary least squares. The numbers should be read as follows: the fixed-effects model indicates that one year after job loss, laid-off male workers are 2.0 percentage points more likely to attend a postsecondary education institution on a full-time basis than other male workers.

Sources: Statistics Canada, Canadian Employer–Employee Dynamics Database and Labour Force Survey, 2001 to 2011.

Table 2
Marginal effects of layoffs on enrolment in postsecondary education institutions, women aged 35 to 44 in 2001

	Total enrolment			Full-time enrolment			Part-time enrolment		
	OLS	Fixed-effects	Probit	OLS	Fixed-effects	Probit	OLS	Fixed-effects	Probit
	regression coefficients								
Number of years prior to job loss									
Two	0.006 ***	0.008 ***	0.006 ***	0.008 ***	0.005 ***	0.008 ***	-0.002 †	0.004 ***	-0.002 †
One	0.012 ***	0.014 ***	0.012 ***	0.011 ***	0.008 ***	0.012 ***	0.001	0.007 ***	0.002
None	0.028 ***	0.031 ***	0.031 ***	0.024 ***	0.022 ***	0.028 ***	0.006 ***	0.011 ***	0.006 ***
Number of years after job loss									
One	0.034 ***	0.037 ***	0.039 ***	0.032 ***	0.028 ***	0.038 ***	0.005 ***	0.011 ***	0.006 ***
Two	0.014 ***	0.017 ***	0.017 ***	0.014 ***	0.011 ***	0.018 ***	0.001	0.007 ***	0.001
Three	0.008 ***	0.011 ***	0.010 ***	0.009 ***	0.005 ***	0.011 ***	0.0001	0.007 ***	0.0002
Four	0.006 ***	0.009 ***	0.008 ***	0.007 ***	0.003 **	0.010 ***	-0.001	0.006 ***	-0.001
Five	0.005 ***	0.008 ***	0.007 ***	0.006 ***	0.002 †	0.009 ***	-0.0004	0.007 ***	-0.001
Unemployment rate	-0.032	-0.022	-0.030	-0.009	0.003	-0.009	-0.031	-0.022	-0.030

** significantly different from reference category ($p < 0.01$)

*** significantly different from reference category ($p < 0.001$)

† significantly different from reference category ($p < 0.10$)

Notes: OLS: ordinary least squares. The numbers should read as follows: the fixed-effects model indicates that one year after job loss, laid-off female workers are 2.8 percentage points more likely to attend a postsecondary education institution on a full-time basis than other female workers.

Sources: Statistics Canada, Canadian Employer–Employee Dynamics Database and Labour Force Survey, 2001 to 2011.

Table 3
Marginal effects of layoffs on enrolment in postsecondary education institutions, models with person-specific trends

	Total enrolment		Full-time enrolment		Part-time enrolment	
	Men	Women	Men	Women	Men	Women
	regression coefficients					
Number of years prior to job loss						
Two	0.005 ***	0.004 ***	0.003 ***	0.003 ***	0.001 *	0.002 *
One	0.005 ***	0.010 ***	0.004 ***	0.006 ***	0.001 *	0.004 ***
None	0.018 ***	0.026 ***	0.015 ***	0.019 ***	0.003 ***	0.008 ***
Number of years after job loss						
One	0.017 ***	0.030 ***	0.016 ***	0.025 ***	0.002 ***	0.007 ***
Two	0.003 *	0.009 ***	0.003 **	0.007 ***	0.000	0.003 **
Three	0.0003	0.004 **	0.001	0.002 *	-0.001 †	0.002 *
Four	0.000	0.001	0.000	0.000	0.000	0.001
Five	0.000	0.001	0.000	0.000	0.000	0.001
Unemployment rate	0.011 †	-0.011	0.011 **	-0.003	0.001	-0.008

* significantly different from reference category (p < 0.05)
** significantly different from reference category (p < 0.01)
*** significantly different from reference category (p < 0.001)
† significantly different from reference category (p < 0.10)

Note: The numbers should read as follows: one year after job loss, laid-off female workers are 2.5 percentage points more likely to attend a postsecondary education institution on a full-time basis than other female workers.

Sources: Statistics Canada, Canadian Employer–Employee Dynamics Database and Labour Force Survey, 2001 to 2011.

4.2.2 Grouped data

Table 4 shows the results from Equation (2) estimated for the entire set of adult employees who are not students in year t. This includes workers who have been laid off during that year, as well as workers who have not been laid off yet.

Weighted regressions that allow for distinct linear trends for each economic region indicate that, for men aged 35 to 44, a 1-percentage-point increase in layoff rates is associated with a 0.048-percentage-point increase in the proportion of men who make transitions to PS education, from a baseline rate of 1.9% (Appendix Table 2). The corresponding number from unweighted regressions—where each economic region carries the same weight—is, at 0.075 percentage points, somewhat higher. These two estimates imply that, for every additional 100 men aged 35 to 44 laid off in a given economic region, an additional 5 to 8 men aged 35 to 44 enrol in PS education institutions in the following year. Compared with these marginal effects, somewhat smaller marginal effects are found for men aged 45 to 54, although those based on weighted data are not statistically significant.

Increases in full-time enrolment account for all of the positive association between layoff rates and adult education for men. For instance, weighted and unweighted regressions indicate that a 1-percentage-point increase in the layoff rate of men aged 35 to 44 in a given economic region is associated with an increase in the proportion of men aged 35 to 44 who make transitions to full-time enrolment. The increase equals 0.063-percentage-point in weighted regressions and 0.054-percentage-point in unweighted regressions. The corresponding estimates drop to about 0.030 percentage points, but are statistically significant at the 10% level, when a more flexible specification that uses quadratic trends at the economic-region level is used for Equation (2). Layoff effects on full-time enrolment that are statistically significant at the 5% level are also detected for men aged 45 to 54, whether region-specific linear trends or region-specific quadratic

trends are used. Overall, the third column of Table 4 indicates that for every additional 100 adult men laid off in an economic region in a given year, there is an additional 2 to 6 men who enrol in PS education institutions on a full-time basis in the following year.

In contrast, there is little evidence in Table 4 of a relationship between layoff rates and PS transitions for women at the economic-region level. This finding may hide differences between married women and unmarried women. Table 5 confirms this hypothesis. Versions of Equation (2) based on weighted data—which minimize concerns with measurement error in layoff rates at the economic-region level—yield a statistically significant relationship between movements in regional layoff rates and transitions to full-time enrolment for unmarried women aged 35 to 44 and for those aged 45 to 54, but not for their married counterparts. Weighted versions of Equation (2) suggest that for every additional 100 unmarried women laid off in an economic region in a given year, there is an additional 4 to 5 unmarried women who enrol in PS education institutions on a full-time basis in the following year. In contrast, results generally do not differ much by marital status for men.

The results shown in Tables 4 and 5 seek to capture the total impact of movements in regional layoff rates on transitions to PS education through the three distinct channels previously identified in this paper. One testable implication of the second and third channels—which refer to non-laid-off workers employed in distressed firms and in other firms—is that movements in regional layoff rates might be positively correlated with short-term transitions to PS institutions for adult male workers who have not been laid off yet.

Table 6 tests this hypothesis by computing Y_{rt} for the subset of adult employees who have not been laid off in year t and regressing Y_{rt} on year effects, region-specific fixed effects, region-specific linear or quadratic trends, L_{rt} and U'_{rt}.[22] There is evidence that adult male workers who have not yet been laid off respond to movements in regional layoff rates. Using models that include region-specific linear trends, a 1-percentage-point increase in layoff rates in a given economic region is, for male employees aged 35 to 44 who have not been laid off in year t, associated with an increase in transitions to full-time enrolment that varies between 0.029 percentage points and 0.035 percentage points.

22. Because the subset of employees who have not been permanently laid off in year t cannot be identified in the LFS, the LFS control variables used in tables 3 and 4 when estimating Equation (2) cannot be used here.

Table 4
Layoff rates and transitions into postsecondary education, grouped data, by age and sex

	Total enrolment		Full-time enrolment		Part-time enrolment	
	Men	Women	Men	Women	Men	Women
	regression coefficients					
Employees aged 35 to 44						
Weighted data						
Economic-region-specific trends						
Linear trends	0.048 †	-0.009	0.063 ***	0.014	-0.006	-0.023
Quadratic trends	0.017	-0.053	0.030 †	-0.018	-0.009	-0.038
Unweighted data						
Economic-region-specific trends						
Linear trends	0.075 *	0.016	0.054 ***	0.007	0.030	0.010
Quadratic trends	0.040 †	-0.032	0.029 †	-0.013	0.018	-0.020
Employees aged 45 to 54						
Weighted data						
Economic-region-specific trends						
Linear trends	0.034	0.004	0.039 **	0.024	0.000	-0.017
Quadratic trends	0.021	-0.017	0.023 *	0.014	-0.001	-0.029
Unweighted data						
Economic-region-specific trends						
Linear trends	0.042 *	-0.004	0.032 *	0.004	0.014	-0.006
Quadratic trends	0.036 *	-0.031	0.021 *	-0.004	0.017	-0.025

* significantly different from reference category ($p < 0.05$)
** significantly different from reference category ($p < 0.01$)
*** significantly different from reference category ($p < 0.001$)
† significantly different from reference category ($p < 0.10$)

Notes: The sample consists of employees who are not students in year *t*. The numbers should be read as follows: using weighted data and controlling for region-specific linear trends (as well as other variables defined in the main text), a 1-percentage-point increase in layoff rates is, for male employees aged 35 to 44, associated with a 0.063-percentage-point increase in transitions into full-time enrolment in postsecondary education institutions.

Sources: Statistics Canada, Canadian Employer–Employee Dynamics Database and Labour Force Survey, 2001 to 2011.

Table 5
Layoff rates and transitions into full-time postsecondary education, grouped data, by age, sex and marital status

	Weighted data		Unweighted data	
	Men	Women	Men	Women
	regression coefficients			
Employees aged 35 to 44				
All	0.063 ***	0.014	0.054 ***	0.007
Married individuals	0.056 **	-0.005	0.045 *	-0.010
Unmarried individuals	0.056 ***	0.051 *	0.037 **	0.030
Employees aged 45 to 54				
All	0.039 **	0.024 *	0.032 *	0.004
Married individuals	0.034 *	0.018	0.030 †	0.010
Unmarried individuals	0.027 **	0.038 *	0.020 †	0.006

* significantly different from reference category ($p < 0.05$)
** significantly different from reference category ($p < 0.01$)
*** significantly different from reference category ($p < 0.001$)
† significantly different from reference category ($p < 0.10$)

Notes: The sample consists of employees who are not students in year *t*. In all regressions, models with region-specific linear trends are used. The numbers read as follows: using weighted data and controlling for region-specific linear trends (as well as other variables defined in the main text), a 1-percentage-point increase in layoff rates is, for unmarried women aged 35 to 44, associated with a 0.051-percentage-point increase in transitions into full-time enrolment in postsecondary education institutions.

Sources: Statistics Canada, Canadian Employer–Employee Dynamics Database and Labour Force Survey, 2001 to 2011.

Table 6
Layoff rates and transitions into postsecondary education among non-laid-off workers, grouped data, by age and sex

	Total enrolment		Full-time enrolment		Part-time enrolment	
	Men	Women	Men	Women	Men	Women
	regression coefficients					
Employees aged 35 to 44						
Weighted data						
Economic-region-specific trends						
Linear trends	0.018	-0.033	0.035 *	-0.006	-0.010	-0.027
Quadratic trends	-0.007	-0.074	0.009	-0.035 *	-0.015	-0.043
Unweighted data						
Economic-region-specific trends						
Linear trends	0.048	-0.009	0.029 *	-0.012	0.027	0.001
Quadratic trends	0.018	-0.060	0.009	-0.035	0.012	-0.031
Employees aged 45 to 54						
Weighted data						
Economic-region-specific trends						
Linear trends	0.010	-0.015	0.018 †	0.006	-0.006	-0.019
Quadratic trends	-0.001	-0.034	0.006	0.000	-0.007	-0.033
Unweighted data						
Economic-region-specific trends						
Linear trends	0.023	-0.013	0.014	-0.007	0.010	-0.004
Quadratic trends	0.018	-0.039 *	0.005	-0.010	0.012	-0.027 †

* significantly different from reference category ($p < 0.05$)

† significantly different from reference category ($p < 0.10$)

Notes: The sample consists of employees who are not students in year *t* and who have not been laid off in year *t*. All models include year effects, region-specific fixed effects, region-specific linear or quadratic trends, layoff rates, and a measure of the unemployment rate that is orthogonal to layoff rates. The numbers should be read as follows: using weighted data and controlling for region-specific linear trends (as well as other variables defined above), a 1-percentage-point increase in layoff rates is, for male employees aged 35 to 44, associated with a 0.035-percentage-point increase in transitions into full time enrolment in postsecondary education institutions.

Source: Statistics Canada, Canadian Employer–Employee Dynamics Database, 2001 to 2011.

5 Conclusion

Understanding the relationship between job loss and postsecondary (PS) attendance is important, given the well-established literature indicating a negative relationship between job displacement and subsequent earnings. Programs already exist to assist displaced workers by offering government-sponsored training. This study provides complementary information by assessing the degree to which Canadian workers adjust to job loss or rising layoff rates in their region through self-financed PS attendance.

Using longitudinal microdata, the study shows that, regardless of their gender and marital status, laid-off employees are more likely than other employees to attend PS institutions in the year of the layoff or the following year. The study also finds that laid-off employees appear to respond to job loss a few years before layoffs occur and that their response—in terms of increased schooling—spans several years.

Using grouped data, the study finds that for every additional 100 adult men laid off in an economic region in a given year, there is an additional 2 to 6 men who enrol in PS education institutions on a full-time basis in the following year. A positive relationship between regional layoff rates and regional PS transitions is also observed for unmarried women. In line with the notion that some non-laid-off workers may pre-emptively enrol in PS education institutions, the study finds evidence that movements in regional layoff rates are positively correlated with short-term transitions to PS institutions for adult male workers aged 35 to 44 who have not been laid off yet.

To date, a massive literature has assessed the causal impact of numerous factors—for example, classroom size, teacher quality and peer effects—on the school achievement of children. Yet, relatively little is known about the determinants of adult education. Taken together, the results from individual-level analyses and group-level analyses provide compelling evidence that job loss is one determinant of adult education.

Appendix Table 1
Descriptive statistics, individual-level data, 2001 to 2011

	Men	Women
	percent	
Adult enrolment		
Postsecondary education	2.4	4.1
Full-time postsecondary education	1.0	1.4
Part-time postsecondary education	1.6	3.0
Time observed relative to displacement		
Two years before	1.2	1.0
One year before	1.2	1.0
During displacement year	1.2	1.0
One year after	1.1	0.9
Two years after	0.9	0.8
Three years after	0.8	0.7
Four years after	0.6	0.5
Five years after	0.5	0.4
Unemployment rate in the economic region of residence	6.1	5.6
	number	
Average age	44.6	44.7
Number of person-year observations	9,562,622	10,429,372

Notes: The sample consists of individuals aged 35 to 44 in 2001 who filed a T1 Income Tax Return from 2001 to 2011 and who, during the 2001-to-2003 period, had positive wages and salaries, no self-employment income, and did not experience a permanent layoff. Eight treatment groups are considered. They represent workers whose first permanent layoff after 2003 occurred in year t, where t = 2004, ... 2011. The control group consists of employees who, during the 2001-to-2011 period, had positive wages and salaries, no self-employment income, and did not experience any permanent layoffs.

Sources: Statistics Canada, Canadian Employer–Employee Dynamics Database and Labour Force Survey, 2001 to 2011.

Appendix Table 2
Descriptive statistics, grouped data, 2001 to 2011

	Men	Women
	percent	
Employees aged 35 to 44		
Starting postsecondary education in year *t*+1	1.9	2.8
Full-time postsecondary education	0.9	1.2
Part-time postsecondary education	1.1	1.8
Laid off in year *t*	5.8	3.6
With a bachelor's degree or more	25.4	27.1
Employed full time	96.9	81.0
Spouse who is employed full time	43.6	64.0
Immigrants	19.2	18.8
	2002 dollars	
Average real hourly wages	22.22	18.44
	percent	
Employees aged 45 to 54		
Starting postsecondary education in year *t*+1	1.0	1.6
Full-time postsecondary education	0.5	0.6
Part-time postsecondary education	0.6	1.1
Laid off in year *t*	5.3	3.2
With a bachelor's degree or more	22.3	21.5
Employed full time	96.8	81.9
Spouse who is employed full time	46.4	58.3
Immigrants	14.6	13.9
	2002 dollars	
Average real hourly wages	23.54	18.79

Note: The sample consists of employees aged 35 to 44 (or 45 to 54) in year *t* who are not students that year.
Sources: Statistics Canada, Canadian Employer–Employee Dynamics Database and Labour Force Survey, 2001 to 2011.

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