

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

Yige Duan Terry S. Moon

University of British Columbia

December 2022

Motivation

Central Question in Fiscal Policy: How much Reductions in Corporate Taxes Stimulate Growth and Employment?

Motivation

Central Question in Fiscal Policy: How much Reductions in Corporate Taxes Stimulate Growth and Employment?

Large Literature on Corporate Taxes and Investment

- ▶ A wide range of estimates, but overall negative

(Summers 1981; Auerbach and Hassett 1992; Cummins, Hasset, and Hubbard 1996; Goolsbee 1998; Desai and Goolsbee 2004; Cooper and Haltiwanger 2006; House and Shapiro 2008; Zwick and Mahon 2017; Ohrn 2018; Liu and Mao 2019; Maffini et al. 2019; Chen et al. 2019; Harju et al. 2022; Curtis et al. 2022)

Motivation

Central Question in Fiscal Policy: How much Reductions in Corporate Taxes Stimulate Growth and Employment?

Large Literature on Corporate Taxes and Investment

- ▶ A wide range of estimates, but overall negative

(Summers 1981; Auerbach and Hassett 1992; Cummins, Hasset, and Hubbard 1996; Goolsbee 1998; Desai and Goolsbee 2004; Cooper and Haltiwanger 2006; House and Shapiro 2008; Zwick and Mahon 2017; Ohrn 2018; Liu and Mao 2019; Maffini et al. 2019; Chen et al. 2019; Harju et al. 2022; Curtis et al. 2022)

Small Literature on Corporate Taxes and Employment & Wages

- ▶ Positive effects of tax reductions on employment

(Giroud and Rauh 2019; Garrett et al. 2020; Curtis et al. 2022)

- ▶ Negative effects of tax hikes on wages

(Fuest et al. 2018; Arulampalam et al. 2013)

Question

Effects of Corporate Tax Cuts on Firm Growth & Worker Earnings?

Question

Effects of Corporate Tax Cuts on Firm Growth & Worker Earnings?

- ▶ Positive effects on firm growth and employee salaries

Question

Effects of Corporate Tax Cuts on Firm Growth & Worker Earnings?

- ▶ Positive effects on firm growth and employee salaries
 - ▶ Cost of Capital: Corporate Taxes \downarrow \implies Marginal Cost \downarrow
 \implies Investment \uparrow \implies Growth and Salaries \uparrow

Question

Effects of Corporate Tax Cuts on Firm Growth & Worker Earnings?

- ▶ Positive effects on firm growth and employee salaries
 - ▶ Cost of Capital: Corporate Taxes \downarrow \implies Marginal Cost \downarrow
 \implies Investment \uparrow \implies Growth and Salaries \uparrow
 - ▶ Cash Windfall: Corporate Taxes \downarrow \implies Extra Cash Flow \uparrow
 \implies Investment \uparrow \implies Growth and Salaries \uparrow

Question

Effects of Corporate Tax Cuts on Firm Growth & Worker Earnings?

- ▶ Positive effects on firm growth and employee salaries
 - ▶ Cost of Capital: Corporate Taxes \downarrow \implies Marginal Cost \downarrow
 \implies Investment \uparrow \implies Growth and Salaries \uparrow
 - ▶ Cash Windfall: Corporate Taxes \downarrow \implies Extra Cash Flow \uparrow
 \implies Investment \uparrow \implies Growth and Salaries \uparrow
- ▶ No effects on firm growth or employee salaries
 - ▶ Increases in after-tax profits directly go to business owners
 - ▶ Lack of growth potentials

Empirical Challenges

- ▶ Difficult to find **large** and **exogenous** variation in tax rates across firms and workers
 1. Real corporate outcomes **too cyclical** to distinguish tax effects from business cycle effects
 2. Tax rates for small businesses depend on firm sizes or profits in most settings \implies hard to find control group

Empirical Challenges

- ▶ Difficult to find **large** and **exogenous** variation in tax rates across firms and workers
 1. Real corporate outcomes **too cyclical** to distinguish tax effects from business cycle effects
 2. Tax rates for small businesses depend on firm sizes or profits in most settings \implies hard to find control group
- ▶ Prior studies use the following variation to study corporate tax effects on either firm/estab-level or worker-level outcomes :
 - ▶ Across-industry: Zwick & Mahon 2017, Ohrn 2018 & Curtis et al. 2022
 - ▶ Across-state or -municipality: Suarez Serrato & Zidar 2016, Fuest et al. 2018
 - ▶ Across-industry by county: Garrett et al. 2020
 - ▶ Business Type (i.e., C- vs. S-Corp): Giroud & Rauh 2019, Harju et al. 2022

This paper

1. Exploit a reform in Quebec, Canada, to **identify** and **quantify** the effects of corporate income taxes on firm growth and worker earnings

This paper

1. Exploit a reform in Quebec, Canada, to **identify** and **quantify** the effects of corporate income taxes on firm growth and worker earnings
 - ▶ Reform in 2014-2015: reduced corporate tax rates from 8% to 4% for small businesses operating in Manufacturing & Processing (M&P)

This paper

1. Exploit a reform in Quebec, Canada, to **identify** and **quantify** the effects of corporate income taxes on firm growth and worker earnings
 - ▶ Reform in 2014-2015: reduced corporate tax rates from 8% to 4% for small businesses operating in Manufacturing & Processing (M&P)
 - ▶ Compare treated firms w/ small firms in non-M&P sectors & Quebec

This paper

1. Exploit a reform in Quebec, Canada, to **identify** and **quantify** the effects of corporate income taxes on firm growth and worker earnings
 - ▶ Reform in 2014-2015: reduced corporate tax rates from 8% to 4% for small businesses operating in Manufacturing & Processing (M&P)
 - ▶ Compare treated firms w/ small firms in non-M&P sectors & Quebec
 - ▶ Make the same comparison for small firms in B.C. and Ontario

This paper

1. Exploit a reform in Quebec, Canada, to **identify** and **quantify** the effects of corporate income taxes on firm growth and worker earnings
 - ▶ Reform in 2014-2015: reduced corporate tax rates from 8% to 4% for small businesses operating in Manufacturing & Processing (M&P)
 - ▶ Compare treated firms w/ small firms in non-M&P sectors & Quebec
 - ▶ Make the same comparison for small firms in B.C. and Ontario
 - ▶ Triple-difference design: absorbs any sector-specific or province-specific trends or shocks that might have coincided with the reform

This paper

1. Exploit a reform in Quebec, Canada, to **identify** and **quantify** the effects of corporate income taxes on firm growth and worker earnings
 - ▶ Reform in 2014-2015: reduced corporate tax rates from 8% to 4% for small businesses operating in Manufacturing & Processing (M&P)
 - ▶ Compare treated firms w/ small firms in non-M&P sectors & Quebec
 - ▶ Make the same comparison for small firms in B.C. and Ontario
 - ▶ Triple-difference design: absorbs any sector-specific or province-specific trends or shocks that might have coincided with the reform
 - ▶ Administrative Tax Returns Data on the universe of firms and workers

This paper

1. Exploit a reform in Quebec, Canada, to **identify** and **quantify** the effects of corporate income taxes on firm growth and worker earnings
 - ▶ Reform in 2014-2015: reduced corporate tax rates from 8% to 4% for small businesses operating in Manufacturing & Processing (M&P)
 - ▶ Compare treated firms w/ small firms in non-M&P sectors & Quebec
 - ▶ Make the same comparison for small firms in B.C. and Ontario
 - ▶ Triple-difference design: absorbs any sector-specific or province-specific trends or shocks that might have coincided with the reform
 - ▶ Administrative Tax Returns Data on the universe of firms and workers
2. Main Results: large effects on firm growth and employee earnings

This paper

1. Exploit a reform in Quebec, Canada, to **identify** and **quantify** the effects of corporate income taxes on firm growth and worker earnings
 - ▶ Reform in 2014-2015: reduced corporate tax rates from 8% to 4% for small businesses operating in Manufacturing & Processing (M&P)
 - ▶ Compare treated firms w/ small firms in non-M&P sectors & Quebec
 - ▶ Make the same comparison for small firms in B.C. and Ontario
 - ▶ Triple-difference design: absorbs any sector-specific or province-specific trends or shocks that might have coincided with the reform
 - ▶ Administrative Tax Returns Data on the universe of firms and workers
2. Main Results: large effects on firm growth and employee earnings
3. Empirically test **mechanisms** for employment & earnings responses
 - ▶ Larger effects among high-tech, fast-growing industries
 - ▶ No differential responses by firm sizes or labor market HHI

Key Contributions

1. Clean evidence on how corporate taxes affect worker earnings/wages
 - ▶ lack of empirical evidence using employer-employee matched data
 - ▶ allows to flexibly control for worker FEs / compositions

Key Contributions

1. Clean evidence on how corporate taxes affect worker earnings/wages
 - ▶ lack of empirical evidence using employer-employee matched data
 - ▶ allows to flexibly control for worker FEs / compositions
2. Link worker-level responses with firm-level responses to a tax cut
 - ▶ better understand potential mechanisms behind wage responses
 - ▶ comprehensive analysis of tax incidence on both capital and labor

Key Contributions

1. Clean evidence on how corporate taxes affect worker earnings/wages
 - ▶ lack of empirical evidence using employer-employee matched data
 - ▶ allows to flexibly control for worker FEs / compositions
2. Link worker-level responses with firm-level responses to a tax cut
 - ▶ better understand potential mechanisms behind wage responses
 - ▶ comprehensive analysis of tax incidence on both capital and labor
3. Study tax policy targeted for small businesses (a half of total sales & 70% of employment in Canada)
 - ▶ most existing studies examine corporate tax policy across all firm sizes
 - ▶ use large firms as a placebo group to test for GE/competition effects

Institutional Setting

- ▶ Corporate Income Tax System in Canada:
 1. Taxed both at the federal and provincial level
 2. Baseline federal tax rate (after general tax reductions): 15%

Institutional Setting

- ▶ Corporate Income Tax System in Canada:
 1. Taxed both at the federal and provincial level
 2. Baseline federal tax rate (after general tax reductions): 15%
- ▶ Small Business Deductions (SBD) in Canada:
 1. Small Business Tax Rate: 11% up to first 500k of Taxable Income

Institutional Setting

- ▶ Corporate Income Tax System in Canada:
 1. Taxed both at the federal and provincial level
 2. Baseline federal tax rate (after general tax reductions): 15%

- ▶ Small Business Deductions (SBD) in Canada:
 1. Small Business Tax Rate: 11% up to first 500k of Taxable Income
 2. Eligibility: (1) Canadian-Controlled Private Companies
(2) Taxable Capital Below 10 million CAD
Taxable Capital = capital stock, retained earnings, other surpluses etc,
net of investment allowance

Institutional Setting

- ▶ Corporate Income Tax System in Canada:
 1. Taxed both at the federal and provincial level
 2. Baseline federal tax rate (after general tax reductions): 15%

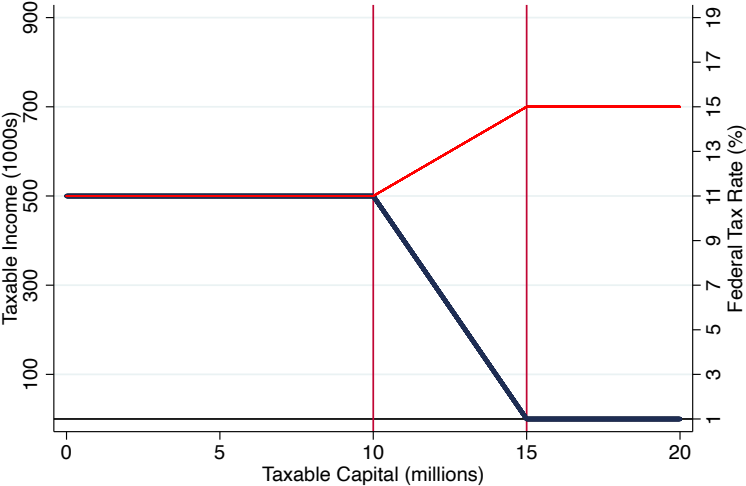
- ▶ Small Business Deductions (SBD) in Canada:
 1. Small Business Tax Rate: 11% up to first 500k of Taxable Income
 2. Eligibility: (1) Canadian-Controlled Private Companies
(2) Taxable Capital Below 10 million CAD
Taxable Capital = capital stock, retained earnings, other surpluses etc,
net of investment allowance
 3. Taxable Income eligible for SBD is reduced by 10 cents per every dollar increase in taxable capital over 10 million CAD

Institutional Setting

- ▶ Corporate Income Tax System in Canada:
 1. Taxed both at the federal and provincial level
 2. Baseline federal tax rate (after general tax reductions): 15%

- ▶ Small Business Deductions (SBD) in Canada:
 1. Small Business Tax Rate: 11% up to first 500k of Taxable Income
 2. Eligibility: (1) Canadian-Controlled Private Companies
(2) Taxable Capital Below 10 million CAD
Taxable Capital = capital stock, retained earnings, other surpluses etc,
net of investment allowance
 3. Taxable Income eligible for SBD is reduced by 10 cents per every dollar increase in taxable capital over 10 million CAD
 4. Taxable Income eligible for SBD completely phases out above 15 million CAD in taxable capital

Phase-out Schedule for Small Business Tax Deductions



— Taxable Income (1000s) — Federal Tax Rate (%)

Policy Reform in Quebec (2014-15)

- ▶ Provincial Corporate Tax Rates in Quebec

1. Baseline: 11.9%
2. Small Business Tax Rate: 8% (before 2014) for firms across all sectors

Policy Reform in Quebec (2014-15)

- ▶ Provincial Corporate Tax Rates in Quebec
 1. Baseline: 11.9%
 2. Small Business Tax Rate: 8% (before 2014) for firms across all sectors
- ▶ Reform (Tax Cuts) in 2014-15
 1. Target: Small firms in Manufacturing & Processing

Policy Reform in Quebec (2014-15)

- ▶ Provincial Corporate Tax Rates in Quebec
 1. Baseline: 11.9%
 2. Small Business Tax Rate: 8% (before 2014) for firms across all sectors
- ▶ Reform (Tax Cuts) in 2014-15
 1. Target: Small firms in Manufacturing & Processing
 2. In 2014: tax rate decreased to 6%
 3. From 2015: tax rate decreased to 4%

Policy Reform in Quebec (2014-15)

- ▶ Provincial Corporate Tax Rates in Quebec
 1. Baseline: 11.9%
 2. Small Business Tax Rate: 8% (before 2014) for firms across all sectors
- ▶ Reform (Tax Cuts) in 2014-15
 1. Target: Small firms in Manufacturing & Processing
 2. In 2014: tax rate decreased to 6%
 3. From 2015: tax rate decreased to 4%
 4. Intention: promote growth for SMEs in M&P sector

Policy Reform in Quebec (2014-15)

- ▶ Provincial Corporate Tax Rates in Quebec
 1. Baseline: 11.9%
 2. Small Business Tax Rate: 8% (before 2014) for firms across all sectors
- ▶ Reform (Tax Cuts) in 2014-15
 1. Target: Small firms in Manufacturing & Processing
 2. In 2014: tax rate decreased to 6%
 3. From 2015: tax rate decreased to 4%
 4. Intention: promote growth for SMEs in M&P sector
 5. Other sectors in Quebec were unaffected

Policy Reform in Quebec (2014-15)

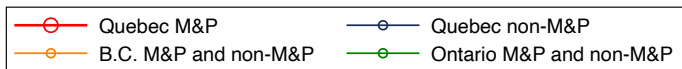
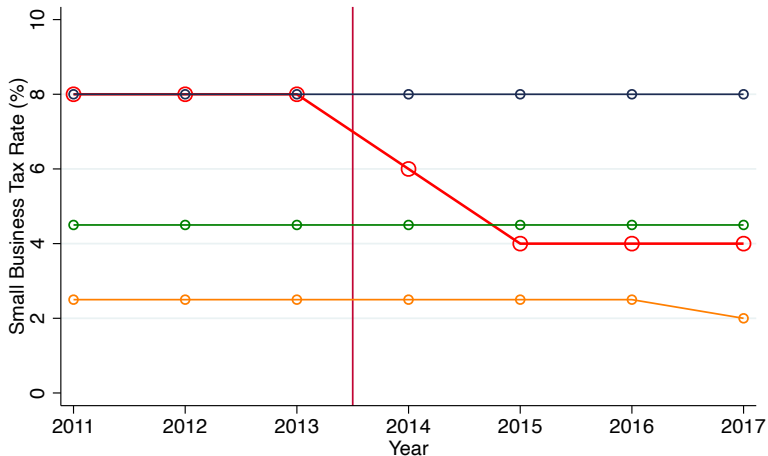
► Provincial Corporate Tax Rates in Quebec

1. Baseline: 11.9%
2. Small Business Tax Rate: 8% (before 2014) for firms across all sectors

► Reform (Tax Cuts) in 2014-15

1. Target: Small firms in Manufacturing & Processing
2. In 2014: tax rate decreased to 6%
3. From 2015: tax rate decreased to 4%
4. Intention: promote growth for SMEs in M&P sector
5. Other sectors in Quebec were unaffected
6. No similar reforms in B.C. or Ontario
7. Quebec, B.C., and Ontario make up for almost 75% of the economy

Reform in Quebec 2014-15



Empirical Model: Estimate Tax Effects on Firm Outcomes

- ▶ Triple-difference: compare outcomes of firms operating in M&P and in Quebec with those of firms in non-M&P sectors and in Quebec. Make the same comparison for firms in British Columbia & Ontario.

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

Firm fixed effects with no additional control variables

Empirical Model: Estimate Tax Effects on Firm Outcomes

- ▶ Triple-difference: compare outcomes of firms operating in M&P and in Quebec with those of firms in non-M&P sectors and in Quebec. Make the same comparison for firms in British Columbia & Ontario.

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

Firm fixed effects with no additional control variables

- ▶ Identifying assumption: outcomes for treated firms and control firms would have trended similarly in the absence of the reform

Empirical Model: Estimate Tax Effects on Firm Outcomes

- ▶ Triple-difference: compare outcomes of firms operating in M&P and in Quebec with those of firms in non-M&P sectors and in Quebec. Make the same comparison for firms in British Columbia & Ontario.

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

Firm fixed effects with no additional control variables

- ▶ Identifying assumption: outcomes for treated firms and control firms would have trended similarly in the absence of the reform
- ▶ Key threat: shocks that coincide with the reform
 1. Triple-difference: absorbs any sector- or province-specific trends or shocks that coincide with the reform
 2. Parallel pre-trends on key outcomes
 3. Robust to various specifications
 4. Placebo tests using ineligible firms

Empirical Model: Estimate Tax Effects on Worker Earnings

- ▶ Triple-difference: compare outcomes of workers in M&P and in Quebec with those of workers in non-M&P sectors and in Quebec. Make the same comparison for workers in B.C. & Ontario.

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

Worker fixed effects with no additional control variables

- ▶ Identifying assumption: outcomes for treated workers and control workers would have trended similarly in the absence of the event

Empirical Model: Estimate Tax Effects on Worker Earnings

- ▶ Triple-difference: compare outcomes of workers in M&P and in Quebec with those of workers in non-M&P sectors and in Quebec. Make the same comparison for workers in B.C. & Ontario.

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

Worker fixed effects with no additional control variables

- ▶ Identifying assumption: outcomes for treated workers and control workers would have trended similarly in the absence of the event
- ▶ Extract workers from our treated and control firms.

Empirical Model: Estimate Tax Effects on Worker Earnings

- ▶ Triple-difference: compare outcomes of workers in M&P and in Quebec with those of workers in non-M&P sectors and in Quebec. Make the same comparison for workers in B.C. & Ontario.

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

Worker fixed effects with no additional control variables

- ▶ Identifying assumption: outcomes for treated workers and control workers would have trended similarly in the absence of the event
- ▶ Extract workers from our treated and control firms.
- ▶ Impose the following restrictions:
 1. Tenure before the event (Wachter et al. 2009; Lachowska et al. 2019)

Empirical Model: Estimate Tax Effects on Worker Earnings

- ▶ Triple-difference: compare outcomes of workers in M&P and in Quebec with those of workers in non-M&P sectors and in Quebec. Make the same comparison for workers in B.C. & Ontario.

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

Worker fixed effects with no additional control variables

- ▶ Identifying assumption: outcomes for treated workers and control workers would have trended similarly in the absence of the event
- ▶ Extract workers from our treated and control firms.
- ▶ Impose the following restrictions:
 1. Tenure before the event (Wachter et al. 2009; Lachowska et al. 2019)
 2. Keep workers with at least \$4000 in annual earnings (Card et al. 2013; Sorkin 2018): Drop part-time workers or multiple-job holders

Empirical Model: Estimate Tax Effects on Worker Earnings

- ▶ Triple-difference: compare outcomes of workers in M&P and in Quebec with those of workers in non-M&P sectors and in Quebec. Make the same comparison for workers in B.C. & Ontario.

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

Worker fixed effects with no additional control variables

- ▶ Identifying assumption: outcomes for treated workers and control workers would have trended similarly in the absence of the event
- ▶ Extract workers from our treated and control firms.
- ▶ Impose the following restrictions:
 1. Tenure before the event (Wachter et al. 2009; Lachowska et al. 2019)
 2. Keep workers with at least \$4000 in annual earnings (Card et al. 2013; Sorkin 2018): Drop part-time workers or multiple-job holders
 3. Results robust to keeping these workers

Empirical Model: Estimate Tax Effects on Worker Earnings

- ▶ Triple-difference: compare outcomes of workers in M&P and in Quebec with those of workers in non-M&P sectors and in Quebec. Make the same comparison for workers in B.C. & Ontario.

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

Worker fixed effects with no additional control variables

- ▶ Identifying assumption: outcomes for treated workers and control workers would have trended similarly in the absence of the event
- ▶ Extract workers from our treated and control firms.
- ▶ Impose the following restrictions:
 1. Tenure before the event (Wachter et al. 2009; Lachowska et al. 2019)
 2. Keep workers with at least \$4000 in annual earnings (Card et al. 2013; Sorkin 2018): Drop part-time workers or multiple-job holders
 3. Results robust to keeping these workers
 4. Placebo tests using workers at ineligible firms

Data Sources

1. Canadian Employer Employee Dynamics Database (Stats Canada)
 - ▶ firm-level balance sheets (T2 & National Longitudinal Micro-data file)
 - ▶ job-level information (T4 and Record of Employment)
 - ▶ worker characteristics (T1 individual tax returns)

Data Sources

1. Canadian Employer Employee Dynamics Database (Stats Canada)
 - ▶ firm-level balance sheets (T2 & National Longitudinal Micro-data file)
 - ▶ job-level information (T4 and Record of Employment)
 - ▶ worker characteristics (T1 individual tax returns)
2. Sample Selection: 2011 - 2017 (unbalanced panel)
 - ▶ Quebec, B.C., and Ontario account for 3/4 of all firms in Canada
 - ▶ Drop firms in the following criteria:
 - 2.1 moved out of province (0.8%) or switched industries (4.4%)
 - 2.2 multi-estab across other provinces (1.6%)
 - 2.3 agriculture (1.6%), finance & real estate (7.1%), professional services (14.7 %), and health care (7.8%)

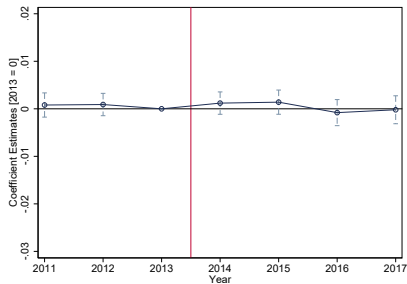
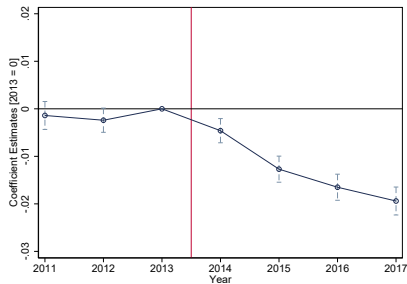
Descriptive Statistics on Firms

	Quebec		B.C./Ontario	
	(1) M&P	(2) Non-M&P	(3) M&P	(4) Non-M&P
<i>Panel A. Firm Characteristics</i>				
Tangible Assets ('000)	790.6	363.1	709.8	314.0
Intangible Assets ('000)	16.2	12.5	17.5	15.3
Total Revenue ('000)	1649.6	1264.3	1582.8	1176.8
Total Expenses ('000)	1580.2	1211.5	1529.0	1134.6
Profit Margins	0.029	0.039	0.015	0.024
Employment	11.4	8.2	10.0	7.6
Total Payroll ('000)	416.5	244.9	417.0	231.9
Average Payroll ('000)	35.6	21.6	36.2	21.4
EBITDA per Worker ('000)	7.4	9.9	6.6	8.6
Taxable Income ('000)	87.3	57.0	73.2	47.7
Total Income Tax Rates	0.157	0.166	0.123	0.130
Federal Income Tax Rates	0.081	0.087	0.082	0.089
Firm Age	14.2	12.0	14.1	11.2
<i>Panel B. Sectors</i>				
High-tech	0.114		0.127	
Low-tech	0.886		0.873	
Mining		0.002		0.004
Construction		0.250		0.223
Wholesale		0.002		0.004
Retail		0.192		0.181
Transportation		0.095		0.110
Information		0.021		0.025
Other services		0.341		0.356
Observations	28,740	274,105	56,075	595,425
Firms	10,195	100,195	20,115	222,705

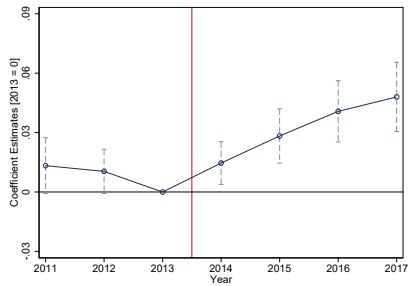
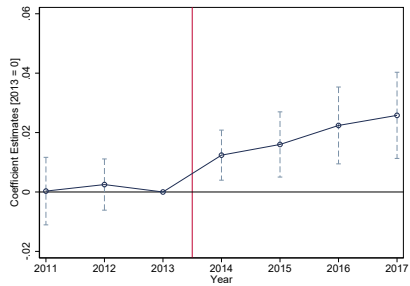
Descriptive Statistics on Workers

	Quebec		B.C./Ontario	
	(1) M&P	(2) Non-M&P	(3) M&P	(4) Non-M&P
<i>Panel A. Worker Characteristics</i>				
Annual Earnings ('000)	38.3	35.1	46.3	39.9
Age	45.7	43.3	46.6	43.7
Male	0.689	0.627	0.704	0.607
<i>Panel B. Sectors</i>				
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
Observations	192,755	1,007,210	320,735	1,883,400
Workers	64,250	335,735	106,910	627,800

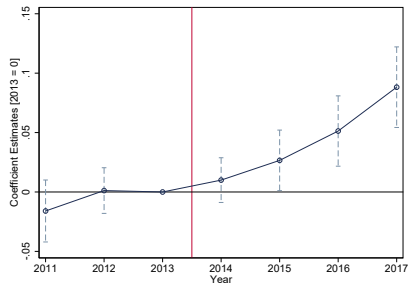
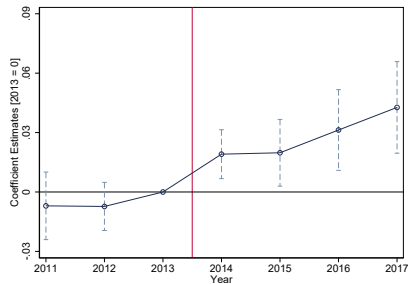
Total Income Tax Rates and Federal Income Tax Rates



Effects on Employment and Avg Payrolls



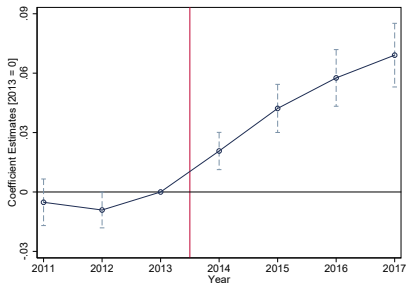
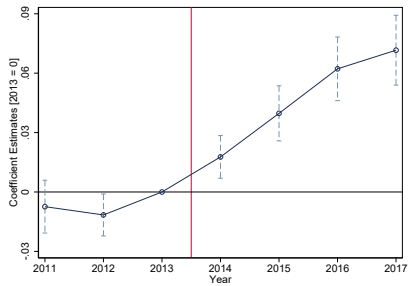
Effects on Tangible Assets and Intangible Assets



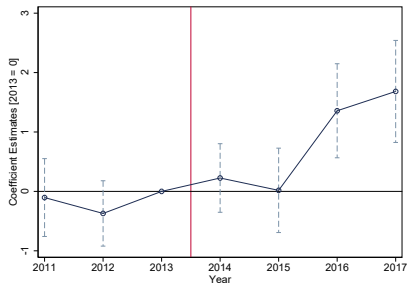
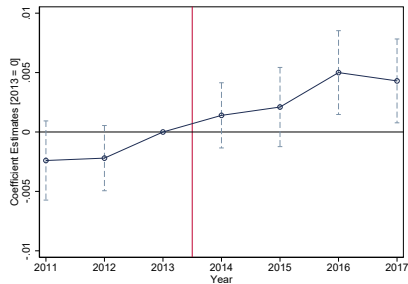
Effects on Employment, Avg Payrolls, and Capital Stock

	(1) log(Employment)	(2) log(Average Payrolls)	(3) log(Tangible Assets)	(4) log(Intangible Assets)
Post \times MP \times QC	0.0175*** (0.0052)	0.0235*** (0.0063)	0.0314*** (0.0084)	0.0468*** (0.0128)
Mean Dep. Var.	11.4	35.6	790.6	16.2
Observations	2,106,660	2,106,660	2,011,725	2,010,400
Firms (Treated)	10,205	10,205	10,165	10,160
Firms (Control)	343,235	343,235	339,825	339,810
Adjusted R^2	0.917	0.888	0.937	0.903

Effects on Sales and Expenses



Effects on Profitability and Productivity



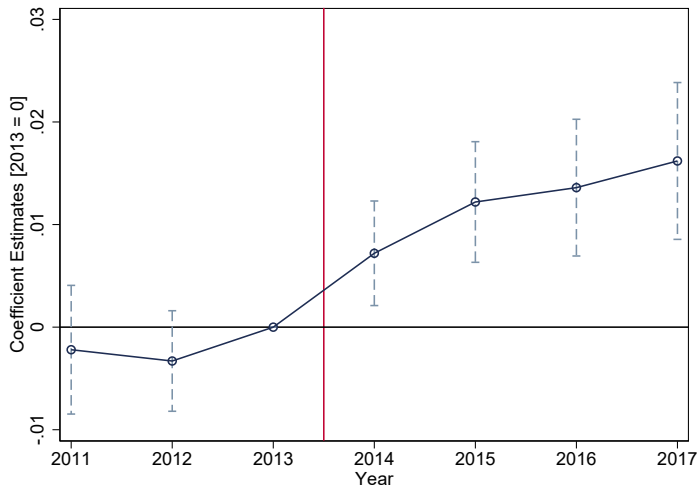
$$\text{Profit Margin} = \frac{\text{Sales} - \text{Expenses}}{\text{Sales}}$$

(Labor) Productivity = EBITDA per worker

Effects on Sales, Expenses, Profitability, and Productivity

	(1) log(Revenue)	(2) log(Expenses)	(3) Profit Margins	(4) EBITDA per Worker
Post \times MP \times QC	0.0519*** (0.0063)	0.0504*** (0.0057)	0.0044*** (0.0012)	0.8908*** (0.2708)
Mean Dep. Var.	1649.6	1580.2	0.029	7.4
Observations	2,106,660	2,106,660	2,106,660	2,106,660
Firms (Treated)	10,205	10,205	10,205	10,205
Firms (Control)	343,235	343,235	343,235	343,235
Adjusted R^2	0.915	0.929	0.521	0.579

Effects on Worker-level Earnings



Effects on Worker-level Earnings

	(1) log(Annual Earnings)	(2) Job Transition	(3) log(Annual Earnings) for Stayers
Post \times MP \times QC	0.0133*** (0.0026)	-0.0011 (0.0013)	0.0134*** (0.0026)
Mean Dep. Var.	38.3	0.040	39.8
Observations	6,692,730	6,692,730	5,488,305
Workers (Treated)	64,250	64,250	51,615
Workers (Control)	1,070,455	1,070,455	818,055
Adjusted R^2	0.812	0.080	0.831

Robustness Checks & Internal Validity

- ▶ Robustness: Main results qualitatively similar across **robust**
 1. 4-digit industry \times Year
 2. Commuting Zone \times Year
 3. Defining small firms with missing or below 10/15 mil in taxable cap
 4. Including excluded workers (without tenure restriction, part-time, below 4k in annual earnings, or multiple-job holders)
- ▶ Placebo Tests: Ineligible for SBD **placebo**
 1. Non-CCPCs
 2. Large firms ($>$ 15 million in taxable capital): spillover effects minimal

Comparing to User Cost of Capital Model

- ▶ Based on these results, the corresponding elasticity with respect to net of corporate income tax rates:

$$\epsilon_{Y,1-\tau} = \frac{\% \Delta Y}{\% \Delta (\text{net of tax rate})} = \frac{\Delta Y}{Y_0} * \frac{(1 - \tau_0)}{(\tau_1 - \tau_0)}$$

Comparing to User Cost of Capital Model

- ▶ Based on these results, the corresponding elasticity with respect to net of corporate income tax rates:

$$\epsilon_{Y,1-\tau} = \frac{\% \Delta Y}{\% \Delta (\text{net of tax rate})} = \frac{\Delta Y}{Y_0} * \frac{(1 - \tau_0)}{(\tau_1 - \tau_0)}$$

- ▶ Our estimates sensible based on UCC? $\epsilon_{K,1-\tau_c} = \epsilon_{K,C_K} \times \epsilon_{C_K,1-\tau_c}$

Comparing to User Cost of Capital Model

- ▶ Based on these results, the corresponding elasticity with respect to net of corporate income tax rates:

$$\epsilon_{Y,1-\tau} = \frac{\% \Delta Y}{\% \Delta (\text{net of tax rate})} = \frac{\Delta Y}{Y_0} * \frac{(1 - \tau_0)}{(\tau_1 - \tau_0)}$$

- ▶ Our estimates sensible based on UCC? $\epsilon_{K,1-\tau_c} = \epsilon_{K,C_K} \times \epsilon_{C_K,1-\tau_c}$
 - ▶ Based on the model parameterized by Desai and Goolsbee (2004), a firm faces a cost of capital:

$$C_K = \frac{\overbrace{r}^{\text{expected rate of return}}}{\underbrace{(1 - \tau_c)}_{\text{net of corp tax rate}} \left[\underbrace{(1 - \tau_d)}_{\text{net of div tax rate}} \underbrace{\alpha}_{\text{div share}} + \underbrace{(1 - \tau_g)}_{\text{net of cap gains tax rate}} (1 - \alpha) \right]}$$

Comparing to User Cost of Capital Model

- Based on these results, the corresponding elasticity with respect to net of corporate income tax rates:

$$\epsilon_{Y,1-\tau} = \frac{\% \Delta Y}{\% \Delta (\text{net of tax rate})} = \frac{\Delta Y}{Y_0} * \frac{(1 - \tau_0)}{(\tau_1 - \tau_0)}$$

- Our estimates sensible based on UCC? $\epsilon_{K,1-\tau_c} = \epsilon_{K,C_K} \times \epsilon_{C_K,1-\tau_c}$
 - Based on the model parameterized by Desai and Goolsbee (2004), a firm faces a cost of capital:

$$C_K = \frac{\overbrace{r}^{\text{expected rate of return}}}{\underbrace{(1 - \tau_c)}_{\text{net of corp tax rate}} \left[\underbrace{(1 - \tau_d)}_{\text{net of div tax rate}} \underbrace{\alpha}_{\text{div share}} + \underbrace{(1 - \tau_g)}_{\text{net of cap gains tax rate}} (1 - \alpha) \right]}$$

- Based on parameters in our setting, $\epsilon_{C_K,1-\tau_c} = -0.95$
- Based on our estimate of $\epsilon_{K,1-\tau_c} = 0.64$, we find $\epsilon_{K,C_K} = -0.67$
- In line with estimates from Zwick and Mahon (2017), Moon (2022), and Curtis et al. (2022)

Comparing other elasticities to prior studies

- ▶ Labor elasticity: 0.35. Smaller but in line with Curtis et al. (2022)

Comparing other elasticities to prior studies

- ▶ Labor elasticity: 0.35. Smaller but in line with Curtis et al. (2022)
- ▶ Earnings/wage elasticity: 0.27. Smaller but in line with Fuest et al. (2018)

Comparing other elasticities to prior studies

- ▶ Labor elasticity: 0.35. Smaller but in line with Curtis et al. (2022)
- ▶ Earnings/wage elasticity: 0.27. Smaller but in line with Fuest et al. (2018)
- ▶ In general, in line with estimates based on the U.S. and German settings, although institutional differences or firm-level heterogeneity can explain differences across different studies

Corporate Tax Incidence on Labor and Capital

- ▶ To evaluate distributional impacts of corporate taxes, we measure the tax incidence on workers (L) and firm owners (K).

Corporate Tax Incidence on Labor and Capital

- ▶ To evaluate distributional impacts of corporate taxes, we measure the tax incidence on workers (L) and firm owners (K).
 - ▶ Link a welfare change for workers, driven by a marginal tax rate change, to the sum of welfare changes for workers and firm owners

Corporate Tax Incidence on Labor and Capital

- ▶ To evaluate distributional impacts of corporate taxes, we measure the tax incidence on workers (L) and firm owners (K).
 - ▶ Link a welfare change for workers, driven by a marginal tax rate change, to the sum of welfare changes for workers and firm owners
 - ▶ Using the ownership information, we can differentiate workers without or with ownership in their own firms (“owner-worker”).

Corporate Tax Incidence on Labor and Capital

- ▶ To evaluate distributional impacts of corporate taxes, we measure the tax incidence on workers (L) and firm owners (K).
 - ▶ Link a welfare change for workers, driven by a marginal tax rate change, to the sum of welfare changes for workers and firm owners
 - ▶ Using the ownership information, we can differentiate workers without or with ownership in their own firms (“owner-worker”).
- ▶ Tax Incidence Measures:

$$I^{w_1} = \frac{dV_1}{dV_1 + dV_2 + d\pi} = \frac{L_1 w_1 \epsilon_{w_1} (1 - t_1)}{L_1 w_1 \epsilon_{w_1} (1 - t_1) + L_2 w_2 \epsilon_{w_2} (1 - t_2) + \pi \epsilon_\pi}$$

$$I^{w_2} = \frac{dV_2 + \psi d\pi}{dV_1 + dV_2 + d\pi} = \frac{L_2 w_2 \epsilon_{w_2} (1 - t_2) + \psi \pi \epsilon_\pi}{L_1 w_1 \epsilon_{w_1} (1 - t_1) + L_2 w_2 \epsilon_{w_2} (1 - t_2) + \pi \epsilon_\pi}$$

$$I^\pi = \frac{(1 - \psi) d\pi}{dV_1 + dV_2 + d\pi} = \frac{(1 - \psi) \pi \epsilon_\pi}{L_1 w_1 \epsilon_{w_1} (1 - t_1) + L_2 w_2 \epsilon_{w_2} (1 - t_2) + \pi \epsilon_\pi}$$

Using our estimates, $I^{w_1} + I^{w_2} \approx \frac{2}{3}$; $I^\pi \approx \frac{1}{3}$

Empirical Test: High-tech vs. Low-tech Industries

- ▶ Firms in high-tech industries have higher growth potentials, and may have a stronger demand for labor and capital after tax cut

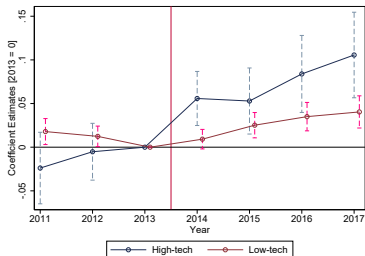
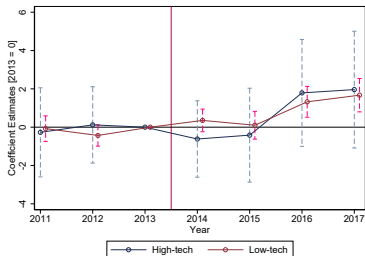
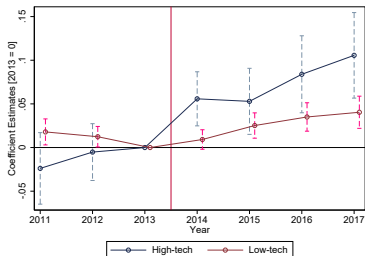
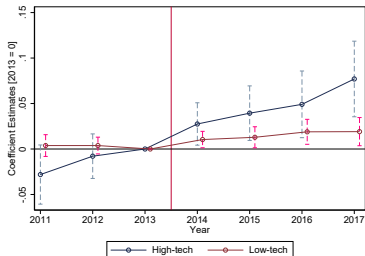
Empirical Test: High-tech vs. Low-tech Industries

- ▶ Firms in high-tech industries have higher growth potentials, and may have a stronger demand for labor and capital after tax cut
- ▶ Heckler (2005): High-tech = employment in tech-oriented occupations account for at least 10% of total employment
 1. High-tech: Pharma & medical, communication equipment
 2. Low-tech: motor vehicle parts, plastic parts

Empirical Test: High-tech vs. Low-tech Industries

- ▶ Firms in high-tech industries have higher growth potentials, and may have a stronger demand for labor and capital after tax cut
- ▶ Heckler (2005): High-tech = employment in tech-oriented occupations account for at least 10% of total employment
 1. High-tech: Pharma & medical, communication equipment
 2. Low-tech: motor vehicle parts, plastic parts
- ▶ Prediction: Following corporate tax cut, firms in high-tech industries increase employment and salaries more relative to low-tech firms
- ▶ Within M&P sector: 11% High-tech and 89% Low-tech.
Use the same baseline control group

Effects on Employment, Payrolls, EBITDA, and Earnings



Effects on Employment, Payrolls, EBITDA, and Earnings

	(1) log(Employment)	(2) log(Average Payrolls)	(3) EBITDA per Worker	(4) log(Annual Earnings)
Post × MP × QC (Low-tech)	0.0123** (0.0055)	0.0159** (0.0067)	0.9449*** (0.2742)	0.0122*** (0.0027)
Post × MP × QC (High-tech)	0.0581*** (0.0151)	0.0820*** (0.0182)	0.6424 (0.9692)	0.0246*** (0.0068)
Difference	0.0458*** (0.0159)	0.0661*** (0.0192)	-0.3025 (1.0000)	0.0124* (0.0072)
Mean Dep. Var. (Low-tech)	11.5	34.8	6.9	37.3
Mean Dep. Var. (High-tech)	11.1	42.4	10.8	46.4
Observations	2,106,660	2,106,660	2,106,660	6,692,730
Firms/Workers (low-tech)	9,035	9,035	9,035	57,780
Firms/Workers (High-tech)	1,170	1,170	1,170	7,220
Firms/Workers (Control)	343,235	343,235	343,235	1,070,450
Adjusted R^2	0.917	0.888	0.579	0.812

Potential Heterogeneity / Mechanisms

1. Labor market concentration: no differential response
2. Firm sizes / credit-constraints: no statistically differential response
3. Collective Bargaining / Union: no differential response

Cost-per-Job Calculation (Marginal Value of Public Funds)

- ▶ Cost-per-Job = 6,300 CAD per job within four years after the reform

$$= \frac{\textit{Losses in Corporate Tax Revenue} - \textit{Gains in Income Tax Revenue}}{\textit{Number of Jobs Created}}$$

Losses in Corporate Tax Revenue = 108.5 mil CAD

Gains in Labor Income Tax Revenue = 57.2 mil CAD

Fiscal Cost = 51.3 mil CAD

Number of Jobs Created = 8,144

Policy Implications & Conclusion

1. Main Takeaway: Corporate Taxes impact firm growth & worker earnings
 - ▶ larger impacts for firms in high-tech industries

Policy Implications & Conclusion

1. Main Takeaway: Corporate Taxes impact firm growth & worker earnings
 - ▶ larger impacts for firms in high-tech industries
2. Policymakers may benefit from considering:
 - ▶ Which sector / industry has a higher growth potential

Thank You