Predicted Earnings Losses from Graduating during COVID-19

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Poor labour market conditions at the start of a worker’s career can result in significant declines in earnings for many years. For example, Oreopoulos, von Wachter, and Heisz (2012) estimate using administrative data for graduates from Canadian colleges and universities up to 1999 that a 10 percentage point increase in youth unemployment in the year of graduation leads to a 7 percent decline in earnings five years after graduating. Using more recent cross-sectional survey data from the United States, Schwandt and von Wachter (2019) reach a similar conclusion. Adverse labour market entry conditions and the economic fallout experienced by the unlucky graduates could have broader-reaching implications. An emerging literature has found persistent health effects, including excessive alcohol consumption (Cutler, Huang, and Lleras-Muney 2015; MacLean 2015); obesity and smoking (Cutler et al. 2015); increased incidence of heart attacks in middle age (Maclean 2013); and higher mortality starting in the late 30s as a result of heart and liver disease, lung

Les travailleurs dont les conditions sur le marché du travail laissent à désirer en début de carrière sont exposés à des pertes de revenus pendant plusieurs années. Les étudiants de la cohorte 2021 de diplômés d’établissements canadiens d’enseignement secondaire et postsecondaire ont vu leurs perspectives d’emploi s’étioler par suite des interruptions de l’activité économique visant à freiner la propagation de la maladie provoquée par le coronavirus 2019 (COVID-19). Notre objectif, dans le présent article, est de prédire les pertes de revenu que risquent les membres de cette cohorte. Nous utilisons les données du recensement de la population pour démontrer qu’une hausse de 1 pour cent du taux de chômage au moment de la diplomation entraîne une diminution moyenne de 1,5 à 4 pour cent des revenus. À l’aide de prévisions du taux de chômage provenant de diverses sources, nous prédisons ensuite de quelle façon les diplômés de 2021 devraient s’en sortir. Nous supposons, dans l’application de cette méthode, que les récessions antérieures nous éclairent sur les conséquences de la récession actuelle. Nous estimons que le diplômé moyen de 2021 sera privé de 5 à 12 pour cent du revenu qu’il aurait gagné au cours de ses premières années de carrière si la pandémie n’avait pas sévi.

Mots clés : interruption des activités économiques, éducation, diplomation, revenus de travail, récession, taux de chômage

Introduction

Poor labour market conditions at the start of a worker’s career result in significant declines in earnings for many years to follow. For example, Oreopoulos, von Wachter, and Heisz (2012) estimate using administrative data for graduates from Canadian colleges and universities up to 1999 that a 10 percentage point increase in youth unemployment in the year of graduation leads to a 7 percent decline in earnings five years after graduating. Using more recent cross-sectional survey data from the United States, Schwandt and von Wachter (2019) reach a similar conclusion. Adverse labour market entry conditions and the economic fallout experienced by the unlucky graduates could have broader-reaching implications. An emerging literature has found persistent health effects, including excessive alcohol consumption (Cutler, Huang, and Lleras-Muney 2015; MacLean 2015); obesity and smoking (Cutler et al. 2015); increased incidence of heart attacks in middle age (Maclean 2013); and higher mortality starting in the late 30s as a result of heart and liver disease, lung

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cancer, and drug overdoses (Schwandt and von Wachter 2019). Another strand of the literature has found that cohorts entering the labour market under weaker conditions experience lower marital rates and fertility (Currie and Schwandt 2014), higher divorce rates, and a greater likelihood of living alone (Schwandt and von Wachter 2019). Attitudes and behaviours can also be affected, such as believing that success in life depends more on luck than effort and supporting more government redistribution (Giuliano and Spilimbergo 2014), reduced self-esteem (Maclean and Hill 2015), and increased criminal activity (Bell, Bindler, and Machin 2018).

The economic lockdowns to stop the spread of the novel coronavirus disease 2019 (COVID-19) led to significant declines in economic activity in Canada and many other countries. The Bank of Canada’s April 2020 Monetary Policy Report estimates that the short-term economic decline is one of the largest on record (Bank of Canada 2020). Notwithstanding temporary measures by the Government of Canada to help students overcome financial hardship—such as suspending principal repayments and interest on student and apprentice loans until October 2020 and introducing the Canada Emergency Student Benefit (CESB; Canada 2020)—students who were expecting to graduate from high school, college, or university when the labour market was performing well and unemployment was low saw employment prospects disappear (Jones et al. 2020; Lemieux et al. 2020).

The labour market has not yet fully rebounded, particularly for youth (Statistics Canada 2020). To demonstrate this, in Table 1 we report monthly estimates of unemployment for all workers (aged 15 y and older) and youths (aged 15–24 y) from January to December 2020. These estimates derive from Statistics Canada’s monthly Labour Force Surveys. Particularly among youths, the lockdowns led to a surge in unemployment (up to almost 30 percent) that did not decline for several months. Moreover, by the end of the year, unemployment for youths was still 7.4 percentage points higher than it was at the start of the year.

The goal of this article is to use the analysis of Oreopoulos et al. (2012) and Schwandt and von Wachter (2019) with recent data from Canada to predict earnings losses for the 2021 cohort as a result of graduating during the COVID-19 pandemic. To this end, the analysis proceeds in two stages. First, we replicate Oreopoulos et al.’s and Schwandt and von Wachter’s studies using Statistics Canada’s Census of Population data spanning 1986 to 2016 to predict the effect that graduating during a recession has on earnings. This replication exercise is an important first step because it allows us to incorporate more recent years of data into the analysis, including the time period spanning the Great Recession of 2008–2009, and because doing so allows us to estimate the earnings losses for high school graduates who were not included in the Oreopoulos et al. sample because of data limitations. We find that a 1 percentage point increase in the unemployment rate at the time of graduation leads to an approximately 1.5–4 percent decrease in earnings, on average. Moreover, this effect is larger among individuals entering the labour market with lower levels of education than among their higher-educated counterparts, and it is slightly larger for women than men. The findings imply that individuals with lower earnings are hit the hardest by the bad luck of graduating in a recession. By separately estimating the extensive and intensive margin effects—defined as the probability of finding a job and change in earnings conditional on holding a job, respectively—we show that both of these effects partly contribute to the overall drop in earnings but that the likelihood of not finding a job within the first year or two after completing school is largest among high school graduates.

Second, we use those results to predict the effects of graduating during COVID-19 on earnings for the class of 2021. Specifically, we collect unemployment forecasts for 2021 that were produced from various sources after the pandemic began and then use those forecasts to predict how this year’s graduating class is expected to fare in the short run (first five years) under those scenarios compared with the labour market conditions that prevailed just before the pandemic began. The forecasts are from large banks (Bank of Montreal [BMO], Canadian Imperial Bank of Commerce [CIBC], National Bank, Royal Bank of Canada [RBC], Scotiabank, and Toronto–Dominion [TD]), the IMF, and the OECD. The findings suggest that this year’s graduating class could lose between 5 and 12 percent of the amount they would have earned over the first few years if the pandemic had not occurred. The estimates vary depending on the level of education and the unemployment

Table 1: Unemployment Rates in 2020, by Month and Age Group

| Month     | Aged ≥ 15 y (1) | Aged 15–24 y (2) |
|-----------|----------------|------------------|
| January   | 5.5            | 10.3             |
| February  | 5.6            | 10.3             |
| March     | 7.8            | 16.8             |
| April     | 13.0           | 27.2             |
| May       | 13.7           | 29.4             |
| June      | 12.3           | 27.5             |
| July      | 10.9           | 24.2             |
| August    | 10.2           | 23.1             |
| September | 9.0            | 18.9             |
| October   | 8.9            | 18.8             |
| November  | 8.5            | 17.4             |
| December  | 8.6            | 17.7             |

Source: Statistics Canada, Labour Force Survey.
rate forecast used and do not take into account government measures that offset the labour market losses. Most of the predicted loss occurs in the first few years after graduation. An important caveat to these findings is that our approach assumes the labour market effects of previous recessions are informative about what we can expect from the current recession. The economic lockdowns during this pandemic have disproportionately affected service workers and others who hold jobs that are not “essential” services but cannot be done from home. The initial effect of the pandemic on youth unemployment has been large, but the speed of recovery remains to be determined.3

This article proceeds as follows. In the next section, we describe the data and methodology used in the study. Then, we present the results from the Oreopoulos et al. (2012) and Schwandt and von Wachter (2019) replication and forecasting analyses, respectively. We then briefly conclude.

Data and Methodology

In this section, we begin by describing the dataset used, the sample restrictions, and some assumptions imposed on the data to construct a few key variables for the analysis. Then, we present the empirical model and describe how we predict earnings losses using the unemployment rate forecasts from various institutions.

Data and Sample

This study uses Statistics Canada’s (quinquennial) Census of Population for the years spanning 1986 to 2016. Designed to provide a statistical portrait of the country every five years, the census is an excellent source for this project because it includes a wide set of information needed in the analysis, including the respondent’s year of birth; provinces of birth, residence, and study; whether the respondent is a student; highest level of education; labour force status; and labour market earnings (if employed). This time period was chosen because 1986 is the first year in which province of birth is observed and 2016 is the most recent year for which census data are available for analytical purposes at the time of writing.

We closely follow the sample selection and methodology of Schwandt and von Wachter (2019), who also use a similar dataset throughout their analysis. Specifically, we restrict the sample to respondents aged 15–40 years who are not still in school in order to model short-term and intermediate effects among individuals who likely transition from school to the labour market along a linear path. Dropping current students focuses the analysis on individuals who are graduating but not continuing their studies, such as transitioning from high school to college or university. For reasons described further later, individuals are included if they were born, resided in, or studied in one of the ten provinces. We exclude those who self-report that they are not in the labour force in order to centre the extensive margin analysis on involuntary joblessness. Last, as in Schwandt and von Wachter, we condition on those with 1 to 15 years of potential work experience to observe how the effect of graduating in a recession evolves over time.

A limitation of the census is that it is quinquennial, which means that, although it is possible to observe respondents who graduated in any given year, the corresponding unemployment rate at the time of graduation can only be calculated for the survey years. Thus, we supplement the analysis using annual unemployment rate estimates from the 1976 to 2016 waves of the Labour Force Survey. For robustness, we distinguish between four different measures: (a) general unemployment rate among individuals aged 15 years and older, (b) youth unemployment rate among individuals aged 15–24 years, (c) youth unemployment rate for women, and (d) youth unemployment rate for men. Although Oreopoulos et al. (2012) and Schwandt and von Wachter (2019) primarily use youth rates in their analyses because they are likely the best indicator of the labour market tightness for recent graduates, they note that results do not meaningfully change using the general rate instead. Our approach differs in that we rely on the general rate because all of the unemployment rate forecasts that we use to predict earnings losses are full population estimates (we did not find any that were specific to youths); however, as we show, our results are also robust to using the youth rate.

Accordingly, the analysis is limited to individuals graduating from high school, college with a certificate or diploma, and from college with a bachelor’s degree. This means other graduates, such as from trade schools, apprenticeships, and graduate programs, are excluded. We impose this restriction for methodological reasons because the time to graduation for trades-related programs is much more variable than it is in these other cases and because the sample sizes for graduates of master’s, doctoral, and related programs are small.

The descriptive statistics for the sample of census respondents that we use throughout this analysis are presented in Table 2. On balance, individuals are aged 30 years old and are divided equally between men and women. The distribution in the number of graduates by province of residence is about proportional to the population-wide distribution. About 40 percent of respondents hold a high school diploma as the highest level of education and the remaining 60 percent hold either a college certificate or diploma or a bachelor’s degree. Approximately 95 percent of the sample has some employment income, suggesting that any extensive margin responses to changes in the unemployment rate at the time of graduation are likely small. The average earnings are $40,300 expressed in 2016 constant dollars.
Empirical Approach

To estimate the effect of graduating in a recession, we follow the approach used by Oreopoulos et al. (2012) and Schwandt and von Wachter (2019) of working with a cell-level model in which all of the variables are aggregated to the level of province of graduation (p), year of graduation (g), survey year (t), and educational attainment and gender (e). Denote by \( y_{pgte} \) and \( u_{pg} \) the average earnings and the unemployment rate in the province at the year of graduation, respectively. The statistical model is as follows:

\[
y_{pgte} = \alpha_e + \beta_p u_{pg} + \rho_p + \gamma_g + \theta_t + \epsilon_{pgte}.
\]  (1)

The terms \( \rho_p, \gamma_g, \) and \( \theta_t \) are province of graduation, cohort, and year fixed effects, respectively, and \( \epsilon_{pgte} \) is the residual. We run several variants of Equation (1) in which the dependent variable, \( y_{pgte} \), is the unconditional average earnings of all individuals within each cell (unconditional margin), the average likelihood of having positive earnings (extensive margin), or the average earnings conditional on being strictly positive (intensive margin). We run the model separately for each level of educational attainment and gender, which yields parameter estimates that are specific to each education group. The dependent variable is expressed in logs for the unconditional and intensive margin analyses.

Although Equation (1) is informative about the average effect of a per-unit increase in the unemployment rate at the time of graduation on labour market outcomes for all workers in the sample, we also follow the approach of Oreopoulos et al. (2012) and Schwandt and von Wachter (2019) of estimating a version of this model that interacts the unemployment rate with a vector of potential experience (t) dummies, where \( t = t - g \). The statistical model in this case is as follows:

\[
y_{pgte} = \alpha + \sum_{t=0}^{15} \beta_t u_{pg} \times 1(\tau = t - g) + \rho_p + \gamma_g + \theta_t + \epsilon_{pgte}.
\]  (2)

Thus, the former approach is informative about average effects, whereas the latter approach informs the effects of a per-unit increase in unemployment separately for each year after graduation. As in Oreopoulos et al. and Schwandt and von Wachter, we expect the costs of graduating in a recession to be front loaded, such that the loss of earnings diminishes with experience. This would be reflected in the data by the estimated coefficients, \( \beta_t \), being negative (for the first few years) but increasing toward zero. Last, we carry out the analysis separately for high school diploma, college certificate or diploma, and bachelor’s degree graduates as well as separately for men and women to allow for heterogeneity along these dimensions (Schwandt and von Wachter 2019 include a fixed effect for level of education, but we instead present results separately by group).

A cell-level approach is sufficient for our analysis because the measure of unemployment used varies at the province-year level and we do not use control variables that vary at the individual level. We use census survey probability weights to construct the cell-level aggregate statistics and analytical weights of the cell sizes throughout the regression analysis to ensure that the results are representative of the Canadian population. Similarly, we use probability weights from the Labour Force Survey to construct the unemployment rate estimates. We follow the approach of Schwandt and von Wachter (2019) in clustering standard errors by province of graduation and year.

Unfortunately, the census dataset does not include information about the year or province of graduation in all years. When province of graduation is not observed, we proxy for it using the province of birth or province of residence five years ago. We calculate the “Mincerian” graduation year as the sum of the birth year and total number of years in school plus six, given that age six years is typically the latest school-entry age. From 2006 onward, the total number of years in school is not observed, so we impute this information on the basis of the average length of time needed to complete each level of schooling as observed in the pre-2006 data. Potential experience is the difference between the survey year and the year of graduation; however, because the census asks for income information for the preceding year (e.g., income declared by respondents of the 2016 census pertains to calendar year 2015), we scale back experience by one year to adjust for this accounting issue in the data.

**Table 2: Descriptive Statistics**

| Characteristic                        | Mean |
|---------------------------------------|------|
| Age, y                                | 29.7 |
| Female, %                             | 49.5 |
| Province of residence, %              |      |
| Atlantic Canada                       | 7.5  |
| Quebec                                | 22.0 |
| Ontario                               | 39.5 |
| Prairies                               | 18.8 |
| British Columbia                      | 12.0 |
| Territories                           | 0.2  |
| Educational attainment, %             |      |
| High school diploma                   | 38.8 |
| College certificate or diploma        | 28.1 |
| Bachelor’s degree                     | 27.2 |
| Employment and earnings               |      |
| Has earnings from employment or self-employment, % | 94.9 |
| Unconditional earnings, 2016 constant $ | 40,300 |

Notes: The averages reported in this table derive from the micro-level data (as opposed to the cell-level data used in the regression analysis) to provide an accurate depiction of the individuals represented in the study. However, the results using cell-level data and proper cell-size weights are very similar.

Sources: Statistics Canada, Census of Population.
It is important to note a potential endogeneity issue in the model. The timing of graduation may be related to economic conditions if some students delay their graduation when conditions are poor. In Oreopoulos et al. (2012), the approach to correct for this bias is to use the predicted graduation date as an instrument for the actual graduation date. Unfortunately, a limitation of our dataset is that we do not observe when respondents began their studies to predict graduation dates. Augmenting the analysis to address this concern is outside the scope of this article, and so we note that our estimates do not have a direct causal interpretation. However, given the similarity of our baseline results to those other studies, we still regard our results as informative for public policy.

Last, we predict the earnings losses from graduating during COVID-19 by using the forecasted unemployment rates from various institutions and the regression results from Equation (2). More precisely, we begin by estimating the average earnings, $\bar{y}_t$, for individuals with potential experience from one to five years. This analysis is restricted to the first five years because forecasting earnings beyond 2025 is increasingly difficult, and because most of the loss occurs in the first few years, there is little to be gained from including later years. Denote by $u_t$ the unemployment rate forecast and by $u_{2019}$ the unemployment rate in 2019 (5.7 percent). Hence, we compute the predicted average annual loss as $L_{e} = \left[\left(\sum_{t=1}^{5} \beta_{e} \bar{y}_t\right) \times (u_{t} - u_{2019})\right] / 5.4$

As before, we compute the loss separately by highest level of education and by gender. This calculation does not discount the future value of earnings because doing so would require us to select an appropriate discount rate, which introduces additional ambiguity into the analysis with little gain. Because we use a short time horizon of five years and interest rates in recent years have been historically low (a fact that is exacerbated by the Bank of Canada’s response to COVID-19), whether or not future earnings are discounted has little impact on the overall findings.

Labour Market Impacts of Graduating in a Recession

In this section, we present the regression results for the effects of a per-unit increase in the unemployment rate at the time of graduation on earnings, based on the model specifications from Equations (1) and (2).

Figure 1 begins by plotting the coefficient estimates, $\beta_{e}^{\tau}$, from Equation (2) separately by highest level of education.

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**Figure 1**: Effect of a 1 Percent Increase in the General Unemployment Rate at the Time of Graduating on Labour Earnings (Unconditional Margin), by Highest Level of Education

Notes: Each dot represents the coefficient estimate for $\beta_{e}^{\tau}$ from Equation (2), for $\tau \in \{1,2,3, \ldots, 15\}$ and $e \in \{\text{High School}, \text{College}, \text{Bachelor's}\}.$ The 95% confidence intervals are also shown as the bars around the dots. These regressions are based on the cell-level model as described in the main text and include all the fixed effects shown in the estimating equation. The model is estimated separately for each highest level of education. Standard errors are clustered by province of graduation and year. The regressions pool men and women in this case, although the model is estimated separately by gender in the remainder of the analysis.

Sources: Statistics Canada, Census of Population and Labour Force Survey.

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Each dot corresponds to a coefficient estimate, and the bars around the dots represent the 95 percent confidence intervals. To simplify the graph, men and women are pooled together in this case. The dependent variable is the log of earnings (we add +1 so that zero earnings is well defined, although fewer than 5 percent of individuals have zero earnings, as shown in Table 2). Because log values are used, the coefficient estimates can be interpreted as percent deviations in earnings from the unconditional average. The figure shows that a 1 percentage point increase in the unemployment rate at the time of graduation leads to a 6 percent drop in earnings in the first year after graduation among those who have just completed high school and did not pursue post-secondary education. For college certificate or diploma and bachelor’s degree graduates, the equivalent estimates are about 4.5 and 3 percent, respectively.

Two key trends are important to note from Figure 1. The first is that the earnings loss increases with potential experience, as expected, so the cost of graduating in a recession is front loaded. By about the eighth year after graduation, the earnings loss is not statistically different from zero, and it is almost zero for a few years before that time. This justifies centering the forecasting analysis in the next section on the first five years of potential experience. The second trend is that the earnings loss is decreasing with the highest level of education, where high school graduates appear to lose the most as a percent of their base earnings.

Whereas Figure 1 presents results for the unconditional change in earnings—that is, the change in earnings for the full sample irrespective of employment status—in Tables 3, 4, and 5 we present the regression results along the unconditional, extensive, and intensive margins of labour supply, respectively. In all cases, we present these results separately for men and women and by highest level of education. The average effect of a per-unit change in the unemployment rate on earnings, based on Equation (1), is presented in Panel A, and the effects of the change in unemployment interacted with the vector of experience indicators, based on Equation (2), are presented in Panel B. In addition, we report the sum of all the coefficient estimates over the first 15 years of potential experience at the bottom of Panel B (standard errors for these estimates are computed using the “lincom” Stata command). This cumulative effect is helpful for drawing comparisons between groups because smaller annual differences quickly become amplified as they are added up over a decade and a half.

For compactness, we do not discuss all of the estimates presented in these tables because it is generally sufficient to say that the trends observed in Figure 1 continue to hold. On balance, a 1 percentage point increase in the unemployment rate at the time of graduation leads to approximately a 1.5–4 percent decrease in earnings (Table 3, Panel A). These losses are larger among individuals with lower levels of education and decrease with experience. It is important to note, however, that there are meaningful differences in earnings losses between men and women. Specifically, men fare slightly worse among bachelor’s degree graduates, but women fare a lot worse among high school graduates. It is outside the scope of this article to identify factors driving these differences, but possible explanations include the higher representation of women in public sector jobs requiring bachelor’s degrees (e.g., education, health care, government), which tend to be less susceptible to cyclical variations in demand, or the higher representation of men in trades professions that can be well paying but do not always require post-secondary credentials and may be more prone to recession-driven declines in demand.

In addition, by comparing Tables 4 and 5, the results suggest that the majority of losses occur along the intensive margin but that the likelihood of being unemployed during a recession is non-trivial for high school graduates. In the first year of potential experience, each 1 percentage point increase in the unemployment rate increases the likelihood of being unemployed by about 0.5 percentage points for both men and women finishing high school; the comparable estimate for bachelor’s degree graduates is only 0.2 percentage points.

The results of this analysis—and from those in Table 3 in particular—imply that the earnings losses are larger than those documented by Oreopoulos et al. (2012) using administrative data from Canada. There are at least two possible explanations for this result. First, our study uses more recent data, and the penalty to graduating in a recession may have increased over time. Our data include individuals who graduated during the Great Recession of 2008–2009 when labour markets were particularly weak and the penalty may have been very severe by historical standards. The second possibility is that the administrative data could be failing to capture individuals who are the hardest hit, because individuals with no or little income to report for the year may be more likely to file taxes late or not at all and, therefore, will not be unobserved. We note that our results in Table 5, which are conditional on individuals with positive earnings who have more incentive to file their tax returns on time, are quite similar to the results of Oreopoulos et al. (2012).

Briefly, Table 6 repeats the unconditional margin analysis using alternative measures of the unemployment rate. For compactness, we report only results for the average effect of a per-unit change in the unemployment rate, based on Equation (1), and the cumulative loss derived from the sum of the coefficient estimates when unemployment is interacted with the vector of potential experience dummies, based on Equation (2). In Columns 1 and 3, we report the results using the youth unemployment rate for both genders, where “youth” is defined as individuals...
### Table 3: Effects of a 1 Percent Increase in the General Unemployment Rate at the Time of Graduating on Labour Earnings (Unconditional Margin), by Gender and Highest Level of Education

| Variable                        | Women         | Men           |            | Women         | Men           |            |
|---------------------------------|---------------|---------------|------------|---------------|---------------|------------|
|                                 | High School Diploma (1) | College Certificate or Diploma (2) | Bachelor’s Degree (3) | High School Diploma (4) | College Certificate or Diploma (5) | Bachelor’s Degree (6) |
| Unemployment rate               | −0.039***     | −0.015***     | −0.012***  | −0.026***     | −0.017***     | −0.015***  |
|                                 | (0.006)       | (0.004)       | (0.004)    | (0.006)       | (0.005)       | (0.003)    |
| \(R^2\)                         | 0.650         | 0.552         | 0.553      | 0.803         | 0.749         | 0.836      |
| No. of observations             | 2,852,045     | 2,799,498     | 2,674,635  | 3,920,198     | 2,272,419     | 2,272,746  |

**Panel A: average effect**

| 1 y                             | −0.088***     | −0.050***     | −0.050***  | −0.077***     | −0.050***     | −0.035***  |
|                                 | (0.018)       | (0.010)       | (0.007)    | (0.010)       | (0.012)       | (0.011)    |
| 2 y                             | −0.059***     | −0.040***     | −0.032***  | −0.049***     | −0.030***     | −0.020***  |
|                                 | (0.012)       | (0.010)       | (0.008)    | (0.011)       | (0.013)       | (0.006)    |
| 3 y                             | −0.053***     | −0.031***     | −0.029***  | −0.043***     | −0.029***     | −0.015**   |
|                                 | (0.011)       | (0.010)       | (0.008)    | (0.010)       | (0.009)       | (0.007)    |
| 4 y                             | −0.050***     | −0.031***     | −0.023***  | −0.027***     | −0.025***     | −0.021**   |
|                                 | (0.012)       | (0.009)       | (0.008)    | (0.012)       | (0.009)       | (0.009)    |
| 5 y                             | −0.042***     | −0.026***     | −0.024***  | −0.020*       | −0.008        | −0.021***  |
|                                 | (0.011)       | (0.008)       | (0.007)    | (0.011)       | (0.011)       | (0.006)    |
| 6 y                             | −0.041***     | −0.024***     | −0.017***  | −0.020*       | −0.016        | −0.022***  |
|                                 | (0.010)       | (0.007)       | (0.006)    | (0.012)       | (0.010)       | (0.006)    |
| 7 y                             | −0.031***     | −0.024***     | −0.015**   | −0.015        | −0.021***     | −0.008     |
|                                 | (0.010)       | (0.005)       | (0.006)    | (0.011)       | (0.007)       | (0.005)    |
| 8 y                             | −0.041***     | −0.009        | −0.002     | −0.017*       | −0.019***     | −0.012*    |
|                                 | (0.009)       | (0.007)       | (0.006)    | (0.010)       | (0.007)       | (0.006)    |
| 9 y                             | −0.020        | −0.000        | −0.006     | −0.014        | −0.016*       | −0.020***  |
|                                 | (0.012)       | (0.007)       | (0.006)    | (0.011)       | (0.009)       | (0.007)    |
| 10 y                            | −0.034***     | −0.009        | 0.001      | −0.017        | −0.015*       | −0.022***  |
|                                 | (0.012)       | (0.007)       | (0.006)    | (0.011)       | (0.008)       | (0.006)    |
| 11 y                            | −0.021*       | 0.001         | −0.009     | −0.003        | −0.012        | 0.002      |
|                                 | (0.011)       | (0.007)       | (0.007)    | (0.013)       | (0.008)       | (0.007)    |
| 12 y                            | −0.011        | −0.004        | 0.009      | −0.017*       | −0.002        | −0.009     |
|                                 | (0.011)       | (0.009)       | (0.007)    | (0.010)       | (0.007)       | (0.007)    |
| 13 y                            | −0.012        | −0.001        | 0.014**    | −0.008        | −0.004        | −0.010     |
|                                 | (0.013)       | (0.007)       | (0.008)    | (0.011)       | (0.008)       | (0.007)    |
| 14 y                            | −0.009        | 0.003         | 0.010      | 0.003         | −0.014*       | 0.005      |
|                                 | (0.011)       | (0.009)       | (0.006)    | (0.013)       | (0.008)       | (0.006)    |
| 15 y                            | −0.018        | 0.016***      | 0.011      | −0.005        | −0.004        | −0.021***  |
|                                 | (0.013)       | (0.006)       | (0.009)    | (0.010)       | (0.008)       | (0.006)    |
| Cumulative                      | −0.531***     | −0.229***     | −0.162***  | −0.328***     | −0.266***     | −0.228***  |
|                                 | (0.091)       | (0.059)       | (0.053)    | (0.089)       | (0.069)       | (0.048)    |
| \(R^2\)                         | 0.678         | 0.591         | 0.603      | 0.818         | 0.757         | 0.842      |
| No. of observations             | 2,852,045     | 2,799,498     | 2,674,635  | 3,920,198     | 2,272,419     | 2,272,746  |

**Panel B: effect by no. of years of potential experience**

Notes: The dependent variable is the cell-level average of the log of earnings (including individuals who have no reported earnings for the year). Panel A corresponds to the specification in Equation (1), and Panel B corresponds to Equation (2). The cumulative statistic is calculated as the sum of all the coefficient estimates over the first 15 years of potential experience, where standard errors for these estimates are computed using the “lincom” Stata command. Standard errors are in parentheses and are clustered by province and year.

* \(p = 0.1\); ** \(p = 0.05\); *** \(p = 0.01\).

Sources: Statistics Canada, Census of Population, and Labour Force Survey.

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Table 4: Effects of a 1 Percent Increase in the General Unemployment Rate at the Time of Graduating on Labour Earnings (Extensive Margin), by Gender and Highest Level of Education

| Effect Type          | Women       | Men          |
|----------------------|-------------|--------------|
|                      | High School Diploma (1) | College Certificate or Diploma (2) | Bachelor's Degree (3) | High School Diploma (4) | College Certificate or Diploma (5) | Bachelor's Degree (6) |
| Unemployment rate    | −0.003***   | −0.001**    | −0.000*    | −0.001*** | −0.001*** | −0.001*** |
|                      | (0.000)     | (0.000)     | (0.000)   | (0.000)   | (0.000)   | (0.000)  |
| R²                   | 0.457       | 0.534       | 0.499     | 0.456     | 0.415     | 0.529    |
| No. of observations  | 2,852,045   | 2,799,498   | 2,674,635 | 3,920,198 | 2,272,419 | 2,274,746 |

Panel A: average effect

| Panel B: effect by no. of years of potential experience |
|--------------------------------------------------------|
| 1 y                                                    |
| −0.006***                                              | −0.003***  | −0.002***  | −0.005***  | −0.003***  | −0.002*   |
| (0.002)                                                | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 2 y                                                    |
| −0.004***                                              | −0.002***  | −0.001***  | −0.003***  | −0.002**   | −0.001***  |
| (0.001)                                                | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 3 y                                                    |
| −0.004***                                              | −0.002***  | −0.001***  | −0.003***  | −0.002***  | −0.001***  |
| (0.001)                                                | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 4 y                                                    |
| −0.003***                                              | −0.002***  | −0.001***  | −0.001**   | −0.002***  | −0.001***  |
| (0.001)                                                | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 5 y                                                    |
| −0.003***                                              | −0.001*    | −0.001***  | −0.001     | −0.000     | −0.001    |
| (0.001)                                                | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 6 y                                                    |
| −0.002***                                              | −0.001     | −0.000     | −0.001     | −0.001**   | −0.001***  |
| (0.001)                                                | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 7 y                                                    |
| −0.002**                                               | −0.001***  | −0.001***  | −0.001     | −0.001***  | −0.001***  |
| (0.001)                                                | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 8 y                                                    |
| −0.003***                                              | −0.000     | 0.000      | −0.001     | −0.001***  | −0.000     |
| (0.001)                                                | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 9 y                                                    |
| −0.001                                                | 0.000      | −0.001     | −0.000     | −0.001***  | −0.000     |
| (0.001)                                                | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 10 y                                                   |
| −0.002**                                              | −0.001     | −0.000     | −0.001     | −0.001     | −0.002***  |
| (0.001)                                               | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 11 y                                                   |
| −0.001                                                | 0.000      | −0.001     | 0.000      | −0.001     | 0.001     |
| (0.001)                                               | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 12 y                                                   |
| −0.000                                                | −0.000     | 0.001      | −0.001     | 0.000      | −0.001    |
| (0.001)                                               | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 13 y                                                   |
| −0.001                                                | 0.000      | 0.001*     | 0.000      | 0.000      | −0.001    |
| (0.001)                                               | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 14 y                                                   |
| −0.000                                                | 0.000      | 0.000      | 0.002***   | −0.001     | 0.000     |
| (0.001)                                               | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| 15 y                                                   |
| −0.001                                                | 0.002***   | 0.001      | 0.000      | −0.001***  | 0.000     |
| (0.001)                                               | (0.001)   | (0.001)   | (0.001)   | (0.001)   | (0.001)   |
| Cumulative                                             |
| −0.034***                                              | −0.010***  | −0.007*    | −0.014***  | −0.015***  | −0.011***  |
| (0.007)                                               | (0.004)   | (0.004)   | (0.006)   | (0.004)   | (0.003)   |
| R²                                                     | 0.493      | 0.561      | 0.527      | 0.501      | 0.439     | 0.544    |
| No. of observations                                   | 2,852,045 | 2,799,498  | 2,674,635  | 3,920,198  | 2,272,419 | 2,274,746 |

Notes: The dependent variable is the cell-level average of an indicator variable for having positive earnings in the year. Panel A corresponds to the specification in Equation (1), and Panel B corresponds to Equation (2). The cumulative statistic is calculated as the sum of all the coefficient estimates over the first 15 years of potential experience, where standard errors for these estimates are computed using the "lincom" Stata command. Standard errors are in parentheses and are clustered by province and year. * p = 0.1; ** p = 0.05; *** p = 0.01.

Sources: Statistics Canada, Census of Population, and Labour Force Survey.
Table 5: Effects of a 1 Percent Increase in the General Unemployment Rate at the Time of Graduating on Labour Earnings (Intensive Margin), by Gender and Highest Level of Education

| Variable                  | Women                  | Men                   |
|---------------------------|------------------------|-----------------------|
|                           | High School Diploma (1)| College Certificate or Diploma (2) | Bachelor's Degree (3) | High School Diploma (4) | College Certificate or Diploma (5) | Bachelor's Degree (6) |
|                           | (1)                    | (2)                   | (3)                   | (4)                     | (5)                     | (6)                    |
| Unemployment rate         | −0.016***              | −0.009***             | −0.007***             | −0.015***               | −0.007***               | −0.008***              |
|                           | (0.003)                | (0.003)               | (0.002)               | (0.003)                 | (0.003)                 | (0.002)                |
| R^2                       | 0.874                  | 0.748                 | 0.796                 | 0.936                   | 0.888                   | 0.933                  |
| No. of observations       | 2,852,045              | 2,799,498             | 2,674,635             | 3,920,198               | 2,272,419               | 2,274,746              |

Panel A: average effect

| Year | Women                  | Men                   |
|------|------------------------|-----------------------|
|      | Unemployment rate       |                       |
| 1    | −0.036***              | −0.022***             |
|      | (0.004)                | (0.006)               |
| 2    | −0.021***              | −0.021***             |
|      | (0.004)                | (0.005)               |
| 3    | −0.019***              | −0.014***             |
|      | (0.005)                | (0.005)               |
| 4    | −0.018***              | −0.015***             |
|      | (0.005)                | (0.005)               |
| 5    | −0.016***              | −0.014***             |
|      | (0.004)                | (0.004)               |
| 6    | −0.018***              | −0.016***             |
|      | (0.003)                | (0.004)               |
| 7    | −0.015***              | −0.013***             |
|      | (0.005)                | (0.004)               |
| 8    | −0.014***              | −0.009***             |
|      | (0.004)                | (0.004)               |
| 9    | −0.013**               | −0.004                |
|      | (0.005)                | (0.004)               |
| 10   | −0.012**               | −0.002                |
|      | (0.006)                | (0.004)               |
| 11   | −0.013**               | −0.002                |
|      | (0.005)                | (0.004)               |
| 12   | −0.009                 | −0.004                |
|      | (0.005)                | (0.004)               |
| 13   | −0.005                 | −0.002                |
|      | (0.005)                | (0.004)               |
| 14   | −0.006                 | 0.003                 |
|      | (0.005)                | (0.004)               |
| 15   | −0.008                 | −0.002                |
|      | (0.006)                | (0.004)               |
| Cumulative                 | −0.222***              | −0.137***             |
|      | (0.039)                | (0.037)               |
| R^2                          | 0.881                  | 0.763                 |
| No. of observations         | 2,852,045              | 2,799,498             |

Panel B: effect by no. of years of potential experience

Notes: The dependent variable is the cell-level average of the conditional log of earnings (which excludes individuals who have no reported earnings for the year). Panel A corresponds to the specification in Equation (1), and Panel B corresponds to Equation (2). The cumulative statistic is calculated as the sum of all the coefficient estimates over the first 15 years of potential experience, where standard errors for these estimates are computed using the “lincom” Stata command. Standard errors are in parentheses and are clustered by province and year.

* p = 0.1; ** p = 0.05; *** p = 0.01.

Sources: Statistics Canada, Census of Population, and Labour Force Survey
The goal of this section is to convert the predicted earnings losses due to a per-unit change in the unemployment rate from Table 3, which are expressed as percentages, into total losses expressed in dollar values. The conversion from percentage point loss to dollar value requires an estimate of base earnings, which we obtain directly from the census data, and the conversion from per-unit loss to a total value requires additional information about how much unemployment is projected to change as a result of COVID-19.

Hence, we collect various forecasts published by large banks (BMO, CIBC, National Bank, RBC, Scotiabank, and TD), the IMF, and the OECD; these rates are summarized in Column (1) of Table 7. The lowest forecast comes from TD and the highest forecast comes from the OECD (7.3 and 8.8 percent, respectively). In addition, Column (2) shows the deviation from the actual 2019 unemployment rate (5.7 percent) implied by each forecast, which range from a low of 1.6 percent to a high of 3.1 percent.

In Table 8, we present earnings trajectories during the first five years of potential experience separately for men and women on the basis of their highest level of education. Recall that, although youth unemployment is potentially a better measure of labour market tightness for recent graduates, the general rate is primarily used throughout this study to facilitate the forecasting analysis in the next section. Recognizing that men and women sometimes work in different industries and occupations and that a gender-specific unemployment rate may be more reflective of labour market tightness taking these differences into account, we also report results for women using the female unemployment rate in Column 2 and results for men using the male unemployment rate in Column 4. In all cases, the magnitudes of the coefficient estimates change, but the differences between highest level of education and gender all remain the same.

The difference in magnitude of the estimates observed in Table 6 is not a problem for the subsequent analysis in which we forecast earnings losses, because we use the general unemployment rate for both genders consistently in both stages. To properly account for this difference in magnitude, we would simply need to apply these estimates to an unemployment rate forecast specific to youths, although unfortunately we were not able to find any such forecast that was published by the institutions we surveyed.

### Table 6: Effects of a 1 Percent Increase in the Youth or General Unemployment Rate at the Time of Graduating on Labour Earnings, by Highest Level of Education

| Variable | Women | Men |
|----------|-------|-----|
|          | Youth Unemployment Rate for Both Genders (1) | Youth Unemployment Rate for Men (4) |
| Unemployment rate | −0.027* (0.004) | −0.019* (0.004) |
| Cumulative | −0.370* (0.058) | −0.242* (0.055) |
| Panel A: high school diploma | | |
| Unemployment rate | −0.014* (0.002) | −0.014* (0.003) |
| Cumulative | −0.208* (0.033) | −0.221* (0.042) |
| Panel B: college certificate or diploma | | |
| Unemployment rate | −0.010* (0.002) | −0.011* (0.003) |
| Cumulative | −0.128* (0.031) | −0.167* (0.027) |
| Panel C: bachelor’s degree | | |
| Cumulative | −0.152* (0.033) | −0.141* (0.023) |

Notes: The unemployment rate estimate corresponds to the specification given by Equation (1), and the cumulative estimate is the sum of the coefficient estimates of interest from Equation (2) within each panel. The youth unemployment rate is defined as the rate for those aged 15–24 years. Standard errors are in parentheses and are clustered by province and year.

* p = 0.01.

Source: Statistics Canada, Census of Population, and Labour Force Survey.

### Forecasted Earnings Losses of Graduating during COVID-19

The goal of this section is to convert the predicted earnings losses due to a per-unit change in the unemployment rate from Table 3, which are expressed as percentages, into total losses expressed in dollar values. The conversion from percentage point loss to dollar value requires an estimate of base earnings, which we obtain directly from the census data, and the conversion from per-unit loss to a total value requires additional information about how much unemployment is projected to change as a result of COVID-19.

Hence, we collect various forecasts published by large banks (BMO, CIBC, National Bank, RBC, Scotiabank, and TD), the IMF, and the OECD; these rates are summarized in Column (1) of Table 7. The lowest forecast comes from TD and the highest forecast comes from the OECD (7.3 and 8.8 percent, respectively). In addition, Column (2) shows the deviation from the actual 2019 unemployment rate (5.7 percent) implied by each forecast, which range from a low of 1.6 percent to a high of 3.1 percent.

In Table 8, we present earnings trajectories during the first five years of potential experience separately for men and women on the basis of their highest level of education.
Table 7: Unemployment Rate Forecasts for 2021

| Institution | Unemployment Rate Forecast (1) | Difference from 2019 (5.7%) (2) |
|-------------|-------------------------------|---------------------------------|
| TD          | 7.3                           | 1.6                             |
| BMO         | 7.5                           | 1.8                             |
| RBC         | 7.6                           | 1.9                             |
| IMF         | 7.9                           | 2.2                             |
| CIBC        | 7.9                           | 2.2                             |
| Scotiabank  | 8.1                           | 2.4                             |
| National Bank | 8.5                         | 2.8                             |
| OECD        | 8.8                           | 3.1                             |

Notes: TD = Toronto–Dominion; BMO = Bank of Montreal; RBC = Royal Bank of Canada; IMF = International Monetary Fund; CIBC = Canadian Imperial Bank of Commerce; OECD = Organisation for Economic Co-operation and Development.

Sources: Bank of Montreal Capital Markets Economic Research (2021), CIBC Capital Markets (2021), IMF (2020), National Bank of Canada (2021), OECD (2020), RBC Economics (2021), Scotiabank Economics (2020), and TD Economics (2020a, 2020b).

Table 8: Earnings after Graduation and Predicted Average Annual Loss Due to Graduating During COVID-19

| Variable | Women | Men |
|----------|-------|-----|
|          | High School Diploma (1) | College Certificate or Diploma (2) | Bachelor's Degree (3) | High School Diploma (4) | College Certificate or Diploma (5) | Bachelor's Degree (6) |
| 1 y experience | 12,700 | 20,900 | 32,200 | 15,900 | 24,700 | 35,600 |
| 2 y experience | 15,300 | 23,900 | 37,300 | 19,700 | 29,200 | 42,100 |
| 3 y experience | 17,400 | 26,400 | 40,600 | 22,900 | 32,800 | 47,000 |
| 4 y experience | 19,300 | 28,100 | 43,000 | 25,800 | 36,600 | 51,700 |
| 5 y experience | 20,900 | 29,300 | 44,800 | 28,400 | 39,400 | 55,400 |
| Cumulative   | 85,600 | 128,600 | 197,900 | 112,700 | 162,700 | 231,800 |

Panel B: predicted average annual loss in the first 5 y after graduation

| Source | Women | Men |
|--------|-------|-----|
| Bank of Montreal | 1,540 | 1,420 | 1,420 | 1,380 | 1,620 |
| Canadian Centre for Policy Alternatives | 1,720 | 1,600 | 2,180 | 1,600 | 1,540 | 1,820 |
| CIBC | 1,820 | 1,700 | 2,300 | 1,680 | 1,640 | 1,920 |
| Conference Board of Canada | 2,100 | 1,960 | 2,660 | 1,960 | 1,880 | 2,220 |
| IMF | 2,100 | 1,960 | 2,660 | 1,960 | 1,880 | 2,220 |
| National Bank | 2,300 | 2,140 | 2,900 | 2,140 | 2,060 | 2,420 |
| RBC | 2,680 | 2,500 | 3,380 | 2,480 | 2,400 | 2,820 |
| Scotiabank | 2,960 | 2,760 | 3,740 | 2,760 | 2,660 | 3,120 |
| Average | 2,153 | 2,005 | 2,720 | 2,000 | 1,930 | 2,270 |
| SD | 483 | 453 | 609 | 452 | 433 | 507 |
| % | 12.6 | 7.8 | 6.9 | 8.9 | 5.9 | 4.9 |

Notes: Panel A reports the average unconditional earnings by gender and highest level of education among individuals during the first five years of potential experience. Using these earnings estimates and the unemployment rate forecasts in Table 7, Panel B reports the predicted losses. The percent loss is calculated as ratio of average loss to the cumulative earnings divided by 5 (which expresses the five-year sum of earnings to an annual basis). See discussion in the main text for more information. CIBC = Canadian Imperial Bank of Commerce; IMF = International Monetary Fund; RBC = Royal Bank of Canada.

Sources: Statistics Canada, Census of Population, Labour Force Survey, Bank of Montreal Capital Markets Economic Research (2021), CIBC Capital Markets (2021), IMF (2020), National Bank of Canada (2021), OECD (2020), RBC Economics (2021), Scotiabank Economics (2020), and TD Economics (2020a, 2020b).
of education (Panel A) and the resulting average annual earnings losses (Panel B), based on the results of Table 3. These results suggest that graduates of the 2021 class stand to lose around $1,500 to $3,750 per year over the first five years after graduation depending on their education and the specific unemployment rate forecast used. The dollar value of the loss now appears relatively similar across education groups due to the fact that high school graduates experience larger losses as a percent of their earnings but they also earn less, on average, than their counterparts with a college certificate/diploma or bachelor’s degree.

Despite the differences in losses between low and high unemployment rate forecasts, the table shows that the average annual loss is roughly $2,000 per year. This is a sizable drop in earnings when compared with total employment income in the first few years after graduation. As shown in the last row of the table, this drop represents between 5 and 13 percent of the level of earnings that would likely have been realized if the pandemic had not occurred. The loss expressed in percentage terms decreases with educational attainment (largest among high school graduates and smallest among bachelor’s degree graduates), and it is larger for women than for men.

As mentioned previously, this methodology assumes the effects of previous recessions are informative about the current one. The economic lockdowns during the pandemic have affected service workers and others in jobs that cannot be done from home, whereas other recessions have been concentrated in other areas (e.g., the Great Recession of 2008–2009 affected construction workers because of the decline in demand for new housing, an industry that employs men more than women). This issue is to some extent mitigated by the fact that we use a few decades of data, so our estimates are based on averages spanning several recessions, each of which affected the labour market in its own way. However, this assumption that underpins our results should be taken into consideration because of the uniqueness of this economic downturn.

Briefly, in Table A.1 of the Appendix, we report the earnings trajectories for college certificate or diploma and for bachelor’s degree graduates from Statistics Canada’s Postsecondary Information System (PSIS) linked to the T1 Family File (T1FF). This allows us to assess how our estimates of earnings trajectories from the census (which is based on a measure of potential experience) differ from the PSIS-T1FF (in which we observe actual experience, since the year of graduation is known) for the 2012 graduating cohort. A limitation of the PSIS-T1FF data is that individuals graduating from high school who do not go on to complete some post-secondary education are not observed. Comparing the cumulative earnings estimates between Tables 8 and A.1 suggests that the census values are indeed very reliable.

Conclusion

The economic lockdowns across Canada to stop the spread of COVID-19 have resulted in significant declines in the labour market prospects of recent graduates who were otherwise poised to enter the market at a time when conditions were generally favourable. As shown in this study and the related literature, a 1 percentage point increase in the unemployment rate at the time of graduation leads to an approximately 1.5–4 percent decrease in earnings over the first several years. Coupled with the fact that larger recessions induce significant increases in unemployment, the bad luck of graduating during a recession can be very costly.

After combining regression-based analysis of the average earnings losses from graduating in a recession with third-party forecasts of the changes in unemployment rates expected in 2021, we predict that graduates from the 2021 cohort can expect to lose about $2,000 annually, which corresponds to between 5 and 12 percent of total income that would have been earned had the pandemic not occurred (an assumption that underpins this result is that past recessions can be used to predict labour market effects of the current one). The losses tend to be larger for individuals with lower levels of education and are larger for women than for men.

By comparison, the CESB was a taxable benefit that provides students and recent graduates with a payment of $1,250 for each four-week period from May to August 2020 (with top-up of $750 for those with a disability or who have a dependent). By this metric, the CESB offered generous support relative to our predicted earnings losses. However, it is important to note that the CESB was introduced during an unprecedented lockdown period in which the monthly or weekly earnings losses were likely much greater than the five-year annual averages we estimate here. Also, although the CESB provided immediate financial relief to those in need, the labour market earnings losses will likely continue to persist over time. For comparison, we also note that bachelor’s degree graduates who took out loans while in school were $26,000 in debt, on average, at the time of graduation according to Statistics Canada’s National Graduate Survey (Statistics Canada 2021). This suggests that foregone earnings over the first five years as a result of graduating during COVID-19 would otherwise have been enough to repay nearly half of all outstanding student loans.

Foley and Neill (2020) discuss two other policy measures designed to ease the economic burden for post-secondary students. The first is the federal government’s announcement of a six-month interest-free payment holiday for student loans (i.e., no payments or interest is expected). Several provinces announced similar measures. The second is the pre-existing Repayment Assistance Program (RAP), which provides interest relief and reduced
payments to borrowers who are struggling to meet their obligations.

Like the CESB, the interest-free payment holiday is a short-term measure designed to provide immediate relief to students and graduates in need. The RAP is a longer-term approach, but as Foley and Neill (2020) point out, borrowers do not qualify by default, and only about half of eligible borrowers use the program (perhaps because of informational constraints). Moreover, all of these measures are designed only to assist post-secondary students and graduates; none of them are available to high school graduates—a group who may be the most affected by the challenging labour market in the years ahead, as the findings from our study suggest.

What long-term public measures can be taken to assist high school graduates? Federal and provincial governments already offer job training and job search assistance. Another approach taken by both levels of government revolves around facilitating access to a post-secondary education. This strategy may be appealing to students in light of the fact that post-secondary graduates earn considerably more than high school graduates over a significant portion of their career (Frenette 2019). It is also an interesting option given two important structural shifts that are emerging in the labour market. The first is increased telework brought on by the lockdown, which may persist after the pandemic. Messacar, Morissette, and Deng (2020) show that workers with post-secondary credentials are more likely to hold jobs that can be done from home than those with terminal high school diplomas. Gallacher and Hossain (2020) also find a correlation between the feasibility to telework and income, age, gender, and other characteristics. The second is the emergence of artificial intelligence and automation technology. Although it is not known how quickly robots and computer algorithms will transform jobs, or even replace workers in some instances, highly educated workers whose skills complement the new technology or who can work directly with it may be less affected by the changes (or even benefit from them, as technology takes over more routine work and leaves the more cognitive, non-routine tasks to humans). Frenette and Frank (2020) show that higher-educated workers are far less likely to face a high risk of job transformation as a result of automation. Looking forward, the pandemic provided firms with an incentive to accelerate investments in automation technology to make the production and distribution of goods and services more resilient to future lockdowns. Increased telework and automation technology in the workplace could significantly raise the demand for university and college graduates in the future. The speed of recovery and extent to which these losses materialize will become increasingly clear as vaccine rollout continues and lockdown restrictions from the second wave start to be lifted. In the meantime, we view the results of this study as informing the potential role of government programs to help recent graduates as they navigate their careers in the midst of the COVID-19 pandemic.

Notes
1 Two other US studies are worth noting. First, Kahn (2010) found that individuals who graduated from college during deeper recessions, such as the one experienced in the early 1980s, earned significantly less for several years than their counterparts graduating in better times. Rothstein (2020) focuses on college graduates who entered the labour market during the Great Recession in the late 2000s and finds persistent negative effects on earnings and employment. All of these studies on the earnings effect of graduating in a recession are summarized in von Wachter (2020), which also provides a thorough discussion of the possible causes behind the findings.

2 See von Wachter (2020) for a summary of this literature.

3 In Frenette, Messacar, and Handler (2020), we estimate earnings losses for the graduating cohort of 2020. We predict larger earnings losses for that cohort than those reported here, which is due to the fact that unemployment rate forecasts were higher at the time. As shown in Table 1, unemployment has declined from the very high levels observed when the pandemic began but continues to remain well above pre-pandemic levels.

4 The first term in the square brackets is the weighted average of the percentage point loss of earnings per year of potential experience for each per-unit increase in the unemployment rate multiplied by the earnings that would otherwise be expected in that year, on average. The second term, \( \left( u_t - u_{2019} \right) \) is the total projected in crease in unemployment. It follows that the product of the two reflects total expected loss. This value is divided by five to express the loss as an annual average. Using 2019 as the base year ensures that the projected change in unemployment is expressed relative to the rate that prevailed just before the pandemic began.

5 It is also worth noting that our analysis of earnings losses begins one year after graduation because we used a Mincerian experience measure. In contrast, this year’s graduating class just recently finished their schooling (at the time of writing) and has not yet reached the point at which they would have been included in our analysis. Although we do not show it in this article, including earnings in the year of graduation raises the overall projected earnings losses in the first five years. Put differently, the unemployment rate in the year of graduation has a significant negative effect on earnings in the same year, consistent with the generous but short-term design of CESB.

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### Table A.1: Earnings after Graduation for the 2012 Cohort in PSIS-TIFF

| Years of Experience | Female | | Male | | |
|---------------------|--------|--------|--------|--------|
|                     | College Certificate or Diploma (2) | Bachelor's Degree (3) | College Certificate or Diploma (5) | Bachelor's Degree (6) |
| 1                   | 19,300 | 28,300 | 23,800 | 33,100 |
| 2                   | 21,600 | 34,500 | 28,200 | 40,100 |
| 3                   | 24,000 | 40,500 | 31,900 | 47,300 |
| 4                   | 27,600 | 45,600 | 35,800 | 53,100 |
| 5                   | 32,200 | 50,900 | 42,800 | 61,200 |
| Cumulative          | 124,700| 199,800| 162,500| 234,800|

Notes: This table replicates the earnings trajectories for Columns 2, 3, 5 and 6 in Panel A of Table 8 but uses administrative data in order to focus on a group of individuals whose date of graduation is known. The estimates reported here are very similar to those obtained in the Census data. See discussion in the main text for more information. PSIS-TIFF = Postsecondary Information System-T1 Family File.

Sources: Statistics Canada, PSIS-TIFF linkage.