Tax Cuts, Firm Growth, and Worker Earnings: Evidence from Small Business Deductions in Canada*

Yige Duan† Terry S. Moon‡

August 24, 2022

Click Here for an Updated Draft

Abstract

This paper assesses the effects of corporate tax reductions for small businesses on their growth and employee earnings. Following a 2014 reform in Quebec, firms that received tax cuts increase their employment, payrolls, and capital stock by 1.8 percent, 2.4 percent, and 8.4 percent, respectively, relative to unaffected firms. In turn, these firms experience 5.2 percent, 0.4 percentage points, and 891 dollars increases in their sales, profit margins, and EBITDA per worker. Furthermore, annual earnings increase by 1.4 percent for workers in treated firms relative to workers in control firms. Additionally, the effects are larger for firms and workers in high-technology industries, although we do not find different responses based on firm sizes or labor market concentrations. Taken together, these findings suggest that tax incentives specifically designed for small businesses may lead to significant increases in their growth and worker earnings, and targeting a specific sector or industry for a corporate tax reduction may be an effective tool to stimulate growth and employment in the economy.

JEL Codes: G11, H25, H32, J31, and O16.
Keywords: Investment Decisions, Business Taxes and Subsidies, Fiscal Policies and Behavior of Economic Agents: Firms, Wage Level and Structure, sand Saving and Capital Investment.

*Shiming Wu provided excellent research assistance. This research was undertaken, in part, thanks to funding from the Canada Excellence Research Chairs program awarded to Dr. Erik Snowberg in Data-Intensive Methods in Economics as well as funding from the Social Sciences and Humanities Research Council.

†Vancouver School of Economics, University of British Columbia (email: yige.duan@gmail.com)
‡Vancouver School of Economics, University of British Columbia (email: tsmoon@mail.ubc.ca)

1 Introduction

A central question in fiscal policy is how much reductions in corporate tax rates would stimulate growth and employment in the economy. Despite large costs associated with providing tax deductions and credits for small businesses, there is a lack of empirical evidence on how tax incentives specifically designed for small firms affect their growth and employee salaries. By contrast, a large strand of literature has found a negative relationship between taxes and investment across a wide range of firm sizes, with varying estimates.[1] A smaller set of empirical studies has found positive impacts of corporate tax reductions on employment (Giroud and Rauh 2019, Garrett et al. 2020, and Curtis et al. 2021), and negative effects of tax hikes on wages (Fuest et al. 2018 and Arulampalam et al. 2012). In theory, lowering corporate tax rates may induce firms' investment in both capital and labor, since higher after-tax profits imply higher marginal returns on investment. This increase in investment may subsequently increase firms' sales, productivity, and workers' earnings. However, the magnitude of these increases can differ significantly, depending on firms' initial financial constraints, growth potentials, and local labor market conditions.

Empirically evaluating tax effects on firm-level and worker-level outcomes is challenging in part because it is difficult to find large and exogenous variations in tax rates across firms and workers. To isolate tax effects from business cycle effects, we need a control group of firms and workers not affected by the tax change. However, tax rates for small businesses in most settings depend on firm sizes or profits, making it difficult to find a control group when estimating the effects of corporate taxes on firm-level or worker-level outcomes.[2]

This paper studies the effects of reductions in corporate tax rates for small businesses on their growth and worker earnings. We exploit a tax rate cut from 8 percent to 4 percent in Quebec, Canada, for small firms operating in the manufacturing and processing sector, and compare their outcomes to those of small firms in other sectors in Quebec. Additionally, we make the same comparisons for small firms located in two other major provinces, British Columbia and Ontario, which experience no change in tax rates during our sample period. Our empirical design exploits this triple differences framework, which absorbs any sector- or province-specific trends or shocks that may have coincided with the reform, in order to assess the tax effects on both firm-level and worker-level outcomes, using administrative employer-employee matched data from tax records.

[1] The estimated range of the investment elasticity with respect to the net of tax rate varies across several empirical studies, including Summers (1981), Auerbach and Hassett (1992), Cummins et al. (1996), Goolsbee (1998), Chirinko et al. (1999), Desai and Goolsbee (2004), House and Shapiro (2008), Zwick and Mahon (2017), Ohrn (2018), Liu and Mao (2019), Maffini et al. (2019), Moon (2022), and Curtis et al. (2021).

[2] Prior studies exploit across-industry variation (Zwick and Mahon 2017, Ohrn 2018, and Curtis et al. 2021), across-state or municipality variation (Suárez Serrato and Zidar 2016 and Fuest et al. 2018), and across-industry by county variation (Garrett et al. 2020) to study the corporate tax effects on either firm-level or worker-level outcomes.

Comparing small firms that received a tax cut to small firms that did not, we find that treated firms increased employment, average payrolls, and capital stock by 1.8 percent, 2.4 percent, and 8.4 percent, respectively, on average within four years after the reform, with implied medium-run elasticities of 0.35, 0.48, and 1.7 with respect to the net of statutory tax rate, respectively. Furthermore, their sales, profit margins, and EBITDA per worker increased by 5.2 percent, 0.4 percentage points, and 891 CAD per worker. These estimates imply that firms with the tax cut increased investment in capital and labor, which resulted in the growth of their sales and labor productivity, compared to unaffected firms.

We proceed to examine how the response to the tax cut varies by firm characteristics or local labor market concentrations. Firms that were relatively financially constrained, based on their pre-reform sales, do not exhibit statistically different responses in terms of their growth or worker earnings. Furthermore, we do not find that workers located in more concentrated labor markets experience a smaller increase in their earnings, relative to workers in less concentrated markets. While these findings seem inconsistent with the financial constraint channel or the monopsony channel, our results can be simply driven by the fact that our sample is restricted to small businesses that are mostly constrained and cannot exercise market power.

Moreover, we investigate whether lowering corporate tax rates generates different responses depending on whether firms are in fast-growing, high-technology industries. Since firms operating in high-technology industries, such as semiconductor manufacturing, tend to have a higher growth potential, these firms may increase demand for labor more and pay higher salaries after a tax cut, relative to firms in slower-growing industries. We find that after the reform, treated firms in high-technology industries do hire more workers and pay higher salaries, compared to treated firms in low-technology industries. These findings suggest that when designing corporate tax incentives, targeting a specific sector or industry that appears to have a high growth potential may be an effective tool to stimulate growth and employment in the economy.

This paper's main contribution to the existing literature is three-fold. While governments in both developed and developing countries spend billions of dollars in providing tax incentives for small businesses, evidence on how tax reductions specifically designed for small firms affect their growth and worker earnings is scant. To our knowledge, this paper is the first to identify the effects of tax cuts targeted for small businesses on both firm-level and worker-level outcomes. Our paper's key contribution is that it provides a set of coherent results on firm and worker outcomes that are, on average, consistent with the prior studies that examine a wide range of firm sizes. Second, our paper provides evidence that when designing a corporate tax reduction policy, targeting a specific sector or industry may be effective for stimulating growth in the economy. Finally, our empirical analysis offers quantitative evidence for the cost-and-benefit analysis of the small busi-

ness deductions. Critics of the small business deduction emphasize its costs in terms of increased opportunities for tax avoidance by high-income professionals (Smart 2021), foregone tax revenue, and misallocation of resources from large, productive businesses to small, inefficient ones. However, we argue that the benefits of the small business deduction may be larger than previously estimated, when accounting for the growth potentials of affected firms and increased welfare for workers in the form of higher salaries.

Additionally, our paper provides evidence that a corporate tax cut can lead to increases in firms' profitability and labor productivity. As firms hire more workers and increase average payrolls, it is unclear how profit margins or labor productivity may change. If the additional funding or resources raised from a tax cut lead to misallocation of capital and labor to less efficient firms and workers, we may expect that these firms may suffer losses in their profits or productivity. By contrast, hiring more productive workers at higher salaries may increase firms' overall productivity, especially in combination of their investment in capital after the tax cut. In general, depending on which forces dominate, firms' profitability or productivity may increase, decrease, or stay constant after tax cuts.

Moreover, our paper shows in which setting we should expect to see an increase in workers' earnings after a corporate tax reduction. If the composition of workers changes after a tax cut (i.e., hiring workers from low SES background), a corporate tax reduction may not actually lead to an increase in average payrolls (Curtis et al. 2021). After flexibly controlling for worker fixed effects using our employer-employee matched data, we find that not only treated workers stay at the same treated firm, relative to the control workers, after the reform, but also their firms hire more productive workers that lead to an increase in firms' productivity. Our findings are consistent with the idea that firms pay higher salaries to their workers after a tax cut in order to hire and retain productive workers, so that they can continue to expand.

Besides contributing to the literature on corporate taxation, this paper complements a wide range of literature that has found large effects of fiscal policies on real outcomes; for example, temporary reforms such as accelerated depreciation (House and Shapiro 2008; Zwick and Mahon 2017) and durable goods subsidies (Mian and Sufi 2012) have been shown to stimulate aggregate spending. Furthermore, our results are consistent with the findings from a growing empirical literature that has documented substantial investment responses to corporate tax incentives (Ohrn 2018; Chen et al. forthcoming; Giroud and Rauh 2019; Liu and Mao 2019; Maffini et al. 2019) and to payout taxes (Moon 2022), and large innovation responses to corporate income taxes (Mukherjee et al. 2017), as well as personal income taxes (Akcigit et al. 2018; Bıró et al. 2022).

This paper is organized as follows. Section 2 provides institutional details on corporate tax income taxes in Canada. Section 3 describes our data and research design. Section 4 shows our main results and Section 5 discusses economic interpretations of our findings. Section 6 concludes.

2 Institutional Background

This section describes the institutional details on the Canadian corporate income tax system and policy changes in Quebec relevant for our empirical design.

2.1 Corporate Income Taxes in Canada

In Canada, businesses can be organized as corporations or unincorporated forms, such as sole proprietorships or partnerships. Unincorporated businesses' income flows through to owners as personal incomes and therefore, is fully taxed on accrual as ordinary income. On the other hand, corporations' income is subject to corporate taxation, and distributions to owners are taxed as ordinary income.[3]

Corporate income taxes in Canada are levied at both federal- and provincial-level. From 2011 to 2017, the baseline federal tax rate, after a general tax reduction, was 16.5 percent in 2011 and is reduced to 15 percent from 2012. Additionally, Canadian-Controlled Private Corporations (hereinafter, CCPCs) are eligible for small business deductions (hereinafter, SBD), which lower their corporate income tax rates by 4 percentage points from the baseline rate for the first 500,000 CAD of their taxable income. To qualify for the SBD, a CCPC has to have taxable capital below 10 million CAD.[4] The eligible taxable income for the SBD is reduced by ten cents per every dollar increase in taxable capital exceeding 10 million CAD and completely phases out above 15 million CAD. For example, a firm that has taxable capital of 12.5 million CAD and taxable income of 500,000 CAD can only qualify for the first half of the taxable income (250,000 CAD) for the SBD. Panel A of Figure 1 describes the phase-out schedule for small business deductions as a function of taxable capital. Note that this phase-out schedule also applies to small business taxes across all provinces, which we describe in the following subsection.

2.2 Policy Changes in Quebec

Each province in Canada sets its own corporate income tax rates. During our sample period (2011 to 2017), in Ontario, which is the largest province in Canada in terms of shares on the number of firms, aggregate revenue, assets, and the number of employees, the general provincial tax rate is

[3]While corporate income is taxed both at the corporate and personal levels, there exists corporate-personal tax integration. For example, a dividend tax credit offsets corporate taxes for dividends from Canadian corporations paid to domestic shareholders Smart 2021.

[4]Taxable capital is the sum of a business' capital, such as capital stock and retained earnings, net of investment allowance. The full definition of taxable capital is available here: https://www.canada.ca/content/dam/cra-arc/formspubs/pbg/t2sch33/t2sch33-15e.pdf

fixed at 11.5 percent, whereas the tax rate for all small businesses is fixed at 4.5 percent. Similarly, in British Columbia, the third largest province (tied with Alberta), the general tax rate is between 10 to 11 percent, whereas the tax rate for all small businesses is fixed at 2.5 percent and is reduced to 2 percent in 2017.

By contrast, in Quebec, the second largest province, the general provincial tax rate is fixed at 11.9 percent and is reduced to 11.8 percent in 2017, while the tax rate for all small businesses was 8 percent until 2013. In 2014, the Quebec government implemented an additional rate reduction for firms operating in the manufacturing and processing (hereinafter, M&P) sector, which further lowers the tax rate for small businesses by 2 percentage points in 2014 and by 4 percentage points in 2015.[5] On the other hand, the tax rate for small businesses operating in non-M&P sectors in Quebec remains unchanged. Figure 2 describes corporate income tax rates for small businesses across these provinces during our sample period. In Section 3, we describe how we use this set of treated firms (operating in the M&P sector and located in Quebec) and control firms (operating in non-M&P sectors and located in Quebec, as well as located in British Columbia and Ontario) for our empirical strategy.

We drop pre-2011 years not only because they include the global recession period starting in 2008, but also because there are non-trivial changes in the general and small business tax rates in Ontario between 2009 and 2010. Tables A.1 - A.4 in Appendix A describe both federal and provincial corporate income tax rates in Canada from 2009 to 2017. Table A.5 in Appendix A describes shares based on the number of firms, assets, revenue, and employment across all provinces. Quebec, British Columbia, and Ontario have about 23 percent, 15 percent, and 36 percent, respectively on average in terms of shares based on the number of firms, total revenue, assets, and employment; therefore, our treated and control provinces make up about 75 percent of our entire sample. We do not include firms in other provinces or territories either because they experience non-trivial changes in the general or small business tax rates between 2011 and 2017 (Alberta, New Brunswick, Nova Scotia, Newfoundland and Labrador, Prince Edward Island, and Yukon) or because they account for a small share of firms (Manitoba, Northwest Territories, Nunavut, and Saskatchewan). Not only our main treated and control provinces account for three quarters of firms in the Canadian economy, but also there is no change in provincial small business tax rates, except in 2014 and 2015 for our treated group during our sample period.

[5]The policy, a part of a comprehensive plan to bolster Québec's economy, was announced and became effective in 2014. In the budget plan for 2014-2015, the provincial government acknowledged the importance of export markets on the growth of Québec's manufacturing Small-Medium Enterprises (hereinafter, SMEs). However, Québec SMEs had been disadvantaged relative to those of other provinces as they faced the highest income tax rate (8 percent) of all the Canadian provinces. With the 4 percent new income tax rate, Québec's manufacturing SMEs will enjoy a tax rate that is competitive with the rest of Canada. In particular, the new rate is lower than that for Ontario businesses (4.5 percent), the principal competitors for Quebec's manufacturing SMEs. The policy is projected to reduce the tax burden of manufacturing SMEs by 157-million dollars over the five-year period.

3 Empirical Strategy

This section describes our empirical strategy and data to identify the effects of the tax cuts from changes in small business tax rates on both firm-level and worker-level outcomes.

3.1 Estimating Tax Effects on Corporate Outcomes

To identify the tax effects on corporate outcomes, we compare the outcomes of firms in the M&P sector in Quebec, relative to the outcomes of firms in non-M&P sectors in Quebec, before and after the policy change in 2014. Additionally, we compare the outcomes of firms in the M&P sector in control provinces (British Columbia and Ontario, which did not experience any change in tax rates for small businesses), relative to the outcomes of firms in non-M&P sectors in control provinces, before and after 2014. Then we compare the former difference-in-differences with the latter difference-in-differences to absorb any sector-specific trends or shocks that may have coincided with the reform. To validate our empirical design and graphically show the reform's effects on firms' outcomes, we estimate the following model:

$$Y_{jt} = \sum_{\tau=2011}^{2017} \theta_\tau \mathbb{1}(t=\tau) \times MP_j \times QC_j + \sum_{\tau=2011}^{2017} \beta_\tau \mathbb{1}(t=\tau) \times MP_j + \sum_{\tau=2011}^{2017} \gamma_\tau \mathbb{1}(t=\tau) \times QC_j + \alpha_j + u_{jt} \quad (1)$$

where Y_{jt} is an outcome variable for firm j in year t, MP_j is an indicator for a firm in M&P sector, QC_j is an indicator for a firm located in Quebec, and α_j are firm fixed effects. Each coefficient θ_τ measures the change in the outcome variable Y_{jt} for treated firms relative to control firms in the τ-th year before or after the reform became effective in 2014. θ_{2013} is normalized to be zero. We cluster standard errors at the firm-level.

We compute and summarize the main estimates of the average tax effects on firms' outcomes by estimating the following triple difference model:

$$Y_{jt} = \theta Post_t \times MP_j \times QC_j + \beta Post_t \times MP_j + \gamma Post_t \times QC_j + \alpha_j + \alpha_t + u_{jt} \quad (2)$$

where $Post_t$ is a dummy equal to 1 if it is after the reform year of 2014, α_t are year fixed effects, and all the other variables are defined as in equation (1). We report the estimates from this equation (2), as well as those from equation (1).

For our analysis sample, we make the following restrictions. First, we focus on the CCPCs, which account for roughly 98 percent of all firms in our dataset, and use non-CCPCs only as a

placebo group in our robustness check. Second, we focus on firms with total assets below 10 million CAD and therefore qualify for small business deductions. As described in Section 2, small business deductions start phasing out 10 cents per every dollar increase in taxable capital above 10 million in CAD, and completely phases out after 15 million CAD. Since we do not observe taxable capital in our data, we proxy it using firms' total assets. Since total assets are larger than taxable capital, we understate the share of eligible firms by using total assets as the threshold. However, as shown in Panel B of Figure 1, the cumulative share of small business deduction claimants is about 99 percent by 10 million CAD in total assets, which implies that the share of eligible firms above this threshold is small. We do a robustness check by including eligible firms above 10 million CAD in total assets and that claimed any positive small business deductions in one year before the reform (see Section B). During our sample period, the share of firms that moved out of province is 0.84 percent and that switched industries is 4.42 percent. We drop these firms as well as those who have multiple establishments across other provinces (1.59 percent). Finally, we exclude firms operating in agriculture (1.6 percent), finance and real estate (7.1 percent), professional services (14.7 percent), and health care (7.8 percent) sectors. Our preferred specification excludes these sectors, but including them does not qualitatively affect our results.

The main identifying assumption behind our empirical design is not the random assignment of firms into treated or control groups. Instead, it is that the affected and unaffected firms' outcomes would have trended similarly in the absence of the policy change. The key threat to this design is that time-varying shocks may coincide with the reform. We present two main empirical evidence that this threat is minimal. First, affected and unaffected firms exhibit parallel trends for the key outcomes prior to the reform. Second, we conduct placebo tests using non-CCPCs that are ineligible for small business deductions (and therefore unaffected by the reform in 2014). We fail to reject the null hypothesis that the effects are not statistically different from zero.

3.2 Estimating Tax Effects on Worker Outcomes

To assess the effects of tax cuts on worker outcomes, we estimate a similar model of the following form:

$$Y_{ijt} = \sum_{\tau=2011}^{2017} \theta_\tau \mathbb{1}(t=\tau) \times MP_{ij} \times QC_{ij} + \sum_{\tau=2011}^{2017} \beta_\tau \mathbb{1}(t=\tau) \times MP_{ij} + \sum_{\tau=2011}^{2017} \gamma_\tau \mathbb{1}(t=\tau) \times QC_{ij} + \alpha_i + u_{ijt} \tag{3}$$

where Y_{ijt} is an outcome variable for worker i at firm j in year t, MP_{ij} is an indicator for an

employee i working at a firm j in the M&P sector, QC_{ij} is an indicator for an employee i working at a a firm j located in Quebec, and α_i are worker fixed effects. Each coefficient θ_τ measures the change in the outcome variable Y_{ijt} for treated workers relative to control workers in the τ-th year before or after the reform became effective in 2014. θ_{2013} is normalized to be zero. Standard errors are two-way clustered at both firm- and worker-level.

We compute and summarize the main estimates of the average tax effects on workers' outcomes by estimating the following triple difference model:

$$Y_{jt} = \theta Post_t \times MP_{ij} \times QC_{ij} + \beta Post_t \times MP_{ij} + \gamma Post_t \times QC_{ij} + \alpha_i + \alpha_t + u_{ijt} \tag{4}$$

where $Post_t$ is a dummy equal to 1 if it is after the reform year of 2014, α_t are year fixed effects, and all the other variables are defined as in equation (3). We report the estimates from this equation (3), as well as those from equation (3).

For our analysis sample, we make the following restrictions. First, we focus on workers that are employed at either treated or control firms during our sample period. Second, we restrict workers to have at least 4,000 CAD in annual earnings to ensure that we study workers with stable income and attached to their firms (Card et al., 2013; Sorkin, 2018). Third, we drop workers with multiple jobs in a given year ("multiple-job holders") so that we focus on full-time workers. The combined share of workers we drop is about 31.1 percent. Finally, we impose that all workers were employed in the treated (or control) firms during the entire pre-event period (2011 to 2013). This tenure restriction is chosen to obtain a sample of workers with attachment to our analysis firms and is similar to tenure restrictions used in the mass layoff literature (Jacobson et al., 1993; Von Wachter et al., 2009; Lachowska et al., 2020). While these restrictions allow us to focus on workers that have stable jobs at either treated or control firms in our analysis sample, we do a robustness check by dropping the tenure restriction and including multiple-job holders or those making below 4,000 CAD in annual earnings, and find qualitatively similar results (Appendix B).

3.3 Data and Outcome Variables

For empirical analysis, we use the Canadian Employer Employee Dynamics Database (CEEDD), a matched employee-employer dataset that covers the universe of workers and companies in Canada from 2001 to 2017. To prevent disclosure of confidential information, Statistics Canada requires researchers to round estimates and observation counts. The CEEDD draws information from both individual (T1) and corporate (T2) tax return records, merged with job-level information using T4 employee tax records and Record of Employment (ROE) data, and with firm-level information from the National Accounts Longitudinal Micro-data File (NALMF). This database has rich

information on the universe of workers and firms in Canada.

The main outcome variables used in the firm-level analysis are total revenue, total expenses, profit margins, average payrolls, number of employees, EBITDA per worker, tangible assets, total income tax rates, and federal income tax rates. We do not use expenditures on physical capital assets (CAPEX) as an investment outcome, mainly because roughly 70 percent of our analysis sample have zero investment. Instead, we use the reported book value of tangible assets as a measure of capital stock. Profit margins are defined as total revenue minus total expenses, scaled by total revenue. Employment is defined as the average number of employees reported from the T4s. Total income tax rate is the sum of a company's current corporate income taxes divided by taxable income in a given year.

At the worker-level, the key outcome is log of annual earnings which is aggregated across all employers in a given year. While we include earnings across all employers, we associate workers with the "dominant" employer (i.e., the employer from which the employee receives the highest pay in the year). We also use information on workers' gender and age derived from T1 for heterogeneity analyses.

All outcome variables are winsorized at the first and ninety-ninth percent levels, except for profit margins and total income tax rates, which are winsorized at the fifth and ninety-fifth percent levels, due to disclosure rules set by Statistics Canada.

3.4 Descriptive Statistics

We close this section with descriptive statistics of our data. Table 1 shows the means for key outcome variables measured in one year before the reform, separately for our treated firms and control firms. On average, firms operating in the M&P sector are older and larger than firms operating in non-M&P sectors, in terms of total assets, revenue, expenses, employment, total payrolls, and average payroll. However, firms operating in non-M&P sectors have higher profit margins and EBITDA per worker on average, compared to firms in the M&P sector. Moreover, firms located in Quebec are similar in sizes relative to firms located in British Columbia or Ontario on average. In Quebec, the share of firms in the M&P sector is about 10 percent. The majority of firms operating in non-M&P sectors is in construction (25 percent), retail (19 percent), transportation (9.7 percent), and other services (34.2 percent). The sectoral composition is similar for firms located in British Columbia or Ontario.

Table 2 shows the means for key variables measured in one year before the reform, separately for our treated workers and control workers. On average, workers in the M&P sector are older and earn more relative to workers in non-M&P sectors. Additionally, the share of male workers

is a bit larger in the M&P sector compared to the share in non-M&P sectors. Moreover, workers in Quebec are younger and earn less than workers in British Columbia or Ontario on average. In Quebec, the share of workers in the M&P sector is about 10 percent. The majority of workers in non-M&P sectors is in construction (20 percent), retail (25 percent), transportation (7 percent), and other services (35 percent). The sectoral composition is similar for workers located in British Columbia or Ontario.

4 Results

This section reports the results from the estimation of the difference-in-differences model in Section 3, and presents additional tests supporting the interpretations of the results.

4.1 Total and Federal Corporate Income Tax Rates

Figure 3 plots estimates of θ_τ from equation (1) on total income tax rates and federal income tax rates using our analysis sample. Total income tax rates include all corporate income taxes both at the federal- and the provincial-level, and thus represent effective tax rates for firms. Panel (a) shows that treated firms followed a similar pattern as those of their control firms before 2014. This parallel pre-trend is important evidence in support of our empirical strategy. After 2014, total income tax rates decrease significantly for treated firms, relative to control firms, consistent with the fact that the reform in Quebec reduced provincial corporate income rates for small businesses operating in the M&P sector. On the other hand, Panel (b) shows that federal income tax rates not only follow a parallel pre-trend with those of control firms, but also remain flat after 2014, because the federal tax rates remained constant for both treated and control firms.

Columns (1) and (2) of Table 3 presents the triple-difference estimates on the total income tax rates and federal income tax rates. Column (1) shows that treated firms' total income tax rates decrease by 1.16 percentage points, relative to those of control firms. This implies that the net of tax rate decreases by 1.38 percent after 2014 using the mean effective tax rate of 15.7 percent before 2014.[6]. By contrast, column (2) shows that treated firms' federal income tax rate remained unchanged after 2014. These results suggest that the reform in Quebec had significant impacts in reducing corporate income tax rates for treated firms in our sample.

Note that the net of tax rate decreases by 4.94 percent for treated firms after 2014 if we use the

[6]The net of tax rate change is defined as $\frac{(\tau_1-\tau_0)}{(1-\tau_0)} = \frac{-0.0116}{(1-0.157)} = -0.0138$.

statutory tax rates.[7] The estimated changes in effective tax rates are lower than changes in statutory tax rates for two main reasons. First, firms tend to have a lower taxable income base because of various tax deductions, and can also claim tax credits, both of which will lower their actual tax rates relative to their statutory tax rates. Thus, changes in effective tax rates are lower than changes in statutory tax rates. Second, a non-trivial share of firms in our analysis sample face zero effective tax rate because their taxable income is non-positive. Because this group of firms experience no changes in effective tax rates after the reform, our estimated changes in tax rates are lower than the changes in statutory tax rates. We use changes in statutory tax rates to compute the elasticities so that we can compare our estimates with those from prior studies that also use statutory tax rate changes.

4.2 Employment, Payrolls, and Capital

Figure 4 plots estimates of θ_τ from equation (1) on employment, average payrolls, and tangible assets using our analysis sample. Panels (a) - (c) show that treated firms followed a similar pattern as control firms before 2014 for these outcomes. After 2014, employment, average payrolls, and tangible assets increase significantly for treated firms, relative to control firms, consistent with the idea that the tax cut lead these firms to increase demand in both labor and capital.

Table 4 presents the triple-difference estimates on these firm-level outcomes. Columns (1) and (2) show that treated firms' employment and average payroll increase by 1.75 percent and 2.35 percent, respectively, relative to those of control firms, implying a large and significant response in demand for labor. Column (3) shows that treated firms' capital stock increases by 8.4 percent after the tax cuts. Using the changes in statutory tax rates, the elasticities of firms' employment, average payrolls, and capital stock with respect to net of corporate income tax rate are 0.35, 0.48, and 1.7, respectively.[8] We discuss the interpretations and comparisons of these estimates with those of prior studies in Section 5.

4.3 Sales, Profitability, and Productivity

Figure 5 plots estimates of θ_τ from equation (1) on total revenue, total expenses, profit margins, and EBITDA per worker using our analysis sample. Panels (a) - (d) show that treated firms followed

[7] Assuming that small businesses have taxable income below 500,000 CAD and taxable capital below 10 million CAD, their statutory corporate income tax rate is 19 percent (11 percent for the federal and 8 percent for Quebec). Since the treated firms' statutory provincial tax rate decreases from 8 percent to 4 percent after the reform, the net of tax rate change is $\frac{-4}{(100-19)} = -0.0494$.

[8] Using the estimated changes in effective tax rates, the elasticities of firms' employment, average payrolls, and capital stock with respect to net of corporate income tax rate are 1.27, 1.71, and 6.12, respectively.

a similar pattern as control firms before 2014 for these outcomes. After 2014, revenue, expenses, profitability and labor productivity increase significantly for treated firms, relative to control firms, consistent with the idea that the tax cut lead these firms to expand both in terms of spending and sales, and resulted in a small gain in both profitability and productivity.

Table 5 presents the triple-difference estimates on these firm-level outcomes. Columns (1) and (2) show that treated firms' total revenue and expenses increase by 5.2 percent and 5 percent, respectively, relative to those of control firms, implying a large and significant response in firm growth. Given that total revenue increase a bit more than total expenses, the net profit margins increase by 0.44 percentage points. Furthermore, EBITDA increased by 891 CAD per worker, which means that firms now generate 891 dollars more in before-tax profits for every worker after the tax cut.

4.4 Worker-level Earnings and Job Transitions

Given that changes in average payrolls may reflect changes in worker compositions, we next turn to the worker-level data which allows us to flexibly control for compositions by tracking the same workers over time.

In Figure 6, we plot $\hat{\theta}_\tau$ from estimating Equation (3) on worker-level annual earnings. As the figure shows, earnings for treated workers trend similarly to those of their control workers in the years prior to 2014, but increase significantly after 2014. Column (1) of Table 6 shows that the average impact on workers is 1.43 percent on average after 2014, relative to their control workers. The elasticity of workers' earnings with respect to net of statutory corporate income tax rate is 0.29, implying that for one percent increase in net of tax rate would increase workers' earnings by roughly 0.29 percent. We discuss the interpretations and comparisons of these estimates with those of prior studies in Section 5.

Next, we examine whether workers move to other firms after their initial firms receive the tax cuts. Column (2) of Table 6 shows that the probability of moving to another firm for treated workers, relative to control workers, is zero. Consistent with the result that workers in treated firms stayed at their firms relative to those in control after the reform, column (3) of Table 6 shows that annual earnings for stayers in treated firms increase by 1.34 percent on average in the years following the reform. This increase in earnings is similar to the one from all workers. In Section 4.5, we explore potential mechanisms behind these increases in worker-level earnings.

4.5 Robustness and Internal Validity

We conduct several robustness checks to strengthen the internal validity of our results. First, to account for any 4-digit industry specific shock in a given year potentially driving our results, we also include 4-digit industry by year fixed effects, and find that the results are qualitatively similar to our main results. Second, to account for any local labor market specific shock in a particular year potentially driving our results, we also include commuting zone by year fixed effects, and find that the results are qualitatively similar to our main results. Third, we include firms above 10 million total assets and claimed any small business deductions in 2013 as part of our analysis sample, and find that the results stay roughly the same. Fourth, while we impose tenure restrictions and drop multiple-job holders or those making below 4,000 CAD in annual workers to focus on workers with stable jobs, our results including these previously excluded workers are qualitatively similar. The results from these robustness checks are included in Appendix B.

Moreover, we conduct a placebo test using a set of non-CCPC firms ineligible for small business deductions. Non-CCPCs, regardless of their sectors or locations, are not impacted by the reform in 2014, so they serve as a placebo group to confirm that our results are indeed not driven by shocks at the sector or provincial levels. Figure B.5 in Appendix B shows that across all outcomes we study, the estimated coefficients are close to zero after 2014.

4.6 Heterogeneity Analysis and Mechanisms

In this subsection, we discuss and empirically test potential mechanisms for responses in worker earnings after the tax cuts. One of the key channels through which a corporate tax reduction can increase workers' earnings is by reducing financial constraints: firms that were more financially constrained before the tax cuts may react more aggressively by hiring more workers and paying them higher salaries. The second mechanism is the labor market power channel: we test whether the effects of the tax cuts are lower for highly concentrated labor markets. The third mechanism is the growth prospect of firms based on their industries. For firms in fast-growing, high-technology industries would likely benefit more from a tax cut and would increase demand in capital and labor more aggressively relative to firms in slower-growing, low-technology industries. This higher demand in labor in turn may result in higher salaries for workers on average.

4.6.1 By Financial Constraints

We first examine whether firms that were ex-ante more financially constrained pay higher salaries to their workers after the tax cuts. A corporate tax cut may reduce firms' financial constraints

by lowering their cost of capital. Firms that have less access to capital or external financing may find it more appealing to increase their investment in capital and labor when their after-tax profits increase.

We test whether the effects of the tax cuts are stronger for firms that appear more financially constrained based on their sizes (Zwick and Mahon, 2017). We use firms' sales as a proxy for financial constraints, and estimate our main specifications (1) and (2), separately for firms below the median value of total revenue reported in one year before the reform, and for firms above the median value.[9] To estimate these effects for worker-level earnings, we repeat this using our main specifications (3) and (4), separately for workers whose firms are above the median value and for workers whose firms are below the median value.

Figure 7 presents these results on employment, average payrolls, profit margins, and worker-level earnings. Panels (a) - (d) show that the tax effects are statistically indistinguishable between small and large firms across these outcomes. Table 7 confirms that the difference between low-revenue firms and high-revenue firms is statistically not different from zero across each of these main outcomes after the tax cuts. While these results suggest that there does not appear to be heterogenous effects by firm sizes, our results could be simply driven by the fact that there is not actually much of a difference in financial constraints between small firms and larger firms in our treated group, given that the vast majority of these firms are small businesses to begin with. Cutting our sample by 25 percentile and 75 percentile to enlarge the gap between low-revenue and high-revenue firms makes the differences a bit larger, but also not statistically significant due to smaller sample sizes. Therefore, we do not find evidence that the responses in workers' earnings are driven by reducing firms' financial constraints.

4.6.2 By Labor Market Concentration

In labor markets where firms have monopsony power, lower corporate taxes may not lead to higher salaries for workers. This is because monopsonistic firms have the ability to set lower wages than the competitive benchmark even after an increase in after-tax profits. Therefore, we hypothesize that workers in more concentrated labor markets would experience a lower increase in their earnings after their firms experience a tax cut.

We test whether the effects of the tax cuts are stronger for workers that are located in less concentrated labor markets. We define labor markets by an industry-by-commuting zone cell and measure concentration by the Herfindahl-Hirschmann Index (HHI), which is commonly used in

[9] We additionally use other proxies for financial constraints, such as firm age and profit margins, and find qualitatively similar results (see Appendix C for details).

antitrust analysis to predict anticompetitive effects of mergers and acquisitions. We estimate our main specifications (1) and (2), separately for firms located in labor markets below the median value of HHI measured in one year before the reform, and for firms located in labor markets above the median value. To estimate these effects for worker-level earnings, we repeat this using our main specifications (3) and (4), separately for workers located in labor markets above the median value and for workers located in labor markets below the median value.

Figure 8 presents these results on employment, average payrolls, profit margins, and worker-level earnings. Panels (a) - (d) show that the tax effects are statistically indistinguishable between firms and workers in low-HHI markets and those located in high-HHI markets across these outcomes, except for profit margins. Table 8 confirms that the difference between low-HHI and high-HHI labor markets is statistically not different from zero across each of these main outcomes after the tax cuts, except for profit margins, where firms in low-HHI markets have higher profit margins. While these results suggest that there does not appear to be heterogenous effects by local labor market concentration, our results could be simply driven by the fact that the vast majority of our treated firms are small businesses that cannot exercise their market power to begin with. It is possible that larger firms located in high-HHI labor markets can extract more after-tax profits after the tax cut, which can result in lower increases in workers' salaries (Fuest et al., 2018).

4.6.3 By High-tech vs. Low-tech

Finally, we examine whether firms operating in fast-growing, high-technology industries pay higher salaries to their workers after the tax cuts. The intuition is that firms in these industries may have a higher growth potential, and therefore, may have a higher demand for capital and labor after the tax cut.

We test whether the effects of the tax cuts are stronger for firms and workers that are in high-technology industries. To define high tech vs. low-tech industries, we follow the approach by Heckler (2005), where an industry is defined as high technology if employment in technology-oriented occupations accounted for 9.8 percent of that industry's total employment.[10] Panel C of Tables 1 and 2 show characteristics of firms and workers in high-technology vs. low-technology industries within our M&P sample. On average, firms in high-technology industries have larger assets (concentrated in intangibles), higher sales, higher average payrolls, higher taxable income and higher EBITDA per worker, relative to firms in low-tech industries prior to the reform. Sim-

[10]Within our analysis sample, examples of top five (sorted by employment) high-technology industries are (1) Semiconductor and other electronic component manufacturing (3344), (2) Navigational, measuring, electromedical, and control instruments manufacturing (3345), (3) Aerospace product and parts manufacturing (3364), (4) Pharmaceutical and medicine manufacturing (3254), and (5) Other general-purpose machinery manufacturing (3339).

ilarly, workers in high-technology industries higher salaries relative to workers in low-technology industries. However, firms in high-technology and low-technology industries are similar in terms of the number of employees and profitability, and workers in both types of industries are similar in their ages. We estimate our main specifications (1) and (2), separately for firms in high-technology industries defined one year before the reform, and for firms in low-technology industries. Note that we use the same baseline control group in both estimations because we do not have this distinction between high-technology and low-technology industries within non-M&P sectors. To estimate these effects for worker-level earnings, we repeat this using our main specifications (3) and (4), separately for workers in high-technology industries and for workers in low-technology industries.

Figure 9 presents these results on employment, average payrolls, profit margins, and worker-level earnings. Panels (a) - (d) show that the tax effects are statistically different between high-technology industries and low-technology industries across these outcomes, except for profit margins and worker-level earnings. Table 9 confirms that the difference between high-technology industries and low-technology is statistically different from zero for employment and average payrolls, although the difference is not statistically significance for profit margins or worker-level earnings. However, we see that the point estimates are higher for firms and workers in high-technology industries, suggesting that indeed firms in these industries tend to grow faster and demand more capital and labor in order to facilitate their expansion after a tax cut. Therefore, our results on worker-level earnings seem most consistent with the channel that a corporate tax reduction increases the after-tax returns on investment, which will be especially beneficial to and will attract firms and workers in faster-growing industries. This finding in turn has a policy implication that if the government wants to promote investment in the economy through a corporate tax reduction, targeting specific sectors or industries that appear to have higher growth potentials may be more effective.

5 Economic Interpretations

The previous section showed that the implied elasticities of capital and labor with respect to the net of corporate income tax rate are both economically and statistically significant. This section discusses potential explanations for the magnitude of these estimates, compared to estimates from the existing literature.

Based on the model parameterized by Desai and Goolsbee (2004), a firm faces a cost of capital,

$$C_K = \frac{r}{(1-\tau_c)[(1-\tau_d)\rho + (1-\tau_g)(1-\rho)]} \tag{5}$$

where r, τ_c, τ_d, τ_g, and ρ are the expected rate of return, corporate income tax rate, dividend tax rate, capital gains tax rate, and share of earnings paid out to shareholders rather than retained, respectively. Fitting the model based on the parameters in our setting, we find that the cost of capital elasticity with respect to $(1 - \tau_c)$ is -0.95. We compute this elasticity by setting $\tau_d = 0.395$, $\tau_d = 0.293$ and $\rho = 0.05$, because the top marginal dividend tax rate and top marginal capital gains tax rate are 39.5 percent and 29.3 percent, respectively, in Quebec, and dividend payouts as a share of net income is about 5 percent on average among treated firms before the reform. We also assume that the change in the corporate income tax rate is from 19 percent to 15 percent, using statutory tax rates. The estimated capital stock elasticity of 1.7 based on the changes in statutory tax rates implies the user cost elasticity of -1.79, which is in line with recent estimates from Zwick and Mahon (2017), Moon (2022) and Curtis et al. (2021).

Using the estimated labor elasticity of 0.35 based on the changes in statutory tax rates, the elasticity of labor with respect to the estimated change in the cost of capital is -0.37. This estimate is about a half of the size of the baseline cost of capital estimate of production labor found in Curtis et al. (2021). The differences in these estimates could be driven by the fact that our treated firms are smaller on average than the treated firms in the sample of Curtis et al. (2021) or the degree of complementarity between labor and capital might be lower among treated firms in our sample.

Turning to worker-level earnings, we find that the elasticity of workers' earnings with respect to net of statutory tax rates is 0.29. Our estimate is a bit smaller, but in line with the estimate by Fuest et al. (2018) from the German setting. Since we observe neither workers' wages nor their hours of work, we focus on full-time workers (see Section 3), so that we can try to rule out extensive margin responses (i.e., increases in workers' hours) to a tax cut and argue that our earnings estimate is close to the wage estimate.

Note that using changes in effective tax rates, estimated in Section 4, yields much larger estimates for the elasticities of capital, labor, and earnings with respect to net of tax rate. For example, the elasticity of workers' earnings with respect to net of effective tax rates is about 1.04, which is more than twice as large as the elasticity estimates in Fuest et al. (2018). In this section, we use changes in statutory tax rates so that our estimates are more comparable to the estimates from other studies that also use changes in statutory tax rates. However, our paper highlights that in general, using changes in statutory tax rates may understate the actual elasticities of key outcomes with respect to net of tax rate.

Overall, our estimated elasticities of capital stock, labor, and worker earnings with respect to net of tax rate are comparable to the estimates across other settings, such as the United States and Germany. However, there might be country-specific institutional differences that generate heterogenous responses to a tax cut in general. For example, if a large share of firms in a given country

consists of fast-growing, high-technology firms, then one may expect to see a larger capital and labor responses to a corporate tax cut. These heterogenous responses, either driven by different firm characteristics or institutional settings, may be observed in different proportions across different countries over time, which can lead to different observed aggregate effects.

In terms of aggregate dollars, the total employment and revenue were roughly 428,000 per year and 69 billion CAD per year on average among the treated firms (M&P in Quebec) after the reform. Then the aggregate increases in employment and sales are about 7,425 per year and 1.2 billion CAD per year, respectively, within the main analysis sample. These are roughly 0.13 percent and 0.1 percent increases in total employment and sales per year within the entire firms in Quebec (the second largest province in Canada) after the reform.[11] Although these aggregate increases in employment and sales in percent may seem small, these are relatively large responses, considering that the treated firms account for about 10 percent of all firms in Quebec within our analysis sample.

6 Conclusion

This paper exploits variation across sectors and provinces, a policy reform, and administrative tax records data to estimate the effects of corporate tax reductions for small businesses on their growth and worker earnings. From 2014 to 2015, small firms operating in the M&P sector received an additional tax reduction by 4 percentage points from the combined statutory rate of 19 percent. We compare the outcomes of affected firms and workers with those of unaffected firms and workers operating in non-M&P sectors and located in other major provinces, finding that employment, average payrolls, sales, profit margins, and labor productivity increased significantly for the treated group, relative to the control group, after the tax cuts. Additionally, we find that these responses are larger for firms in high-technology industries. These findings have policy implications that when designing a corporate tax cut, targeting a certain sector or industry that appears to have a higher growth potential may be an effective way to stimulate growth and employment in the economy.

[11] This calculation is based on a formula, $Y_{actual} = Y_{counterfactual} \times e^{\theta}$, where θ is from the triple-difference estimate of the tax effects on each of these outcomes. The change in aggregate investment is computed by $\Delta Y = Y_{actual} \times (1 - e^{-\theta})$. Note that the aggregate amount is based on the entire sample of firms in Quebec, which includes previously excluded firms across all sectors.

References

Akcigit, Ufuk, John Grigsby, Tom Nicholas, and Stefanie Stantcheva, "Taxation and Innovation in the 20th Century," *NBER Working Paper No. w24982*, 2018.

Arulampalam, Wiji, Michael P. Devereux, and Giorgia Maffini, "The Direct Incidence of Corporate Income Tax on Wages," *European Economic Review*, 2012, *56* (6), 1038–1054.

Auerbach, Alan and Kevin Hassett, "Tax Policy and Business Fixed Investment in the United States," *Journal of Public Economics*, 1992, *47* (2), 141–170.

Bıró, Anikó, Réka Branyiczki, Attila Lindner, Lili Márk, and Dániel Prinz, "Firm Heterogeneity and the Impact of Payroll Taxes," 2022.

Card, David, Francesco Devicienti, and Agata Maida, "Rent-sharing, Holdup, and Wages: Evidence from Matched Panel Data," *Review of Economic Studies*, 2013, *81* (1), 84–111.

Chen, Zhao, Xian Jiang, Zhikuo Liu, and Juan Carlos Suárez Serrato, "Tax Policy and Lumpy Investment Behavior: Evidence from China's VAT Reform," *Review of Economic Studies*, forthcoming.

Chirinko, Robert, Steven Fazzari, and Andrew Meyer, "How Responsive is Business Capital Formation to its User Cost?: An Exploration with Micro Data," *Journal of Public Economics*, 1999, *74* (1), 53–80.

Cummins, Jason, Kevin Hassett, and R. Glenn Hubbard, "Tax Reforms and Investment: A Cross-Country Comparison," *Journal of Public Economics*, 1996, *62* (1-2), 237–273.

Curtis, E. Mark, Daniel G. Garrett, Eric Ohrn, Kevin A. Roberts, and Juan Carlos Suárez Serrato, "Capital Investment and Labor Demand: Evidence from 21st Century Tax Policy," *Working Paper*, 2021.

Desai, Mihir and Austan Goolsbee, "Investment, Overhang, and Tax Policy," *Brookings Papers on Economic Activity*, 2004, (2), 285–338.

Fuest, Clemens, Andreas Peichl, and Sebastian Siegloch, "Do Higher Corporate Taxes Reduce Wages? Micro Evidence from Germany," *American Economic Review*, 2018, *108* (2), 393–418.

Garrett, Daniel G., Eric Ohrn, and Juan Carlos Suárez Serrato, "Tax Policy and Local Labor Market Behavior," *American Economic Review: Insights*, 2020, *2* (1), 83–100.

Giroud, Xavier and Joshua Rauh, "State Taxation and the Reallocation and Business Activity: Evidence from Establishment-level Data," *Journal of Political Economy*, 2019, *127* (3), 1262–1316.

Goolsbee, Austan, "Investment Tax Incentives, Prices, and the Supply of Capital Goods," *Quarterly Journal of Economics*, 1998, *113* (1), 121–148.

Heckler, Daniel E., "High-technology Employment: a NAICS-based update," *Monthly Labor Review*, 2005, *128.*

House, Christopher and Matthew Shapiro, "Temporary Investment Tax Incentives: Theory with Evidence from Bonus Depreciation," *American Economic Review*, 2008, *98* (3), 737–768.

Jacobson, Louis S., Robert J. LaLonde, and Daniel G. Sullivan, "Earnings Losses of Displaced Workers," *The American Economic Review*, 1993, pp. 685–709.

Lachowska, Marta, Alexandre Mas, and Stephen A. Woodbury, "Sources of Displaced Workers' Long-term Earnings Losses," *American Economic Review*, 2020, *110* (10), 3231–66.

Liu, Yongzheng and Jie Mao, "How Do Tax Incentives Affect Investment and Productivity? Firm-level Evidence from China," *American Economic Journal: Economic Policy*, 2019, *11* (3), 261–91.

Maffini, Giorgia, Jing Xing, and Michael P. Devereux, "The Impact of Investment Incentives: Evidence from UK Corporation Tax Returns," *American Economic Journal: Economic Policy*, 2019, *11* (3), 361–89.

Mian, Atif and Amir Sufi, "The Effects of Fiscal Stimulus: Evidence from the 2009 Cash for Clunkers Program," *Quarterly Journal of Economics*, 2012, *127* (3), 1107–1142.

Moon, Terry, "Capital Gains Taxes and Real Corporate Investment: Evidence from Korea," *American Economic Review*, 2022.

Mukherjee, Abhiroop, Manpreet Singh, and Alminas Zaldokas, "Do Corporate Taxes Hinder Innovation?," *Journal of Financial Economics*, 2017, *124* (1), 195–221.

Ohrn, Eric, "The Effect of Corporate Taxation on Investment and Financial Policy: Evidence from the DPAD," *American Economic Journal: Economic Policy*, 2018, *10* (2), 272–301.

Serrato, Juan Carlos Suárez and Owen Zidar, "Who benefits from state corporate tax cuts? A local labor markets approach with heterogeneous firms," *American Economic Review*, 2016, *106* (9), 2582–2624.

Smart, Michael, "Small Business Taxation and Income Inequality: The View from Canada," *National Tax Journal*, 2021, *74* (2), 493–512.

Sorkin, Isaac, "Ranking Firms Using Revealed Preference," *The Quarterly Journal of Economics*, 2018, *133* (3), 1331–1393.

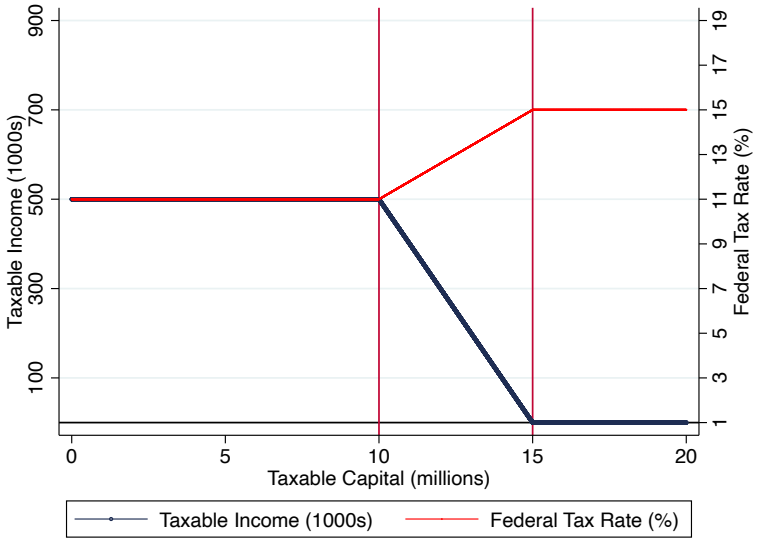
Summers, Lawrence, "Taxation and Corporate Investment: A q-Theory Approach," *Brookings Papers on Economic Activity*, 1981, (1), 67–140.

Wachter, Till Von, Jae Song, and Joyce Manchester, "Long-term Earnings Losses due to Mass Layoffs during the 1982 Recession: An Analysis Using US Administrative Data from 1974 to 2004," *Working Paper*, 2009.

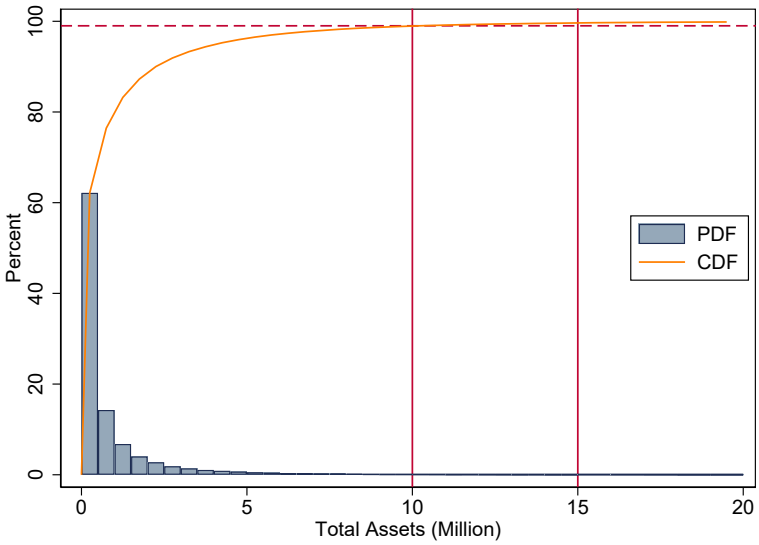
Zwick, Eric and James Mahon, "Tax Policy and Heterogenous Investment Behavior," *American Economic Review*, 2017, *107* (1), 217–248.

Figure 1: Phase-out Schedule for Small Business Deductions and Distribution of Claimants

(a) Phase-out Schedule for Small Business Deductions

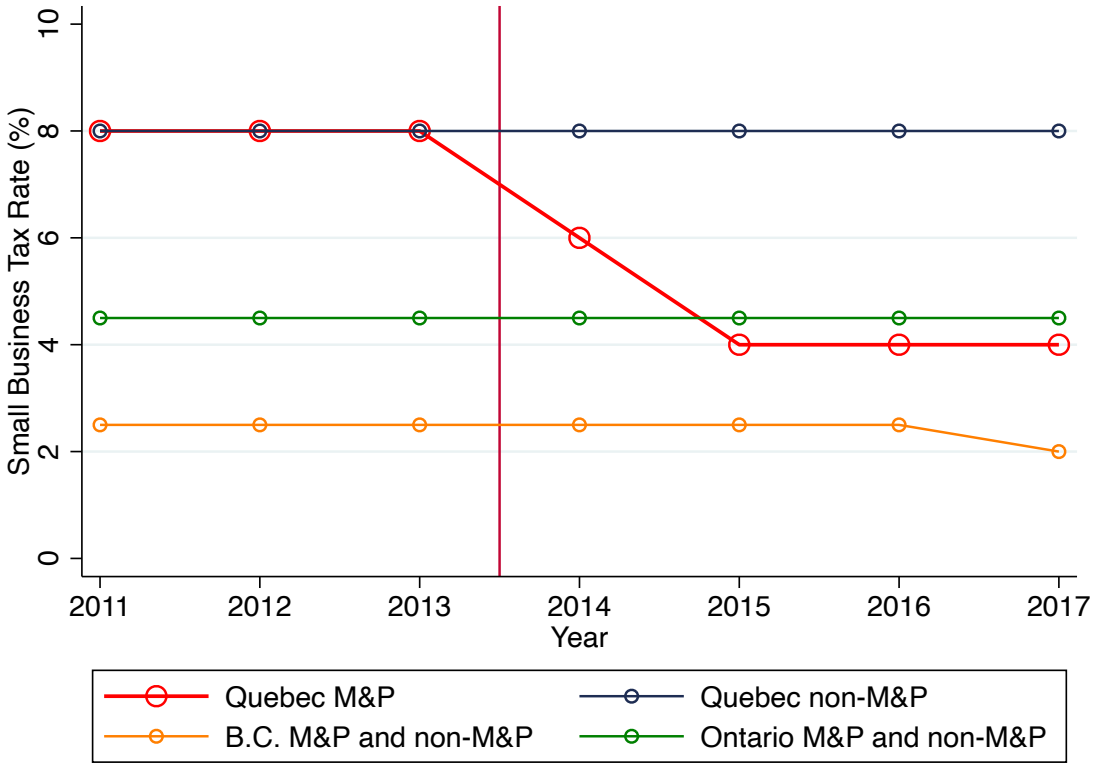


(b) PDF and CDF of SBD Claimants across Total Assets



Notes: Panel (a) in this figure shows the phase-out schedule for small business deductions, with qualifying taxable income (y-axis on the left) as a function of taxable capital (x-axis). At each level of taxable capital, the navy line indicates how much of a firm's taxable income is eligible for the lower tax rate of 11 percent, and the red line indicates the federal corporate income tax rate (y-axis on the right) after the small business deductions, assuming that the firm's taxable income is 500,000 CAD. For example, if a firm's taxable capital is below 10 million CAD, its entire 500,000 CAD of taxable income is subject to a reduced tax rate of 11 percent. If the firm's taxable capital is 12.5 million CAD, then only its first 250,000 CAD of taxable income is qualified for a reduced rate of 11 percent and the remaining is subject to the general rate of 15 percent, which results in the tax rate of 13 percent. If the firm's taxable capital exceeds 15 million CAD, then it is not eligible for small businesses deductions and its entire taxable income is subject to the general tax rate of 15 percent. Panel (b) in this figure shows the probability distribution function (PDF) and cumulative distribution function (CDF) of small business deduction claimants in our sample across total assets. About 99 percent of firms that claimed small business deductions had total assets below 10 million CAD.

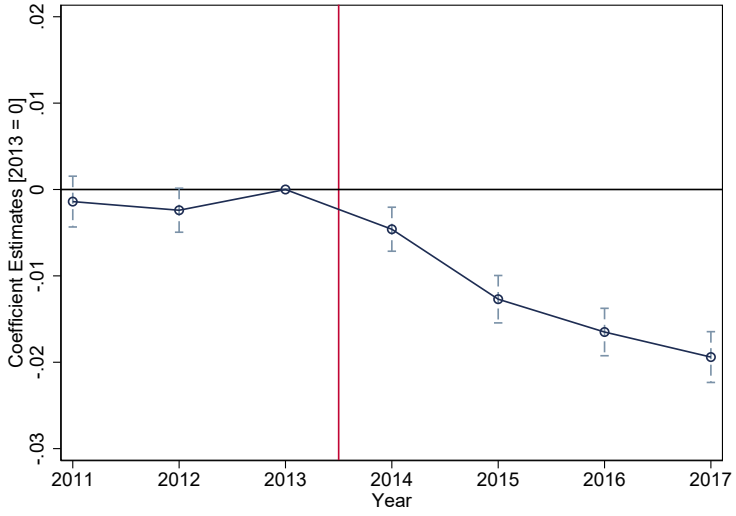
Figure 2: Small Business Tax Rates in Quebec, BC, and Ontario



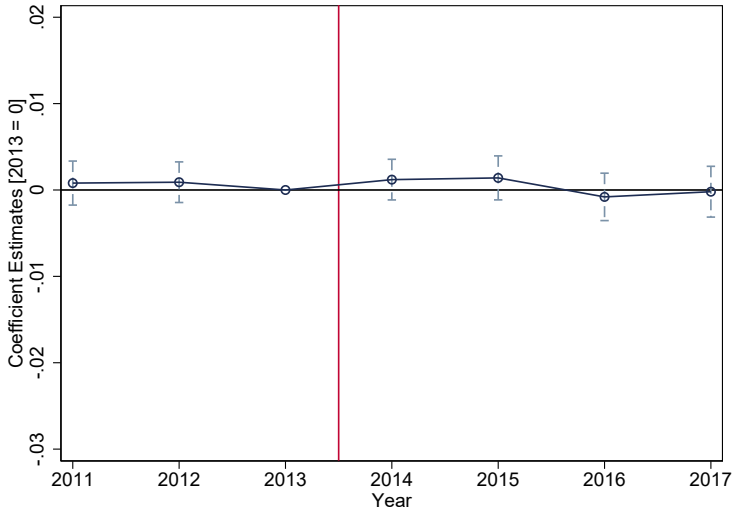
Notes: This figure shows the provincial corporate income tax rates on small businesses in Quebec, British Columbia, and Ontario, from 2011 to 2017. Only the first 500,000 CAD of taxable income of Canadian-Controlled Private Corporations, with taxable capital below 10 million CAD, is eligible for these small business tax rates, which are substantially lower than the general tax rates (See Section 2 and Appendix A for details). The small business tax rate for Manufacturing and Processing (M&P) sector in Quebec was reduced from 8 percent to 6 percent in 2014, and was further reduced to 4 percent in 2015. For British Columbia, Ontario, and Quebec non-M&P sectors, the small business tax rates remained constant from 2011 to 2017 (except for British Columbia, which reduced its rate from 2.5 percent to 2 percent in 2017).

Figure 3: Changes in Effective Tax Rates

(a) Total Income Tax Rates



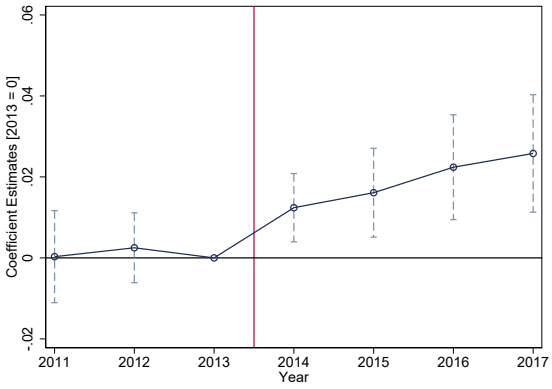
(b) Federal Income Tax Rates



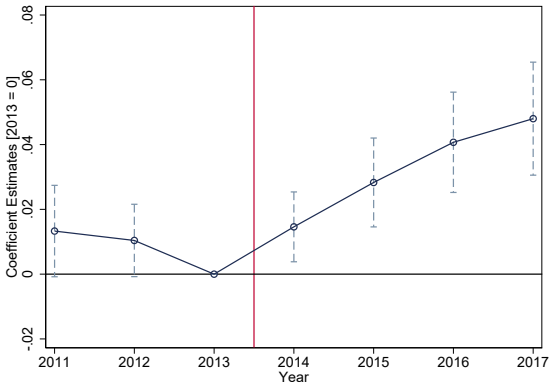
Notes: Panels (a) and (b) in this figure show the coefficient estimates on $Year \times MP \times QC$ in equation (1) for firms' total income tax rates and federal income tax rates, respectively. The solid vertical line indicates the reform year. The dashed lines represent 95 percent confidence intervals. Total income tax rate is defined as the sum of a firm's federal and provincial corporate taxes reported, scaled by its taxable income. Federal income tax rate is the firm's federal taxes (reported as Part I tax payable), scaled by its taxable income.

Figure 4: Tax Effects on Employment, Payrolls, and Capital Stock

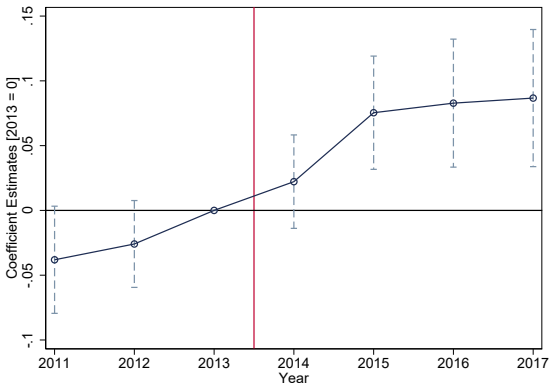
(a) log(Employment)



(b) log(Average Payrolls)

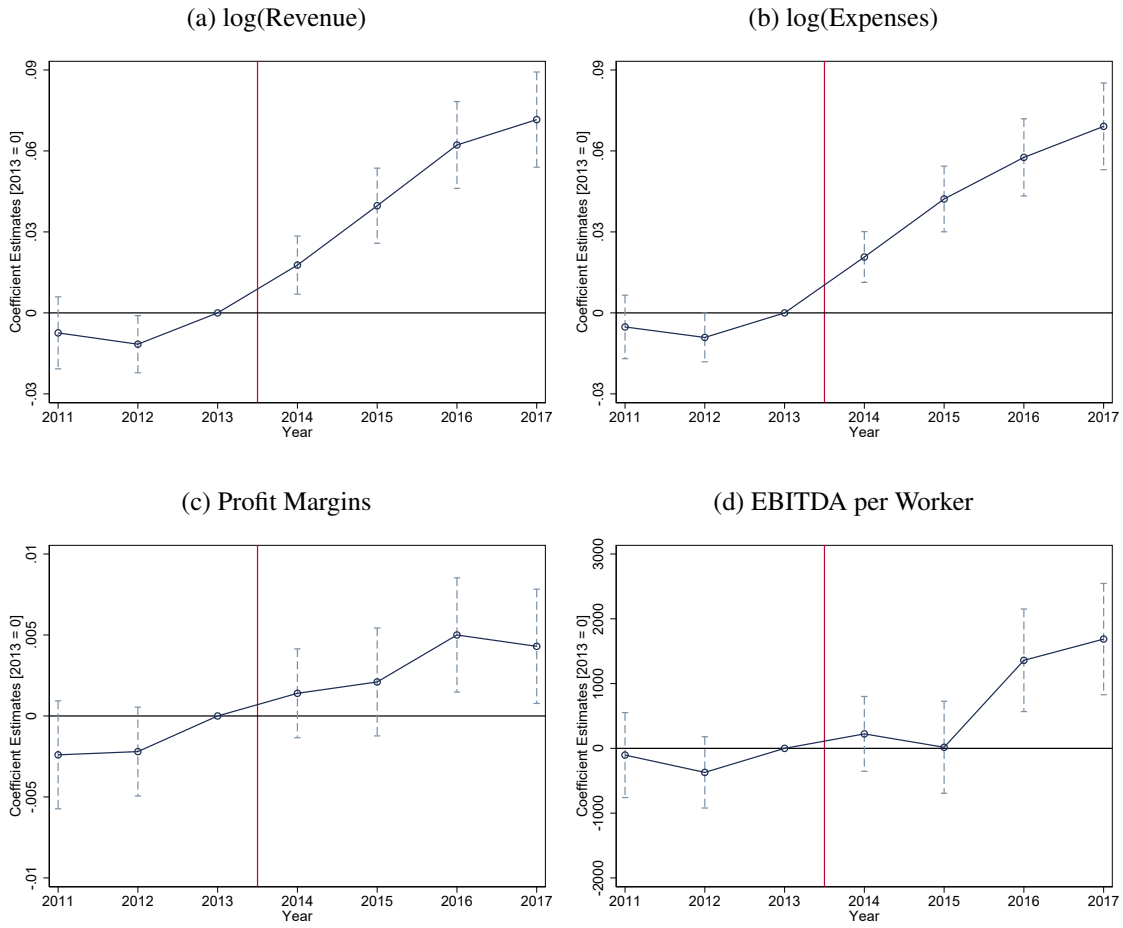


(c) log(Tangible Assets)



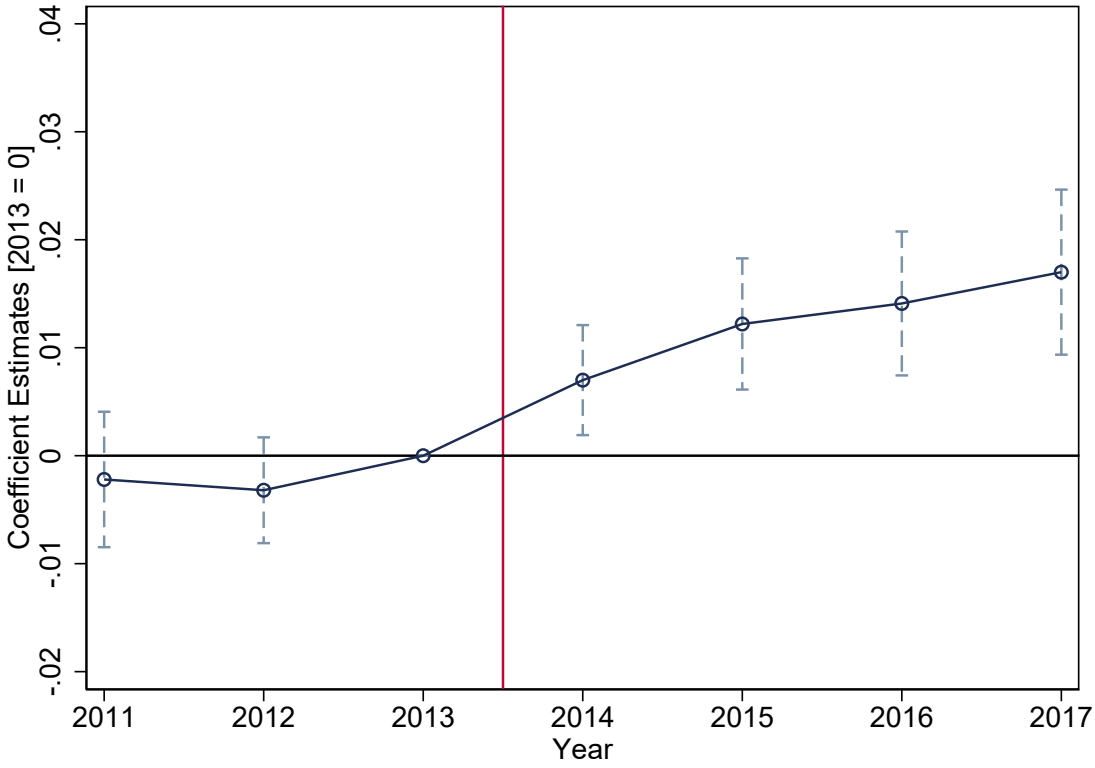
Notes: Panels (a) - (c) show the coefficient estimates on $Year \times MP \times QC$ in (1) for firms' *log*(*employment*), *log*(*average payrolls*), and *log*(*tangible assets*), respectively. The solid vertical line indicates the reform year. The dashed lines represent 95 percent confidence intervals. The book value of tangible assets represents a firm's capital stock.

Figure 5: Tax Effects on Sales, Profitability, and Productivity



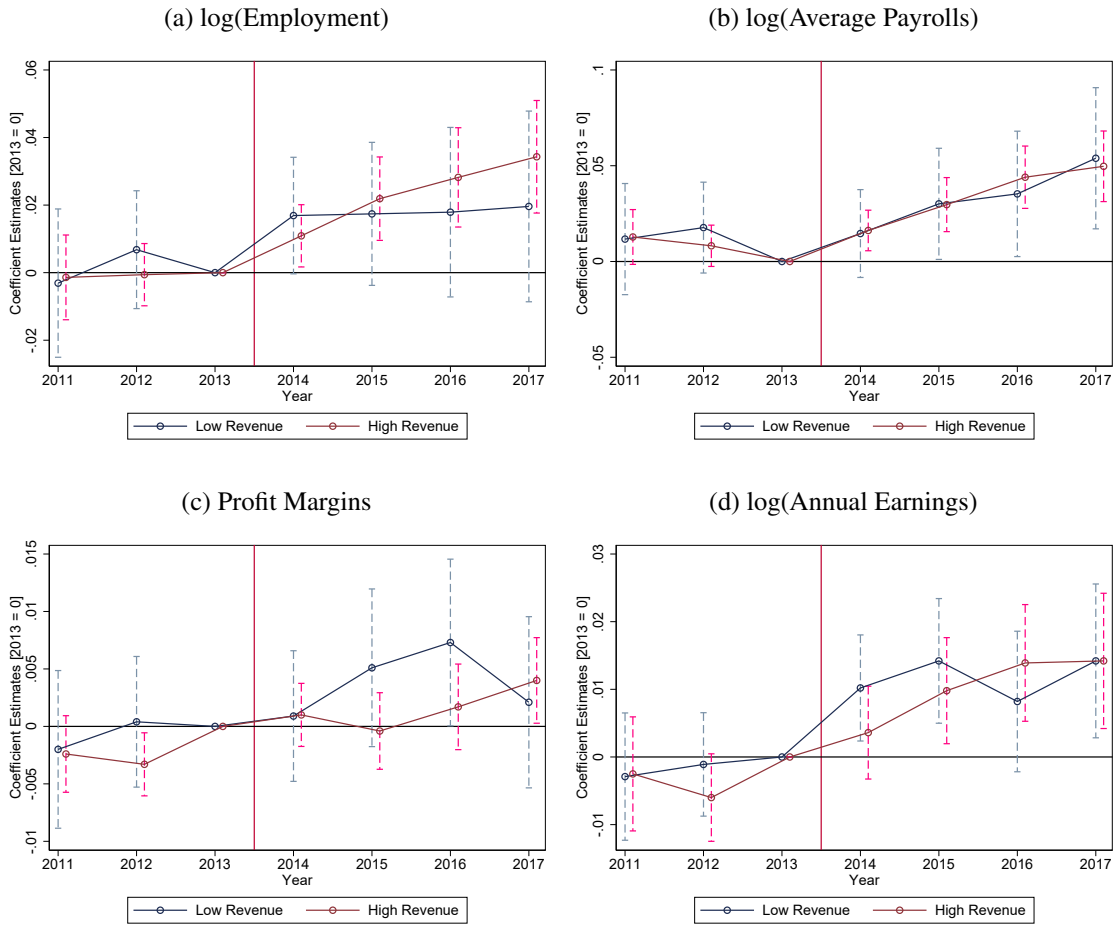
Notes: Panels (a) - (d) show the coefficient estimates on $Year \times MP \times QC$ in equation (1) for firms' $log(revenue)$, $log(expenses)$, profit margins, and EBITDA per worker, respectively. The solid vertical line indicates the reform year. The dashed lines represent 95 percent confidence intervals. Profit margin is defined as total revenue minus total expenses, scaled by total revenue. EBITDA is earnings before income taxes, depreciation, and amortization.

Figure 6: Tax Effects on Worker-level Earnings



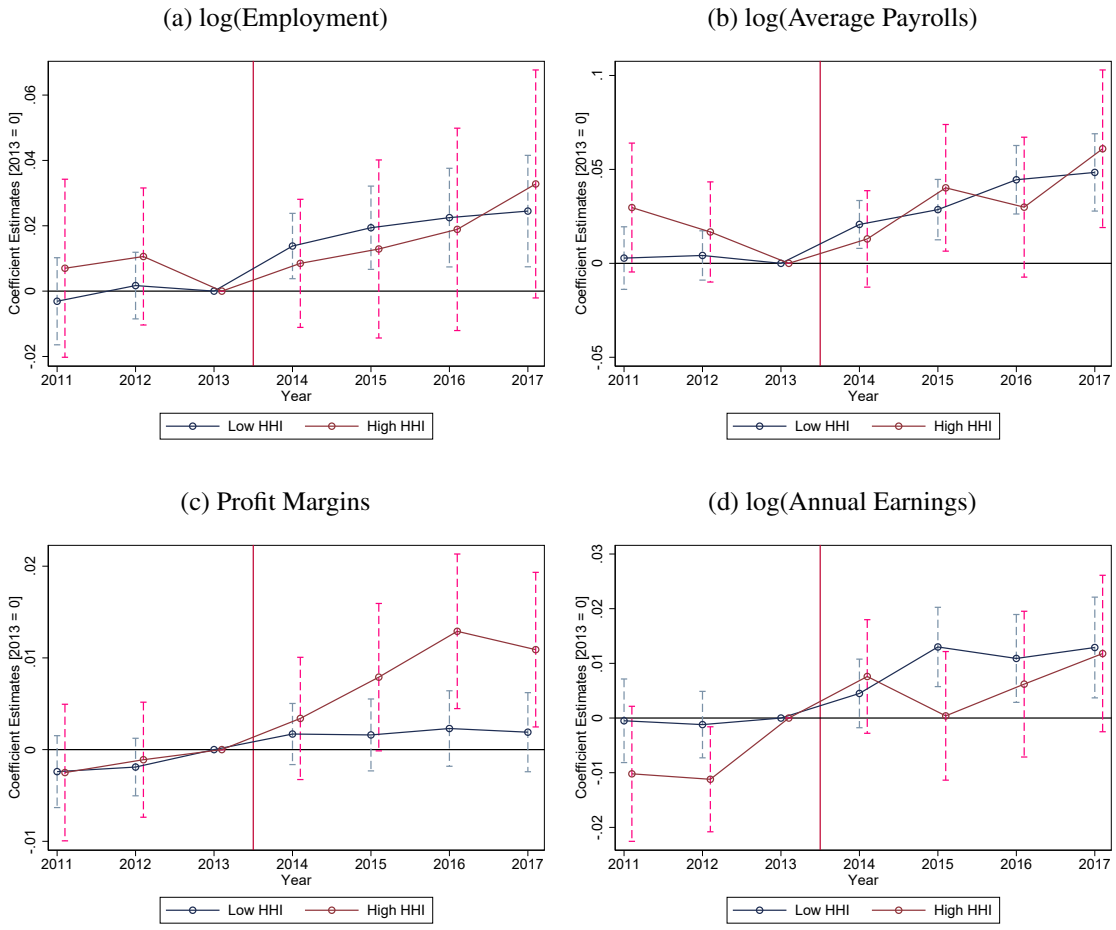
Notes: This figure shows the coefficient estimates on $Year \times MP \times QC$ in equation (3) for workers' *log*(*annual earnings*). The solid vertical line indicates the reform year. The dashed lines represent 95 percent confidence intervals. We exclude part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who were not continuously employed by the same firm during 2011 – 2013. See Appendix B for the result that incorporates this excluded group of workers.

Figure 7: Tax Effects by pre-reform Revenue



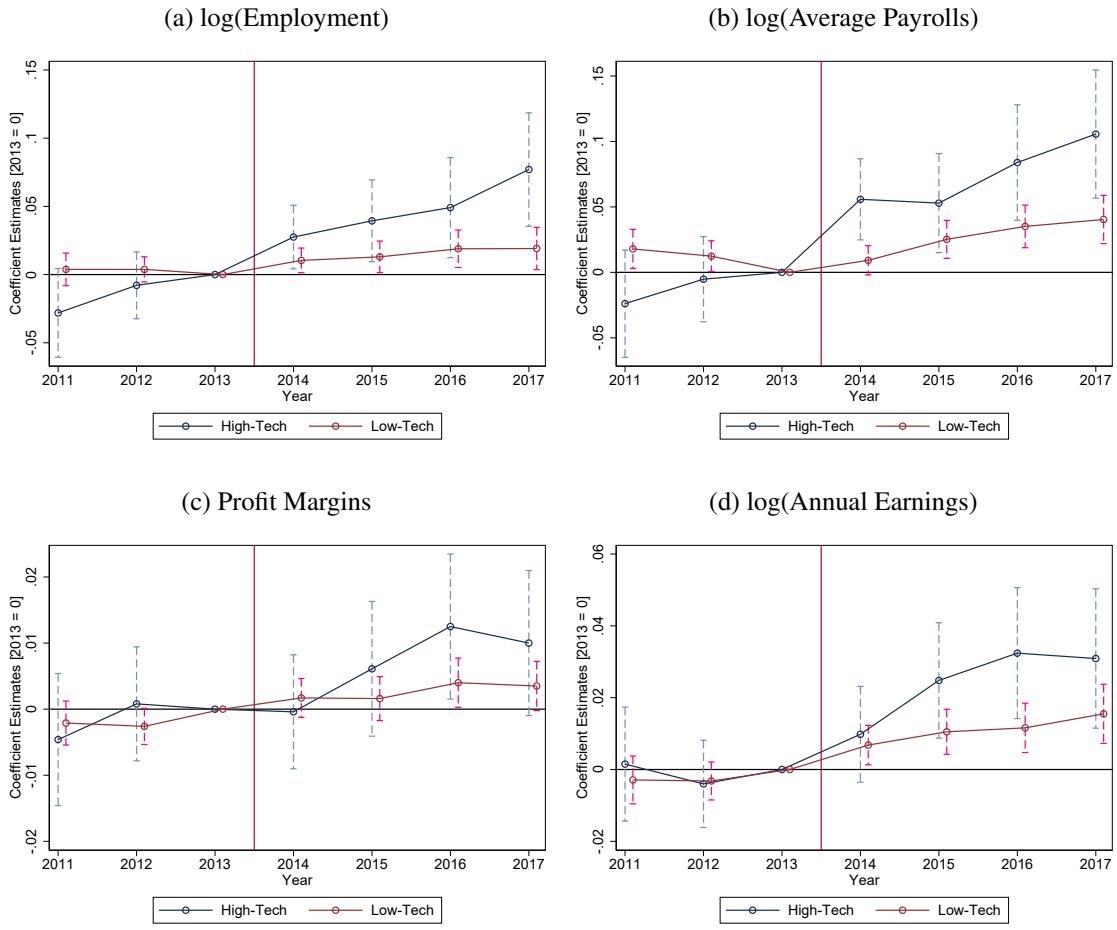
Notes: Panels (a) - (c) in this figure show the coefficient estimates on $Year \times MP \times QC$ in equation (1) for firms' *log*(*employment*), *log*(*average payrolls*), and profit margins, respectively. Panel (d) shows the coefficient estimates on $Year \times MP \times QC$ in (3) for workers' *log*(*annual earnings*). The solid vertical line indicates the reform year. The dashed lines represent 95 percent confidence intervals. We exclude part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who were not continuously employed by the same firm during 2011 – 2013. In each panel, the dark navy line indicates the estimates for firms (or workers whose employers) with revenue below the sample median in 2013 ("low-revenue group"), and the red line indicates the estimates for those with revenue above the sample median in 2013 ("high-revenue group"). We additionally control for 4-digit industry by year fixed effects.

Figure 8: Tax Effects by pre-reform HHI



Notes: Panels (a) - (c) in this figure show the coefficient estimates on $Year \times MP \times QC$ in equation (1) for firms' *log*(*employment*), *log*(*average payrolls*), and profit margins, respectively. Panel (d) shows the coefficient estimates on $Year \times MP \times QC$ in (3) for workers' *log*(*annual earnings*). The solid vertical line indicates the reform year. The dashed lines represent 95 percent confidence intervals. We exclude part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who were not continuously employed by the same firm during 2011 – 2013. In each panel, the dark navy line indicates the estimates for firms (or workers) in labor markets with HHI below the sample median in 2013 ("low-HHI group"),and the red line indicates the estimates for those in labor markets with HHI above the sample median in 2013 ("high-HHI group"). Labor markets are defined by commuting zones and 4-digit NAICS industries. We additionally control for 4-digit industry by year fixed effects.

Figure 9: Tax Effects by High-tech vs. Low-tech



Notes: Panels (a) - (c) in this figure show the coefficient estimates on $Year \times MP \times QC$ in equation (1) for firms' *log*(*employment*), *log*(*average payrolls*), and profit margins, respectively. Panel (d) shows the coefficient estimates on $Year \times MP \times QC$ in (3) for workers' *log*(*annual earnings*). The solid vertical line indicates the reform year. The dashed lines represent 95 percent confidence intervals. We exclude part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who were not continuously employed by the same firm during 2011 – 2013. In each panel, the dark navy line indicates the estimates for firms (or workers) in high-technology industries within M&P sector, relative to non-M&P sectors, and the red line indicates the estimates for firms (or workers) in low-technology industries within the M&P sector, relative to non-M&P sectors. High-tech industries are defined at the level of 4-digit NAICS following Heckler (2005).

Table 1: Summary Statistics for Firms

	Quebec		BC/Ontario	
	(1)	(2)	(3)	(4)
	M&P	Non-M&P	M&P	Non-M&P
Panel A. Firm Characteristics				
Tangible Assets ('000)	773.6	413.6	534.5	326.5
Intangible Assets ('000)	17.4	15.3	18.5	16.3
Total Assets ('000)	1,041.8	619.5	926.8	562.3
Revenue ('000)	1,607.7	1,222.7	1,545.4	1,124.5
Expenses ('000)	1,544.6	1,176.3	1,492.8	1,083.1
Profit Margins	0.018	0.032	0.009	0.022
Employment	11.1	8.0	9.7	7.3
Total Payrolls ('000)	409.9	237.6	411.3	223.2
Average Payrolls ('000)	35.3	21.3	36.1	21.0
EBITDA per Worker ('000)	6.6	9.1	6.6	8.7
Taxable Income ('000)	71.2	43.8	63.9	38
Total Income Tax Rates	0.157	0.164	0.124	0.131
Federal Income Tax Rates	0.082	0.088	0.085	0.091
Firm Age	14.5	12.1	14.3	11.3
Panel B. Sectors				
High-tech	0.114		0.128	
Low-tech	0.886		0.872	
Mining		0.002		0.005
Construction		0.251		0.223
Wholesale		0.002		0.005
Retail		0.191		0.178
Transportation		0.097		0.115
Information		0.021		0.026
Other services		0.342		0.357
Firms	10,190	100,190	20,115	222,705
	Quebec M&P		BC/Ontario M&P	
	(5)	(6)	(7)	(8)
	High-Tech	Low-Tech	High-Tech	Low-Tech
Panel C. M&P Firms Only				
Tangible Assets ('000)	622.7	787.9	433.9	549.3
Intangible Assets ('000)	30.4	15.7	24.6	17.5
Total Assets ('000)	1,328.9	1,004.8	1,095.8	902.0
Revenue ('000)	1,927.3	1,566.5	1,731.3	1,518.1
Expenses ('000)	1,841.4	1,506.4	1,675.5	1,466.0
Profit Margins	0.021	0.018	0.008	0.01
Employment	11	11	9.2	9.8
Total Payrolls ('000)	495.7	398.8	465.1	403.4
Average Payrolls ('000)	42.6	34.4	41	35.4
EBITDA per Worker ('000)	9.7	6.2	7.5	6.4
Taxable Income ('000)	101	67.4	80.9	61.4
Total Income Tax Rates	0.162	0.157	0.123	0.124
Federal Income Tax Rates	0.081	0.082	0.082	0.085
Firm Age	13.8	14.6	13.9	14.4
Firms	1,160	9,025	2,570	17,545

Notes: This table reports summary statistics at the firm level. The sample consists of Canadian-Controlled Private Enterprises with total assets below 10 million CAD and located in Quebec, British Columbia, and Ontario. All of the variables are measured in year 2013. Panel (A) reports firm characteristics by province and by M&P versus non-M&P sectors. Panel (B) reports the distribution of firms across 2-digit NAICS sectors. Panel (C) reports firm characteristics by province and by high-technology versus low-technology industries within the M&P sector. Profit margin is defined as total revenue minus total expenses, scaled by total revenue. Total income tax rate is the sum of a firm's federal and provincial corporate income taxed, scaled by its taxable income.

Table 2: Summary Statistics for Workers

	Quebec		BC/Ontario	
	(1)	(2)	(3)	(4)
	M&P	Non-M&P	M&P	Non-M&P
Panel A. Worker Characteristics				
Annual Earnings ('000)	38.4	35.3	46.3	39.9
Age	46.7	44.3	47.5	44.5
Male	0.689	0.627	0.704	0.607
Panel B. Sectors				
High-tech	0.109		0.122	
Low-tech	0.891		0.878	
Mining		0.002		0.003
Construction		0.202		0.207
Wholesale		0.002		0.003
Retail		0.252		0.218
Transportation		0.071		0.072
Information		0.016		0.018
Other services		0.351		0.373
Workers	64,250	335,735	106,910	627,805
	Quebec M&P		BC/Ontario M&P	
	(5)	(6)	(7)	(8)
	High-Tech	Low-Tech	High-Tech	Low-Tech
Panel C. M&P Workers Only				
Annual Earnings ('000)	46.8	37.4	54.0	45.3
Age	45.9	46.8	47.6	47.5
Male	0.758	0.681	0.716	0.702
Workers	6,995	57,255	13,035	93,875

Notes: This table reports summary statistics at the worker-level. The sample consists of workers at Canadian-Controlled Private Enterprises with total assets below 10 million CAD and located in Quebec, British Columbia, and Ontario. All of the variables are measured in year 2013. Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. Panel (A) reports worker characteristics by province and by M&P versus non-M&P sectors. Panel (B) reports the distribution of workers across 2-digit NAICS sectors. Panel (C) reports worker characteristics by province and by high-technology versus low-technology industries within the M&P sector.

Table 3: Triple Difference Estimates on Effective Tax Rates

	(1) Total Income Tax Rates	(2) Federal Income Tax Rates
Post × MP × QC	-0.0116***	-0.0001
	(0.0010)	(0.0009)
Mean Dep. Var.	0.157	0.082
Observations	1,341,805	1,274,790
Firms	270,095	272,805

Notes: Columns (1) and (2) in this table report the coefficient estimates on $Post \times MP \times QC$ in equation (2) for firms' total income tax rates and federal income tax rates, respectively. Total income tax rate is defined as the sum of a firm's federal and provincial corporate taxes reported, scaled by its taxable income. Federal income tax rate is the firm's federal taxes (reported as Part I tax payable), scaled by its taxable income. *Post* equals 1 for years 2014 – 2017. All specifications include firm and year fixed effects. Standard errors are clustered at the firm-level and are reported in parentheses.

Table 4: Triple Difference Estimates on Employment, Payrolls, and Capital Stock

	(1) log(Employment)	(2) log(Average Payrolls)	(3) log(Tangible Assets)
Post × MP × QC	0.0175***	0.0235***	0.0842***
	(0.0052)	(0.0063)	(0.0179)
Mean Dep. Var.	11.1	35.3	773.6
Observations	2,106,700	2,106,700	2,102,390
Firms	353,435	353,435	353,295

Notes: Columns (1) - (3) report the coefficient estimates on $Post \times MP \times QC$ in equation (2) for firms' *log*(*employment*, *log*(*average payrolls*), and *log*(*tangible assets*), respectively. The book value of tangible assets represents a firm's capital stock. *Post* equals 1 for years 2014 – 2017. All specifications include firm and year fixed effects. Standard errors are clustered at the firm-level and are reported in parentheses.

Table 5: Triple Difference Estimates on Sales, Profitability, and Productivity

	(1) log(Revenue)	(2) log(Expenses)	(3) Profit Margins	(4) EBITDA per Worker
Post × MP × QC	0.0519***	0.0504***	0.0044***	891.2193***
	(0.0063)	(0.0057)	(0.0012)	(270.8346)
Mean Dep. Var.	1607.7	1544.6	0.018	6.6
Observations	2,106,700	2,106,700	2,106,700	2,106,700
Firms	353,435	353,435	353,435	353,435

Notes: Columns (1) - (4) in this table report the coefficient estimates on $Post \times MP \times QC$ in equation (2) for firms' $log(revenue)$, $log(expenses)$, profit margins, and EBITDA per worker, respectively. Profit margin is defined as total revenue minus total expenses, scaled by total revenue. *Post* equals 1 for years 2014 – 2017. All specifications include firm and year fixed effects. Standard errors are clustered at the firm-level and are reported in parentheses.

Table 6: Triple Difference Estimates on Worker-level Earnings and Job Transitions

	(1) log(Annual Earnings)	(2) Job Transition	(3) log(Annual Earnings) for Stayers
Post × MP × QC	0.0143***	-0.0003	0.0134***
	(0.0026)	(0.0004)	(0.0026)
Mean Dep. Var.	38.4	0	40.4
Observations	6,687,775	6,687,775	5,488,620
Workers	1,134,710	1,134,710	869,685

Notes: Columns (1) and (2) in this table report the coefficient estimates on $Post \times MP \times QC$ in equation (4) for workers' $log(annual\ earnings)$ and job transition probabilities, respectively. Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. Column (3) reports the triple difference estimate on $log(annual\ earnings)$ for workers who stayed with their employers throughout the entire sample period ("stayers"). The dummy *Post* is equal to 1 for years 2014 - 2017. All specifications include worker and year fixed effects. Standard errors are two-way clustered at the firm-level and worker-level, and are reported in parentheses.

Table 7: Heterogeneity Results by Pre-reform Revenue

	(1) log(Employment)	(2) log(Average Payrolls)	(3) Profit Margins	(4) log(Annual Earnings)
Post × MP × QC (Low Revenue)	0.0163	0.0217	0.0040	0.0093*
	(0.0094)	(0.0126)	(0.0024)	(0.0038)
Post × MP × QC (High Revenue)	0.0234***	0.0264***	0.0033**	0.0155***
	(0.0063)	(0.0070)	(0.0013)	(0.0034)
Difference	0.0071	0.0047	-0.0007	0.0062
	(0.0113)	(0.0114)	(0.0027)	(0.0051)
Mean Dep. Var. (Low Revenue)	2.7	7.0	-0.013	34.5
Mean Dep. Var. (High Revenue)	16.3	52.7	0.038	40.7
Observations	2,106,700	2,106,700	2,103,110	6,687,775
Firms	353,435	353,435	349,855	
Workers				1,134,710

Notes: Columns (1) - (3) in this table report the coefficient estimates on *Post* × *MP* × *QC* in equation (2) for firms' *log*(*employment*), *log*(*average payrolls*), and profit margins, respectively. Column (4) reports the coefficient estimates on *Post* × *MP* × *QC* in equation (4) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The dummy *Post* is equal to 1 for years 2014 - 2017. Columns (1) - (3) include firm and year fixed effects as well as industry by year fixed effects. Column (4) includes worker and year fixed effects, as well as industry by year fixed effects. For each outcome, we estimate equations (2) and (4) for firms (or workers whose employers) with revenue below and above the sample median measured in 2013 separately, and compare the two coefficient estimates using *t*-tests. Standard errors are at the firm-level for columns (1) - (3), and are two-way clustered at the firm-level and worker-level for column (4), and are reported in parentheses.

Table 8: Heterogeneity Results by Pre-reform Labor Market HHI

	(1) log(Employment)	(2) log(Average Payrolls)	(3) Profit Margins	(4) log(Annual Earnings)
Post × MP × QC (Low HHI)	0.0198***	0.0317***	0.0031*	0.0112***
	(0.0061)	(0.0074)	(0.0014)	(0.0031)
Post × MP × QC (High HHI)	0.0114	0.0189	0.0094***	0.0120*
	(0.0126)	(0.0153)	(0.0028)	(0.0051)
Difference	-0.0084	-0.0128	0.0063**	0.0008
	(0.0140)	(0.0170)	(0.0031)	(0.0060)
Mean Dep. Var. (Low HHI)	11.7	34.7	0.013	38.9
Mean Dep. Var. (High HHI)	11	35.4	0.02	36.9
Observations	2,106,700	2,106,700	2,103,110	6,687,775
Firms	353,435	353,435	349,855	
Workers				1,134,710

Notes: Columns (1) - (3) in this table report the coefficient estimates on *Post* × *MP* × *QC* in equation (2) for firms' *log*(*employment*), *log*(*average payrolls*), and profit margins, respectively. Column (4) reports the coefficient estimates on *Post* × *MP* × *QC* in equation (4) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The dummy *Post* is equal to 1 for years 2014 - 2017. Columns (1) - (3) include firm and year fixed effects as well as industry by year fixed effects. Column (4) includes worker and year fixed effects, as well as industry by year fixed effects. For each outcome, we estimate equations (2) and (4) for firms (or workers) in labor markets (defined at the 4-digit industry by commuting zone levels) HHI below and above the sample median measured in 2013 separately, and compare the two coefficient estimates using *t*-tests. Standard errors are at the firm-level for columns (1) - (3), and are two-way clustered at the firm-level and worker-level for column (4), and are reported in parentheses.

Table 9: Heterogeneity Results by High-tech vs. Low-tech

	(1) log(Employment)	(2) log(Average Payrolls)	(3) Profit Margins	(4) log(Annual Earnings)
Post × MP × QC (Low-Tech)	0.0123*	0.0159*	0.0040**	0.0123***
	(0.0055)	(0.0067)	(0.0012)	(0.0027)
Post × MP × QC (High-Tech)	0.0581***	0.0820***	0.0078*	0.0236***
	(0.0151)	(0.0182)	(0.0035)	(0.0069)
Difference	0.0458***	0.0661***	0.0038	0.0113
	(0.0161)	(0.0194)	(0.0037)	(0.0074)
Mean Dep. Var. (Low-Tech)	11.2	34.4	0.018	37.4
Mean Dep. Var. (High-Tech)	11.0	42.6	0.021	46.8
Observations	2,106,700	2,106,700	2,103,110	6,687,775
Firms	353,435	353,435	349,855	
Workers				1,134,710

Notes: Columns (1) - (3) in this table report the coefficient estimates on *Post* × *MP* × *QC* in equation (2) for firms' *log*(*employment*), *log*(*average payrolls*), and profit margins, respectively. Column (4) reports the coefficient estimates on *Post* × *MP* × *QC* in equation (4) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The dummy *Post* is equal to 1 for years 2014 - 2017. Columns (1) - (3) include firm and year fixed effects as well as industry by year fixed effects. Column (4) includes worker and year fixed effects, as well as industry by year fixed effects. For each outcome, we estimate equations (2) and (4) for firms (or workers) in high-technology and low-technology industries separately, and compare the two coefficient estimates using *t*-tests. Standard errors are at the firm-level for columns (1) - (3), and are two-way clustered at the firm-level and worker-level for column (4), and are reported in parentheses.

ONLINE APPENDIX:

Tax Cuts, Firm Growth, and Worker Earnings: Evidence from Small Business Deductions in Canada

Yige Duan (yigeduan@mail.ubc.ca) Terry S. Moon (tsmoon@mail.ubc.ca)

A Institutional Details and Descriptive Facts

In Appendix A, we provide further institutional details regarding corporate income tax system in Canada.

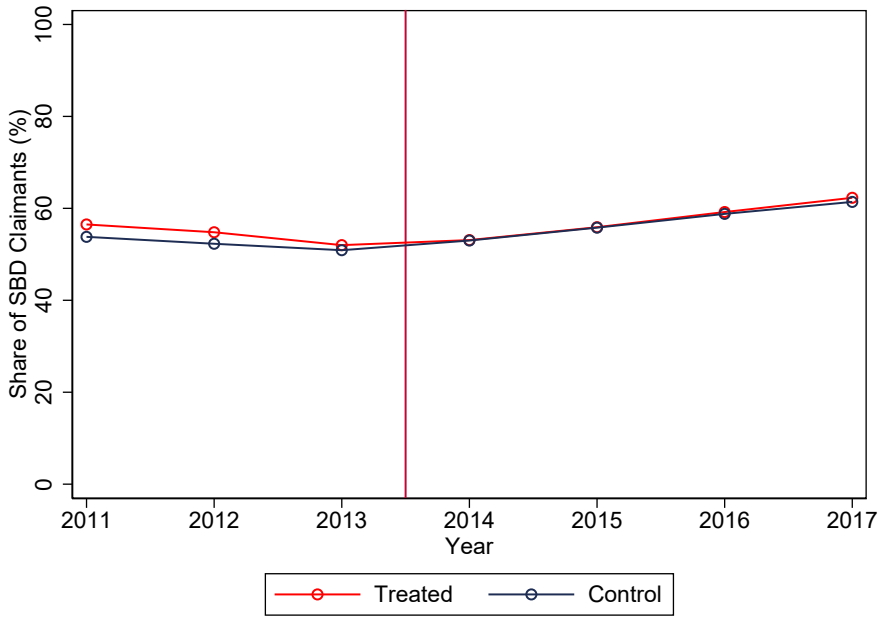
Figure A.1 describes the share of small business deduction (SBD) claimants (conditional on being a CCPC) across years for the treated group (M&P in Quebec) and for the control group separately. The share of SBD claimants is roughly the same between these two groups, both before and after the year of reform.

Figure A.2 shows the share of new entrants and those that exit the sample across years for the treated group and for the control group separately. From 2011 to 2017, there has been a modest decline in firm entry rates and a slight increase in exit rates. However, the treated and control groups experience parallel trends in firm entry and exit rates both before and after the reform in 2014.

Tables A.1 - A.4 describe federal and provincial corporate income tax rates from 2009 to 2017. In most provinces and territories, especially BC and Ontario, the corporate income tax rates remain stable over time. In contrast, Quebec experiences the largest tax rate cut for small businesses in the M&P sector.

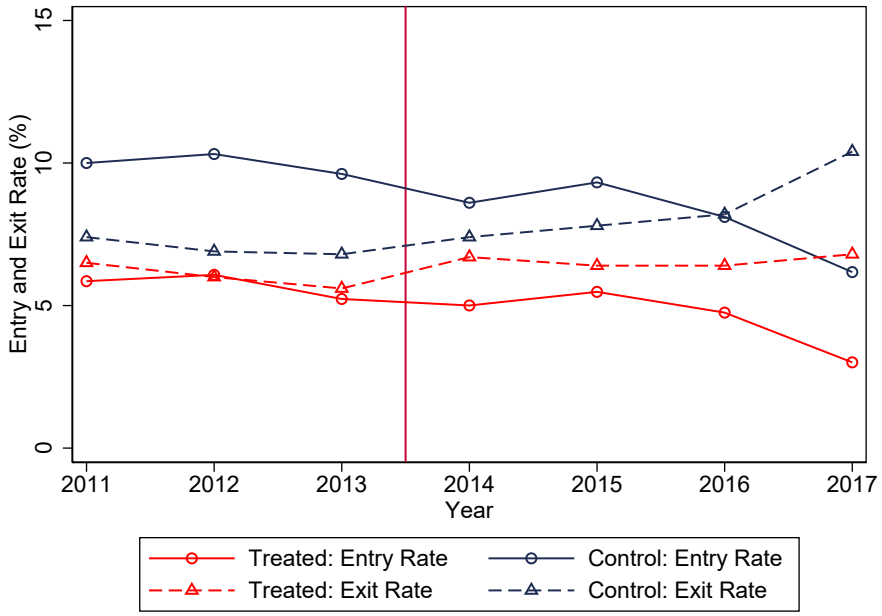
Table A.5 describes the share of firms, along with their revenue share, asset share, and employment share, by each of the provinces and territories in Canada. Quebec, BC and Ontario jointly make up 73.6% of all firms, 71.4% of total assets, 73.5% of total revenue, and 75.2% of total employment. By including these three provinces, our sample of analysis provides a good representation of the entire Canadian economy.

Figure A.1: Share of Small Business Deduction Claimants



Notes: This figure depicts the share of claimants for small business deductions among CCPCs in Quebec, British Columbia, and Ontario, for each year in 2011 - 2017. The red line indicates treated firms in Quebec and M&P sectors, and the dark navy line indicates control firms in British Columbia and Ontario or non-M&P sectors.

Figure A.2: Firm Entry and Exit



Notes: This figure depicts the share of firms entering or exiting our sample of analysis for each year in 2011 - 2017. The red lines indicate treated firms in Quebec and M&P sectors, and the dark navy lines indicate control firms in British Columbia and Ontario or non-M&P sectors. The solid lines indicate entry rates and the dashed lines indicates exit rates.

Table A.1: Corporate Income Tax Rates

Federal/ Province	Types	2009	2010	2011	2012	2013	2014	2015	2016	2017
Federal	General / Investment	19	18	16.5	15	15	15	15	15	15
	M&P	19	18	16.5	15	15	15	15	15	15
	Small Businesses (M&P)	11	11	11	11	11	11	11	10.5	10.5
	Small Businesses (non M&P)	11	11	11	11	11	11	11	10.5	10.50
Quebec	General / Investment	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.8
	M&P	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.8
	Small Businesses (M&P)	8	8	8	8	8	6	4	4	4
	Small Businesses (non M&P)	8	8	8	8	8	8	8	8	8
British Columbia	General / Investment	11	10.5	10	10	11	11	11	11	11
	M&P	11	10.5	10	10	11	11	11	11	11
	Small Businesses (M&P)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2
	Small Businesses (non M&P)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2
Ontario	General / Investment	14	12	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	M&P	12	10	10	10	10	10	10	10	10
	Small Businesses (M&P)	5.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	Small Businesses (non M&P)	5.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5

Table A.2: Corporate Income Tax Rates (Continued)

Federal/ Province	Types	2009	2010	2011	2012	2013	2014	2015	2016	2017
Alberta	General / Investment	10	10	10	10	10	10	12	12	12
	M&P	10	10	10	10	10	10	12	12	12
	Small Businesses (M&P)	3	3	3	3	3	3	3	3	2
	Small Businesses (non M&P)	3	3	3	3	3	3	3	3	2
Manitoba	General / Investment	12	12	12	12	12	12	12	12	12
	M&P	12	12	12	12	12	12	12	12	12
	Small Businesses (M&P)	1	0	0	0	0	0	0	0	0
	Small Businesses (non M&P)	1	0	0	0	0	0	0	0	0
New Brunswick	General / Investment	12	11	10	10	12	12	12	14	14
	M&P	12	11	10	10	12	12	12	14	14
	Small Businesses (M&P)	5	5	5	4.5	4.5	4.5	4	3.5	3
	Small Businesses (non M&P)	5	5	5	4.5	4.5	4.5	4	3.5	3
Nova Scotia	General / Investment	16	16	16	16	16	16	16	16	16
	M&P	16	16	16	16	16	16	16	16	16
	Small Businesses (M&P)	5	5	4.5	4	3.5	3	3	3	3
	Small Businesses (non M&P)	5	5	4.5	4	3.5	3	3	3	3
Newfoundland and Labrador	General / Investment	14	14	14	14	14	14	14	15	15
	M&P	5	5	5	5	5	5	5	15	15
	Small Businesses (M&P)	5	4	4	4	4	3	3	3	3
	Small Businesses (non M&P)	5	4	4	4	4	3	3	3	3

Table A.3: Corporate Income Tax Rates (Continued)

Federal/ Province	Types	2009	2010	2011	2012	2013	2014	2015	2016	2017
Northwest Territories	General / Investment	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	M&P	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	Small Businesses (M&P)	4	4	4	4	4	4	4	4	4
	Small Businesses (non M&P)	4	4	4	4	4	4	4	4	4
Nunavut	General / Investment	12	12	12	12	12	12	12	12	12
	M&P	12	12	12	12	12	12	12	12	12
	Small Businesses (M&P)	4	4	4	4	4	4	4	4	4
	Small Businesses (non M&P)	4	4	4	4	4	4	4	4	4
Prince Edward Island	General / Investment	16	16	16	16	16	16	16	16	16
	M&P	16	16	16	16	16	16	16	16	16
	Small Businesses (M&P)	2.1	1	1	1	4.5	4.5	4.5	4.5	4.5
	Small Businesses (non M&P)	2.1	1	1	1	4.5	4.5	4.5	4.5	4.5
Saskatchewan	General / Investment	12	12	12	12	12	12	12	12	11.5
	M&P	10	10	10	10	10	10	10	10	9.5
	Small Businesses (M&P)	4.5	4.5	2	2	2	2	2	2	2
	Small Businesses (non M&P)	4.5	4.5	2	2	2	2	2	2	2
Yukon	General / Investment	15	15	15	15	15	15	15	15	12
	M&P	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Small Businesses (M&P)	4	4	4	2.5	2.5	1.5	1.5	1.5	1.5
	Small Businesses (non M&P)	4	4	4	4	4	3	3	3	2

Table A.4: Distribution of Firms across Provinces

Provinces and Territories	(1) Firm share	(2) Assets share	(3) Revenue share	(4) Employment share
Quebec	0.230	0.240	0.243	0.251
Ontario	0.357	0.332	0.359	0.358
British Columbia	0.148	0.143	0.133	0.143
Subtotal	0.736	0.714	0.735	0.752
Alberta	0.153	0.158	0.145	0.127
Manitoba	0.027	0.031	0.029	0.032
New Brunswick	0.018	0.018	0.018	0.019
Newfoundland and Labrador	0.013	0.015	0.014	0.013
Nova Scotia	0.019	0.019	0.021	0.022
Prince Edward Island	0.004	0.004	0.004	0.004
Saskatchewan	0.029	0.036	0.031	0.028
Northwest Territories	0.001	0.002	0.002	0.001
Nunavut	0.000	0.001	0.000	0.000
Yukon	0.001	0.002	0.001	0.001
Total	1.000	1.000	1.000	1.000

Notes: This table reports the distribution of firms in Canada across provinces and territories in 2013. Together, Quebec, British Columbia and Ontario make up over percent of firm counts, total assets, total revenue, and total employment.

B Robustness Checks

In Appendix B, we provide results from robustness tests discussed in Section 4.

B.1 Controlling for industry by year fixed effects

To account for any 4-digit industry specific shock in a given year that might drive our results, we include 4-digit industry by year fixed effects. The results in Figure B.1 and Table B.1 are qualitatively similar to our main ones.

B.2 Controlling for commuting zone by year fixed effects

Analogously, we include commuting zone by year fixed effects to aborb any local labor market specific shock in a given year potentially driving our findings. The results in Figure B.2 and Table B.2 are qualitatively similar to our main ones.

B.3 Including firms above 10 million in total assets and claimed SBD in year 2013

We include firms above 10 million CAD in total assets and claimed any small business deductions in 2013. This is a less conservative definition of firms eligible for small business deductions, and we see a slight increase in sample sizes. However, Figure B.3 and Table B.3 show that the estimates stay roughly the same.

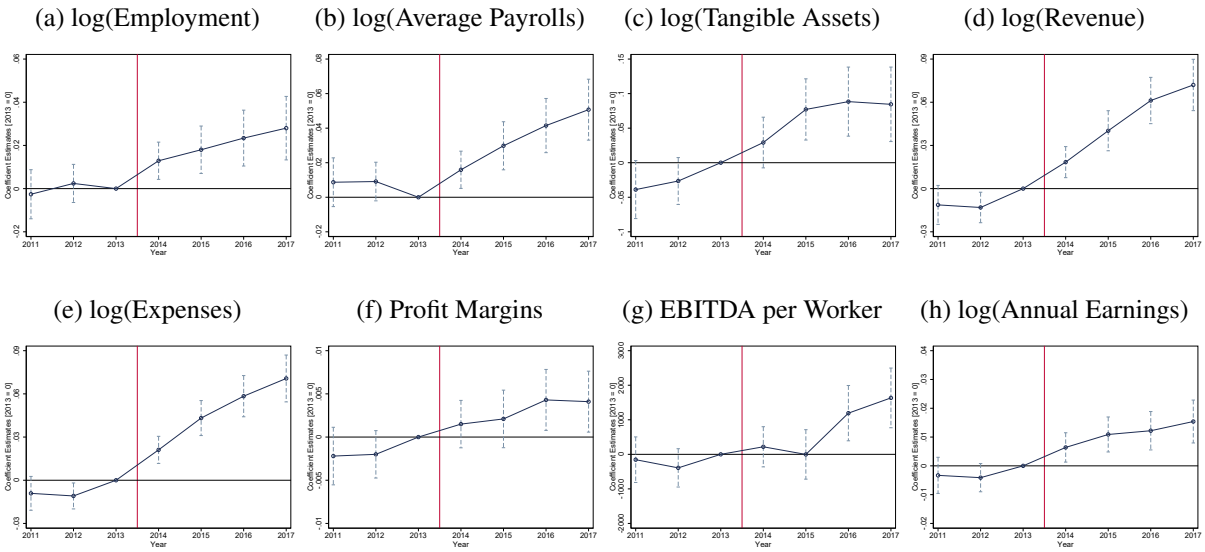
B.4 Including part-time workers or multiple-job holders, and dropping tenure restrictions

In the preferred specification, we impose tenure restrictions and drop multiple-job holders or those making below 4,000 CAD in annual workers to focus on workers with stable jobs. In Figure B.4 and Table B.4, we relax these restrictions and include the previously excluded workers. Although this greatly increases the sample size, the estimated effects of the tax cut on workers' earnings are qualitatively similar.

B.5 Placebo test using non-CCPCs

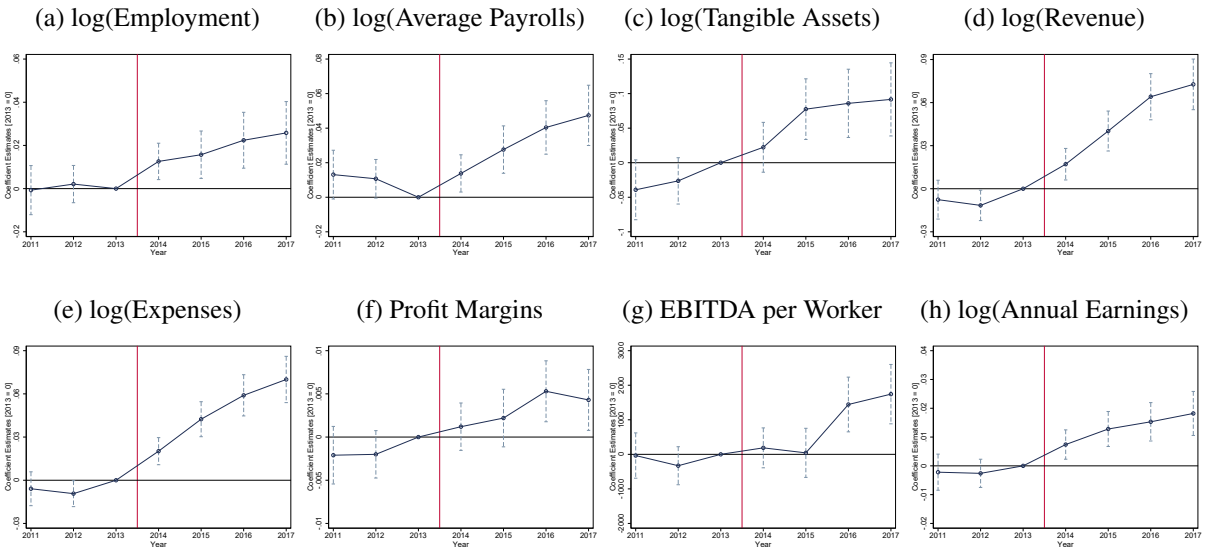
Finally, we conduct a placebo test using a set of non-CCPC firms ineligible for small business deductions. Non-CCPCs, regardless of their sectors or locations, are not impacted by the reform in 2014, so they serve as a placebo group to confirm that our results are indeed not driven by shocks at the sector or provincial levels. Figure B.5 and Table B.5 show that across all outcomes we study, the estimated coefficients remain close to zero after 2014. The estimates are also noisier due to smaller sample sizes.

Figure B.1: Including Industry × Year FEs



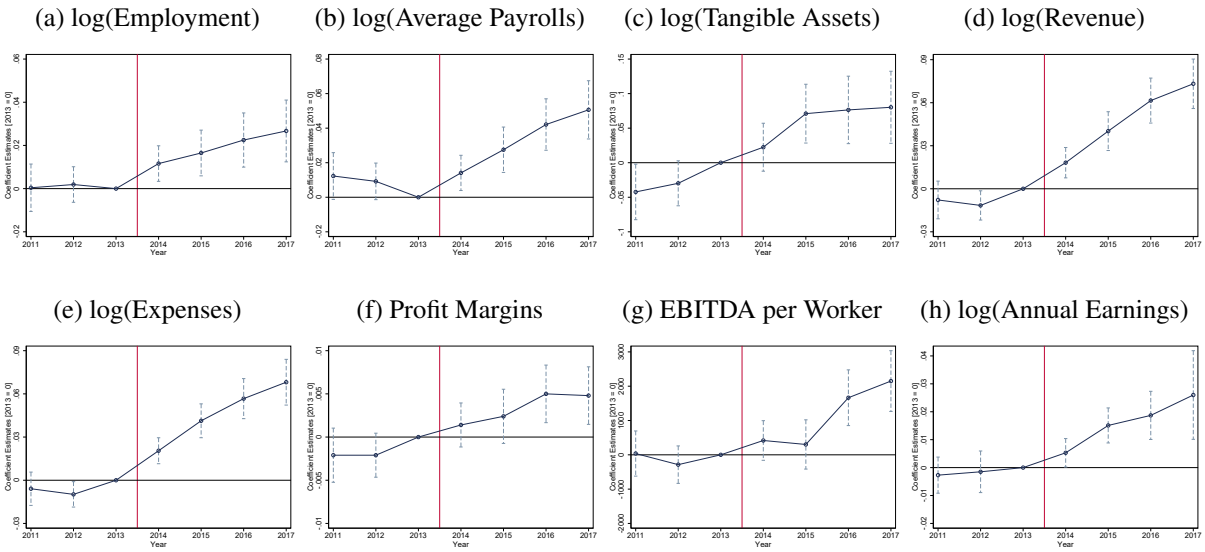
Notes: Panels (a) - (g) in this figure show the in coefficient estimates on $Year \times MP \times QC$ in equation (1) for firms' *log*(*employment*), *log*(*average payrolls*), *log*(*tangible assets*), *log*(*revenue*), *log*(*expenses*), profit margins, and EBITDA per worker, respectively. Panel (h) shows the in coefficient estimates on $Year \times MP \times QC$ in equation (3) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The solid vertical line indicates the reform year. The dashed lines represent 95% confidence intervals. We additionally control for 4-digit NAICS industry by year fixed effects.

Figure B.2: Including CZ × Year FEs



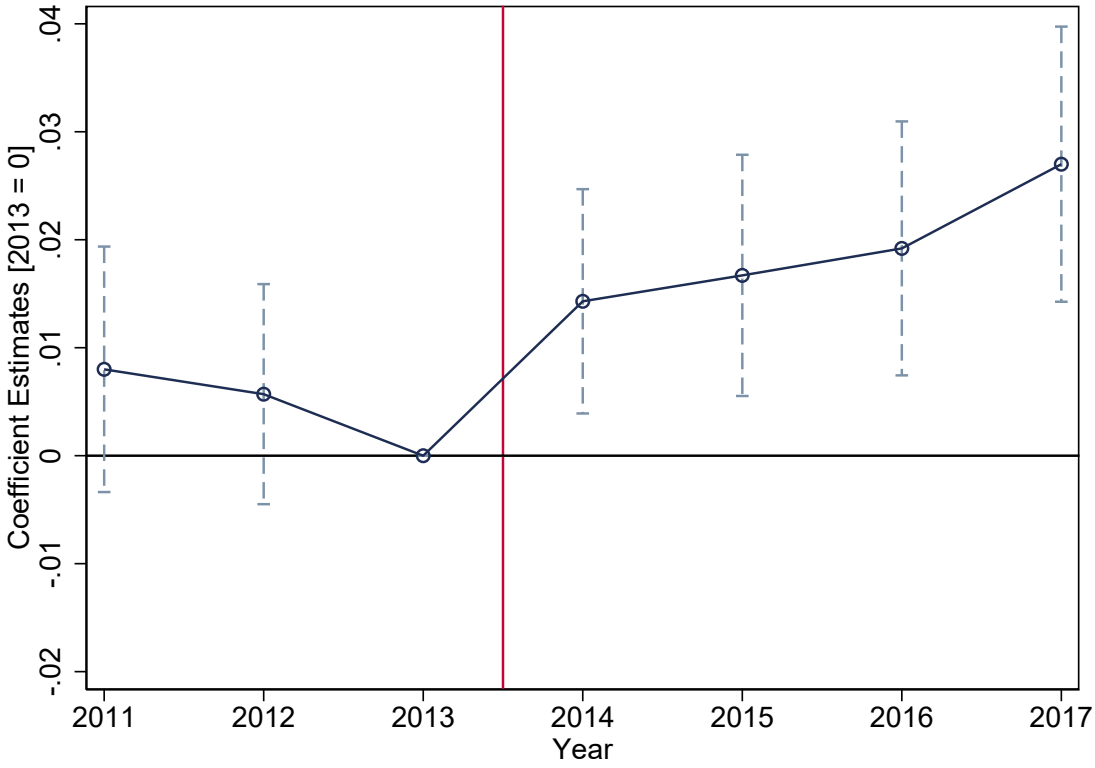
Notes: Panels (a) - (g) in this figure show the in coefficient estimates on *Year* × *MP* × *QC* in equation (1) for firms' *log*(*employment*), *log*(*average payrolls*), *log*(*tangible assets*), *log*(*revenue*), *log*(*expenses*), profit margins, and EBITDA per worker, respectively. Panel (h) shows the in coefficient estimates on *Year* × *MP* × *QC* in equation (3) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The solid vertical line indicates the reform year. The dashed lines represent 95% confidence intervals. We additionally control for commuting zone by year fixed effects.

Figure B.3: Including firms above 10 million in total assets and claimed SBD in year 2013



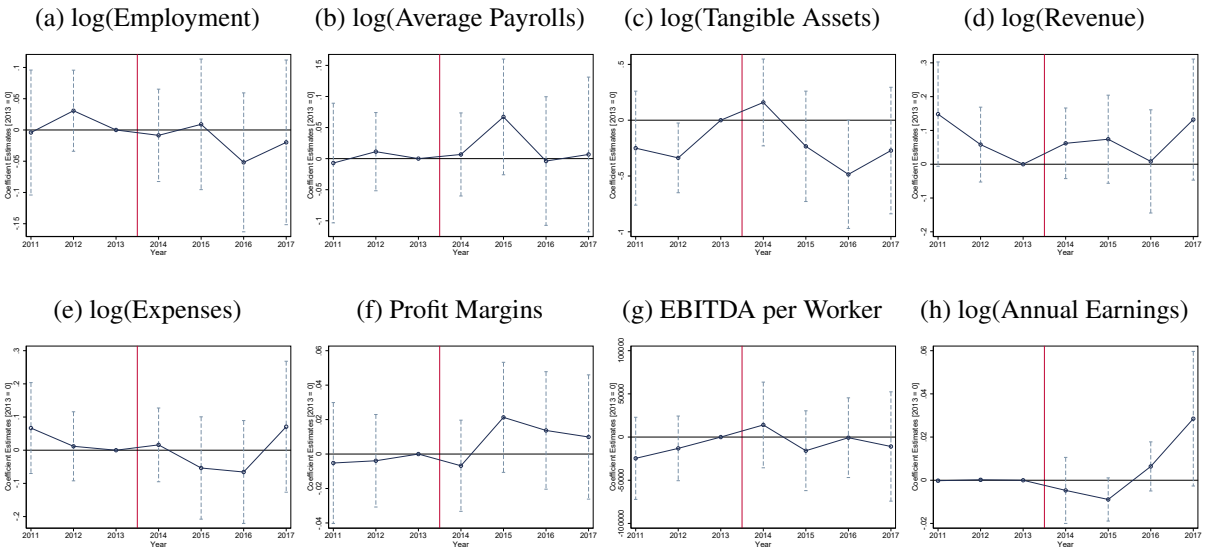
Notes: Panels (a) - (g) in this figure show the in coefficient estimates on $Year \times MP \times QC$ in equation (1) for firms' $log(employment)$, $log(average\ payrolls)$, $log(tangible\ assets)$, $log(revenue)$, $log(expenses)$, profit margins, and EBITDA per worker, respectively. Panel (h) shows the in coefficient estimates on $Year \times MP \times QC$ in equation (3) for workers' $log(annual\ earnings)$. Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The solid vertical line indicates the reform year. The dashed lines represent 95% confidence intervals. The samples additionally include firms that claimed small business deductions in 2013.

Figure B.4: Including part-time workers and multiple-job holders, and dropping tenure restrictions



Notes: This figure shows the in coefficient estimates on *Year* × *MP* × *QC* in equation (3) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are not excluded. The solid vertical line indicates the reform year. The dashed lines represent 95% confidence intervals with standard errors clustered by firms and workers.

Figure B.5: Placebo Tests using Non-CCPCs



Notes: Panels (a) - (g) in this figure show the in coefficient estimates on $Year \times MP \times QC$ in equation (1) for firms' $log(employment)$, $log(average\ payrolls)$, $log(tangible\ assets)$, $log(revenue)$, $log(expenses)$, profit margins, and EBITDA per worker, respectively. Panel (h) shows the in coefficient estimates on $Year \times MP \times QC$ in equation (3) for workers' $log(annual\ earnings)$. Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The solid vertical line indicates the reform year. The dashed lines represent 95% confidence intervals. The samples comprise non-CCPC firms and workers who are not impacted by the reform regardless of their sectors or locations.

Table B.1: Including Industry × Year FEs

	(1) log(Employment)	(2) log(Average Payrolls)	(3) log(Tangible Assets)	(4) log(Revenue)
Post × MP × QC	0.0180***	0.0266***	0.0880***	0.0535***
	(0.0052)	(0.0064)	(0.0181)	(0.0063)
Mean Dep. Var.	11.1	35.3	773.6	1,607.7
Observations	2,106,700	2,106,700	2,102,390	2,106,700
Firms	353,435	353,435	353,295	353,435
	(5) log(Expenses)	(6) Profit Margins	(7) EBITDA per Worker	(8) log(Annual Earnings)
Post × MP × QC	0.0529***	0.0041***	854.0196**	0.0128***
	(0.0057)	(0.0012)	(272.2990)	(0.0025)
Mean Dep. Var.	1,544.6	0.018	6.6	38.4
Observations	2,106,700	2,106,700	2,106,700	6,687,775
Firms	353,435	353,435	353,435	
Workers				1,134,710

Notes: Columns (1) - (7) in this table report the in coefficient estimates on *Post* × *MP* × *QC* in equation (2) for firms' *log*(*employment*), *log*(*average payrolls*), *log*(*tangible assets*), *log*(*revenue*), *log*(*expenses*), profit margins, and EBITDA per worker, respectively. Column (8) reports the in coefficient estimates on *Post* × *MP* × *QC* in equation (4) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The dummy *Post* is equal to 1 for years 2014 - 2017. Columns (1) - (7) include firm fixed effects and industry by year fixed effects. Column (8) includes worker fixed effects and industry by year fixed effects. Standard errors are clustered at the firm-level for columns (1) - (3), two-way clustered at the firm-level and worker-level for column (4), and reported in parentheses.

Table B.2: Including Commuting Zone × Year FEs

	(1) log(Employment)	(2) log(Average Payrolls)	(3) log(Tangible Assets)	(4) log(Revenue)
Post × MP × QC	0.0181***	0.0236***	0.0875***	0.0527***
	(0.0052)	(0.0063)	(0.0179)	(0.0062)
Mean Dep. Var.	11.1	35.3	773.6	1,607.7
Observations	2,106,700	2,106,700	2,102,390	2,106,700
Firms	353,435	353,435	353,295	353,435
	(5) log(Expenses)	(6) Profit Margins	(7) EBITDA per Worker	(8) log(Annual Earnings)
Post × MP × QC	0.0511***	0.0044***	911.0162***	0.0143***
	(0.0057)	(0.0012)	(270.6027)	(0.0026)
Mean Dep. Var.	1,544.6	0.018	6.6	38.4
Observations	2,106,700	2,106,700	2,106,700	6,687,775
Firms	353,435	353,435	353,435	
Workers				1,134,710

Notes: Columns (1) - (7) in this table report the in coefficient estimates on *Post* × *MP* × *QC* in equation (2) for firms' *log*(*employment*), *log*(*average payrolls*), *log*(*tangible assets*), *log*(*revenue*), *log*(*expenses*), profit margins, and EBITDA per worker, respectively. Column (8) reports the in coefficient estimates on *Post* × *MP* × *QC* in equation (4) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The dummy *Post* is equal to 1 for years 2014 - 2017. Columns (1) - (7) include firm fixed effects and commuting zone by year fixed effects. Column (8) includes worker fixed effects and commuting zone by year fixed effects. Standard errors are clustered at the firm-level for columns (1) - (3), two-way clustered at the firm-level and worker-level for column (4), and reported in parentheses.

Table B.3: Including firms above 10 million in total assets and claimed SBD in year 2013

	(1) log(Employment)	(2) log(Average Payrolls)	(3) log(Tangible Assets)	(4) log(Revenue)
Post × MP × QC	0.0178***	0.0248***	0.0828***	0.0525***
	(0.0051)	(0.0061)	(0.0175)	(0.0061)
Mean Dep. Var.	13.7	45.2	1,010.5	2,205.6
Observations	2,157,085	2,157,085	2,144,345	2,157,085
Firms	361,300	361,300	359,735	361,300
	(5) log(Expenses)	(6) Profit Margins	(7) EBITDA per Worker	(8) log(Annual Earnings)
Post × MP × QC	0.0502***	0.0045***	1121.3185***	0.0160***
	(0.0056)	(0.0011)	(278.3227)	(0.0025)
Mean Dep. Var.	2,103.2	0.021	7.2	40
Observations	2,157,085	2,157,085	2,157,085	7,875,540
Firms	361,300	361,300	361,300	
Workers				1,322,655

Notes: Columns (1) - (7) in this table report the in coefficient estimates on *Post* × *MP* × *QC* in equation (2) for firms' *log*(*employment*), *log*(*average payrolls*), *log*(*tangible assets*), *log*(*revenue*), *log*(*expenses*), profit margins, and EBITDA per worker, respectively. Column (8) reports the in coefficient estimates on *Post* × *MP* × *QC* in equation (4) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The dummy *Post* is equal to 1 for years 2014 - 2017. Columns (1) - (7) include firm fixed effects and year fixed effects. Column (8) includes worker fixed effects and year fixed effects. The samples additionally include firms that claimed small business deductions in 2013. Standard errors are clustered at the firm-level for columns (1) - (3), two-way clustered at the firm-level and worker-level for column (4), and reported in parentheses.

Table B.4: Including part-time workers and multiple-job holders, and dropping tenure restrictions

	(1)
	log(Annual Earnings)
Post × MP × QC	0.0256***
	(0.0045)
Mean Dep. Var.	26.7
Observations	19,157,414
Workers	3,813,100

Notes: This table reports the in coefficient estimates on *Post* × *MP* × *QC* in equation (4) for workers' *log*(*annual earnings*). The dummy *Post* is equal to 1 for years 2014 - 2017. Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are not excluded. We control for worker fixed effects and year fixed effects. Standard errors are two-way clustered at the firm-level and worker-level and reported in parentheses.

Table B.5: Placebo Tests using Non-CCPCs

	(1) log(Employment)	(2) log(Average Payrolls)	(3) log(Tangible Assets)	(4) log(Revenue)
Post × MP × QC	-0.0266	0.0173	-0.0055	0.0122
	(0.0509)	(0.0458)	(0.1941)	(0.0580)
Mean Dep. Var.	126.3	609.3	28,105	46,700
Observations	16,785	16,785	16,735	16,785
Firms	3,410	3,410	3,405	3,410
	(5) log(Expenses)	(6) Profit Margins	(7) EBITDA per Worker	(8) log(Annual Earnings)
Post × MP × QC	-0.0297	0.0118	8088.4829	-0.0324
	(0.0608)	(0.0119)	(15800.8491)	(0.0314)
Mean Dep. Var.	44,500	0.034	16.5	67.8
Observations	16,785	16,785	16,785	826,650
Firms	3,410	3,410	3,410	
Workers				158,625

Notes: Columns (1) - (7) in this table report the in coefficient estimates on *Post* × *MP* × *QC* in equation (2) for firms' *log*(*employment*), *log*(*average payrolls*), *log*(*tangible assets*), *log*(*revenue*), *log*(*expenses*), profit margins, and EBITDA per worker, respectively. Column (8) reports the in coefficient estimates on *Post* × *MP* × *QC* in equation (4) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The dummy *Post* is equal to 1 for years 2014 - 2017. Columns (1) - (7) include firm fixed effects and year fixed effects. Column (8) includes worker fixed effects and year fixed effects. The samples comprise non-CCPC firms and workers who are not impacted by the reform regardless of their sectors or locations. Standard errors are clustered at the firm-level for columns (1) - (3), two-way clustered at the firm-level and worker-level for column (4), and reported in parentheses.

C Additional Heterogeneity Results

In Appendix C, we provide additional heterogeneity results in addition to those discussed in Section 4.6.

Instead of using firms' sales as a proxy for firm size or financial constraints, we use firms' age and profit margins measured in one year before the reform as alternative proxies. The results using firms' age are presented in Table C.1, and the results using profit margins are in Table C.2. As expected, older firms and firms with higher profit margins tend to be larger and less financially constrained, but they exhibit no statistically different responses relative to younger and less profitable firms, consistent with our findings in Section 4.6.

Table C.1: By Firm Age

	(1) log(Employment)	(2) log(Average Payrolls)	(3) Profit Margins	(4) log(Annual Earnings)
Post × MP × QC (Young Firms)	0.0072	0.0040	0.0024	0.0075
	(0.0111)	(0.0133)	(0.0023)	(0.0043)
Post × MP × QC (Old Firms)	0.0254***	0.0382***	0.0046***	0.0136***
	(0.0057)	(0.0070)	(0.0013)	(0.0031)
Difference	0.0182	0.0342**	0.0022	0.0061
	(0.0125)	(0.0150)	(0.0026)	(0.0053)
Mean Dep. Var. (Young Firms)	7.0	20.9	0.001	36.9
Mean Dep. Var. (Old Firms)	13.1	42.2	0.027	39.1
Observations	2,106,700	2,106,700	2,103,110	6,687,775
Firms	353,435	353,435	349,855	
Workers				1,134,710

Notes: Columns (1) - (3) in this table report the in coefficient estimates on *Post* × *MP* × *QC* in equation (2) for firms' *log*(*employment*), *log*(*average payrolls*), and profit margins, respectively. Column (4) reports the in coefficient estimates on *Post* × *MP* × *QC* in equation (4) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The dummy *Post* is equal to 1 for years 2014 - 2017. Columns (1) - (3) include firm fixed effects and industry by year fixed effects. Column (4) includes worker fixed effects and industry by year fixed effects. For each outcome, we estimate equations (2) and (4) for firms (or workers whose employers) with firm age below and above the sample median measured in 2013 separately, and compare the two coefficient estimates using *t*-tests. Standard errors are clustered at the firm-level for columns (1) - (3), two-way clustered at the firm-level and worker-level for column (4), and reported in parentheses.

Table C.2: By Profit Margins

	(1) log(Employment)	(2) log(Average Payrolls)	(3) Profit Margins	(4) log(Annual Earnings)
Post × MP × QC (Low Profit)	0.0218**	0.0348***	0.0060***	0.0162***
	(0.0081)	(0.0099)	(0.0018)	(0.0039)
Post × MP × QC (High Profit)	0.0151*	0.0163*	0.0025	0.0104**
	(0.0067)	(0.0080)	(0.0014)	(0.0033)
Difference	-0.0067	-0.0185	-0.0035	-0.0058
	(0.0105)	(0.0127)	(0.0023)	(0.0051)
Mean Dep. Var. (Low Profit)	10.3	31.2	-0.087	36.1
Mean Dep. Var. (High Profit)	11.8	38.7	0.107	40.2
Observations	2,106,700	2,106,700	2,103,110	6,687,775
Firms	353,435	353,435	349,855	
Workers				1,134,710

Notes: Columns (1) - (3) in this table report the in coefficient estimates on *Post* × *MP* × *QC* in equation (2) for firms' *log*(*employment*), *log*(*average payrolls*), and profit margins, respectively. Column (4) reports the in coefficient estimates on *Post* × *MP* × *QC* in equation (4) for workers' *log*(*annual earnings*). Part-time workers whose annual earnings are below 4000 CAD, multiple-job holders, and workers who are not continuously employed by the same firm in 2011 – 2013 are excluded. The dummy *Post* is equal to 1 for years 2014 - 2017. Columns (1) - (3) include firm fixed effects and industry by year fixed effects. Column (4) includes worker fixed effects and industry by year fixed effects. For each outcome, we estimate equations (2) and (4) for firms (or workers whose employers) with profit margins below and above the sample median measured in 2013 separately, and compare the two coefficient estimates using t-tests. Standard errors are clustered at the firm-level for columns (1) - (3), two-way clustered at the firm-level and worker-level for column (4), and reported in parentheses.