The Impact of Corporate Tax Cuts on Employment, Wages, Investment, and Output: Evidence from Quebec, Canada

ECON 450 Project

Names Ting Guo

Jiayi Wu

Date December 16, 2022

1 Introduction

Small businesses are an important part of an economy. In Canada, small businesses make up 98.1 percent of all businesses, which plays a crucial role in the economy's investment, job creation, and productivity growth (Cui et al., 2021). However, due to a lack of adequate access to financing, small businesses are also more likely to experience financial constraints, which hinder the growth of the economy (Beck et al., 2008). Keeping everything else constant, a lower corporate tax rate can lift financial constraints, which gives small business owners more room to expand their businesses and may lead to better outcomes in one or more of employment, wages, investment and total revenue. Therefore, understanding how small businesses react to tax policies and how the economy is affected by tax policies is essential to stimulate economic growth and boost employment.

This paper examines the impact of corporate tax cuts on employment, wages, investment and total output at the sector level. The authors take the corporate tax cut that happened in Quebec, Canada in 2014 as a natural experiment. The policy reduced the corporate tax rate from 8% to 4% for small businesses in the manufacturing sector (Duan and Moon, 2022). The data on employment, wages, investment and output used In this paper is from publicly available databases on Statistic Canada, and we examine the period from 2011 to 2017 since there have been no other crucial policy changes in this period.

We use the triple difference as the empirical strategy to examine the policy's influences on employment, wages, investment and output for all gender and workers, controlling for sector and province. To be more specific, we examine the variation after the policy reform in employment, wages, investment and output for manufacturing and procession sectors, in Quebec and Ontario. The results show that after the policy implementation, employment in the manufacturing sector increased. The total wage and hourly wage also increased. For investment, the investment in total non-residential capital and machinery equipment increased, but investment in property products decreased. Moreover, the total output of manufacturing decreased after the policy was promulgated.

In conclusion, the corporate tax cut policy leads to positive influences on wages and employment in the manufacturing sector in Canada. The policy also stimulated investment in total non-residential capital and machinery equipment but discouraged investment in intellectual property products. The reform also discouraged the total output of the manufacturing sector in Quebec. The results show the effectiveness of the tax cut policy on promoting employment, increasing wages, and stimulating investment. Therefore, governments in other provinces may consider decreasing corporate income taxes to small businesses as a way to stimulate the economy.

2 Institutional Background

Corporate income taxes in Canada are levied at the federal level and provincial levels by the Canada Revenue Agency (CRA). The baseline federal tax rate after a tax reduction was 16.5% in 2011 and 15% in 2012. Moreover, Canadian-controlled private corporations (CCPCs) reduce the corporate tax rate on their active business income by using the Small Business Deduction (SBD), which represents a sizable tax reduction of 4% from the baseline federal tax rate for the first $500,000 of their taxable income (Wikipedia, 2022).

Ontario and Quebec are two of the biggest provinces in Canada in terms of the number of firms, aggregate revenue, assets, and number of employees. The basic income tax rate in Ontario is 11.5% and the tax rate for small businesses is 4.5%. Quebec has three levels of corporate tax rates: the rate for the first level is 3% to 5% for different sectors, for the second level is 11.5%, and for the third level is 11.5%. In the budget plan for 2014 – 2015, the Quebec provincial government realized the importance of export markets on the growth of Quebec's manufacturing Small-Medium Enterprises (SMEs). To bolster Quebec's economy, a policy which cut the corporate tax rate from 8% to 4% in Quebec for small businesses in the manufacturing and processing sector was announced in 2014. With this 4% decrease in corporate income tax, Quebec's manufacturing SMEs could have a tax rate that is comparable to other provinces of Canada and is even lower than the corporate tax of 4.5% in Ontario (Government of Canada, 2022).

3 Data

Data on employment, wages, investment and output are extracted from four publicly available databases on Statistics Canada to conduct empirical analysis (Statistics Canada, 2022a,b,c,d). Empirical analysis are conducted based on annual data. Employment data is seasonally adjusted, and since the raw data from Statistics Canada is monthly data, the authors compute the mean of monthly employment in a year as an estimator of the actual employment in that year. All wages for total employees and average hourly wage are both extracted, and wages focus on full-time workers across all age groups and all genders. Investment data is broken down into 3 more specific areas: total non-residential capital, machinery and equipment, and intellectual property products. For output data, the authors aggregate the output of all of the subsectors of the construction sector (e.g.: residential building construction, engineering construction, etc.) to get the output of the entire construction sector. The paper uses data from 2011 to 2017 for analysis.

4 Empirical Methodology

The triple difference model is used to address the research question, which absorbs the bias in sector data, province data, and data on the time relevant to the policy change. The authors compare the data in the manufacturing sector in Quebec against the data in the construction sector and in the province of Ontario, as well as the data before versus after the policy change to exploit the impact of the tax cut.

The main assumption behind the empirical model is that absent of the tax cut, both the control and treated groups would have trended similarly. The assumption is validated using the following equation:

$$Y_{spt} = \sum_{\tau=2011}^{2017} \theta_\tau \mathbb{1}(t=\tau) \times M_s \times Q_p + \sum_{\tau=2011}^{2017} \beta_\tau \mathbb{1}(t=\tau) \times M_s + \sum_{\tau=2011}^{2017} \gamma_\tau \mathbb{1}(t=\tau) \times Q_p + \alpha_s + \alpha_p + u_{spt} \tag{1}$$

where Y_{spt} is the outcome variable (e.g.: employment, hourly wage) for sector s in province p and in year t, M_s indicates whether s is in the manufacturing sector, and Q_p indicates whether p is in Quebec. α_s is fixed effect for sector, α_p is fixed effect for province. Coefficients θ_τ's measure the change in Y_{spt} for treated firms compared to control firms in year τ. θ_τ's are normalized such that $\theta_{2013} = 0$.

The triple difference model is as follows:

$$Y_{spt} = \theta P_t \times M_s \times Q_p + \beta P_t \times M_s + \gamma P_t \times Q_p + \alpha_s + \alpha_p + \alpha_t + \epsilon_{spt} \tag{2}$$

where P_t indicates whether year t is on or after the reform year (2014), and α_t is fixed effect for year t. θ measures the difference in the outcomes. The rest of the variables are defined in Equation (1).

The construction sector is chosen to be the control sector since the construction sector and manufacturing sector are both under the goods-producing industry. Moreover, the two sectors are the largest sectors under the goods-producing industry, which makes them more similar (Business Faculty from Nova Scotia Community College et al., 2021). Ontario is chosen to be the control province since it did not experience policy changes in corporate taxes over the sample period. Furthermore, control sector and control province data demonstrate excellent data quality in general, which makes the data reliable. The analysis assumes that firms do not relocate to other provinces and do not change their sector during the sampled period.

The sampled period starts from 2011 since there was a corporate tax cut for Ontario corporations in 2010 which reduced corporate income tax from 5.5% to 4.5% (Government of Ontario, 2022). The policy could have an impact on our analysis, so time series data before 2011 are excluded.

5 Results and Discussions

The results are discussed in reference to Duan and Moon (2022)'s paper, which examines the same subject matter but uses different control sectors and control provinces, and analyzes data at the firm level. Figures in the appendix show that parallel trends exist before the tax reform, indicating that the assumption of the empirical model is satisfied.

Based on the results from triple difference estimations, the coefficient of employment is 0.0889 with a standard error of 0.037, which shows that employment in manufacturing is 8.89% increased after Corporate Tax Cuts was promulgated, and this coefficient is statistically significant after the t-test. It is larger than the reference paper's outcome which is a 1.75% increase, which could be attributed to the difference in data level. The sector-level data may include many outliers like large firms which not affected by related policies and will overstate the policy's effects on employment.

For wages, the coefficient of the total wage is positive 0.2034 with a standard error of 0.044, and the coefficient of hourly wage is positive 0.0459 with a standard error of 0.042. These coefficients show that the total wage for a week is a 20.34% increase and the hourly wage is a 4.60% increase after the policy was promulgated, the coefficient of total wage is statistically significant but the coefficient of hourly wage is not. Both coefficients are largely larger than the coefficient from the reference paper which is a 2.35% increase after the policy was published.

For investment, after the policy was promulgated, our estimation shows that the coefficient of investment in total non-residential capital is 0.1554 with a standard error of 0.124, the coefficient of investment in machinery equipment is 0.1432 with a standard error of 0.138, the coefficient of investment in property products is -0.0548 with standard error 0.173. These coefficients show that investment in total non-residential capital increased by 15.54%, investment in machinery and equipment increased by 14.32% and investment in intellectual property products decreased by 5.48%. However, all these results are not statistically significant. For total revenue, after the policy was promulgated, the coefficient of total revenue is negative 0.4657 with a standard error of 0.213, which shows the total revenue of manufacturing decreased by 46.57% after the policy was promulgated, however, the coefficient from the reference paper shows that after the policy the total revenue increased by 5.19%, and both coefficients are statistically efficient.

The main reason that contributed to the discrepancy between the estimation and the reference paper is the data discrepancy. Firstly, our data level is sector data, which is an extremely limited data level to show effective statically significant results and it can not control variables like large firms to estimate the effect of the policy more precisely. Since there is no available data at the firm level, evaluating sector-level data will lead to an underestimation since sector-level data includes businesses other than small businesses. In order to absorb sector- or province-specific shocks, the reference paper uses administrative employer-employee matched data from tax records to examine

the tax effects on firm- and worker-level (Duan and Moon, 2022).

The examination also contains several limitations. Because we do not have firm-level data, using sector-level data overlooks the impact of the tax cut on the firm level since sector-level data includes firm data of big businesses that are not impacted by the tax cut, which leads to an underestimation of our results. Moreover, we assumed that firms do not change their province or sector over time. However, in reality, firms change sector and province, although not a large percentage of firms do. With the tax cut, it is possible that firms in Ontario change their corporate address to Quebec due to the geographical proximity of the two provinces, which creates a spillover effect and causes an underestimation in our results.

Besides, the 2010 corporate tax change for small businesses in Ontario might affect business investment and employment decisions, which can be reflected in the next few years after 2010. This may result in an underestimation of the results. To avoid the impact of the 2018 policy change of limit on the Small Business Deduction. Our analysis is done up to the year 2017 and is hence unable to study the impacts in the long run (Crosbie et al., 2019). Another variation is that federal corporate taxes decreased by 0.5 percentage points for small businesses in 2016, which might have an influence on our examination.

6 Policy Implications and Conclusion

For government implication, our estimation shows that the corporate tax cuts brought positive effects on both employment and wages for all gender and workers. Thetax cut policy also leads to more investment in total non-residential capital and machinery equipment but less in intellectual property products. However, the data shows that the total revenue sharply decreased which may contribute to the change in the total output of outliers or unaffected observers like large firms.

In conclusion, the policy related to corporate tax could effectively increase both the wage and employment in the manufacturing sector in Quebec, and it will also encourage increased investment in specific areas like total non-residential capital and machinery equipment. However, the policy will reduce investment in intellectual property products. Moreover, since the data level is sector-level data, more detailed data, like firm-level data, are required to produce more precise and specific effects on different groups. All these results show the prominent effect of the new corporate tax policy on the manufacturing sector's employment, wages and investments, which shows the effectiveness of the tax policies from the government on the firms in related sectors. Therefore, governments in other provinces may consider implementing tax-cut policies for small businesses as one way to stimulate the economy.

References

Thorsten Beck, Asli Demirgüç-Kunt, and Vojislav Maksimovic. Financing patterns around the world: Are small firms different?□. *Journal of Financial Economics*, 89(3):467–487, September 2008.

Business Faculty from Nova Scotia Community College, Business Faculty from Ontario Colleges, and Original Authors and Contributors from Virginia Tech. What Industries Are Small Businesses In? In *NSCC Fundamentals of Business*. NSCC, June 2021.

R. Ian Crosbie, Bobby J. Sood, Michael N. Kandev, Marc André Gaudreau Duval Duval, Olivia Khazam, Reuben Abitbol, and John J. Lennard. Canadian Tax Laws: A Review of 2018 and a Look Ahead to 2019, January 2019.

Wei Cui, Mengying Wei, Weisi Xie, and Jing Xing. Corporate Tax Cuts for Small Firms: What Do Firms Do? *SSRN Electronic Journal*, October 2021.

Yige Duan and Terry S. Moon. Tax Cuts, Firm Growth, and Worker Earnings: Evidence from Small Businesses in Canada. Technical report, November 2022. Publication Title: Vancouver School of Economics.

Government of Canada. Corporation tax rates, 2022.

Government of Ontario. Corporate Income Tax. Technical report, March 2022.

Statistics Canada. Table 14-10-0223-01 Employment and average weekly earnings (including overtime) for all employees by province and territory, monthly, seasonally adjusted. 2022a.

Statistics Canada. Table 36-10-0096-01 Flows and stocks of fixed non-residential capital, by industry and type of asset, Canada, provinces and territories (x 1,000,000). 2022b.

Statistics Canada. Table 36-10-0488-01 Output, by sector and industry, provincial and territorial (x 1,000,000). 2022c.

Statistics Canada. Table 14-10-0064-01 Employee wages by industry, annual. 2022d.

Wikipedia. Corporate tax in Canada, May 2022.

Data Appendix

The raw data and `.pynb` code file can be found here:
`https://github.com/ting486/Corporate-Tax-Cuts-for-Small-Businesses-in-Quebec`

Appendix

Table 1: Triple Difference Estimates on Employment

	log(Employment)
$P \times M \times Q$	0.0888
	(0.037)
95% Confidence Interval	[0.012, 0.166]
Observations	28
Adjustment R^2	0.997

The table reports the triple difference coefficient estimates on $P \times M \times Q$ in Equation (2) for $log(Employment)$. Employment is seasonally adjusted. M indicates whether the sector is in manufacturing, Q indicates whether the province is in Quebec, and P indicates whether the year is on or after the reform year (2014).

Table 2: Triple Difference Estimates on Total Employees, All Wages

	(1) log(Full-time Workers)	(2) log(Part-time Workers)
$P \times M \times Q$	0.2034	0.1059
	(0.044)	(0.166)
95% Confidence Interval	[0.112, 0.295]	[-0.240, 0.452]
Observations	28	28
Adjustment R^2	0.997	0.910

The table reports the triple difference coefficient estimates on $P \times M \times Q$ in Equation (2) for $log(TotalEmployeesAllWages)$. M indicates whether the sector is in manufacturing, Q indicates whether the province is in Quebec, and P indicates whether the year is on or after the reform year (2014). Column (1) reports $log(TotalEmployeesAllWages)$ for full-time workers across all age group and all genders. Column (2) reports $log(TotalEmployeesAllWages)$ for part-time workers across all age group and all genders.

Table 3: Triple Difference Estimates on Average Hourly Wage

	(1) log(Full-time Hourly Wage)	(2) log(Part-time Hourly Wage)
$P \times M \times Q$	0.0459	0.0590
	(0.042)	(0.078)
95% Confidence Interval	[-0.042, 0.133]	[-0.104, 0.222]
Observations	28	28
Adjustment R^2	0.844	0.754

The table reports the triple difference coefficient estimates on $P \times M \times Q$ in Equation (2) for $log(AverageHourlyWage)$. M indicates whether the sector is in manufacturing, Q indicates whether the province is in Quebec, and P indicates whether the year is on or after the reform year (2014). Column (1) reports $log(AverageHourlyWage)$ for full-time workers across all age groups and all genders. Column (2) reports $log(AverageHourlyWage)$ for part-time workers across all age groups and all genders.

Table 4: Triple Difference Estimates on Investments

	(1) log(Non-Residential Capital)	(2) log(M&E)	(3) log(IP Products)
$P \times M \times Q$	0.1554	0.1432	-0.0548
	(0.044)	(0.138)	(0.173)
95% Confidence Interval	[-0.103, 0.414]	[-0.145, 0.431]	[-0.416, 0.307]
Observations	28	28	28
Adjustment R^2	0.992	0.980	0.996

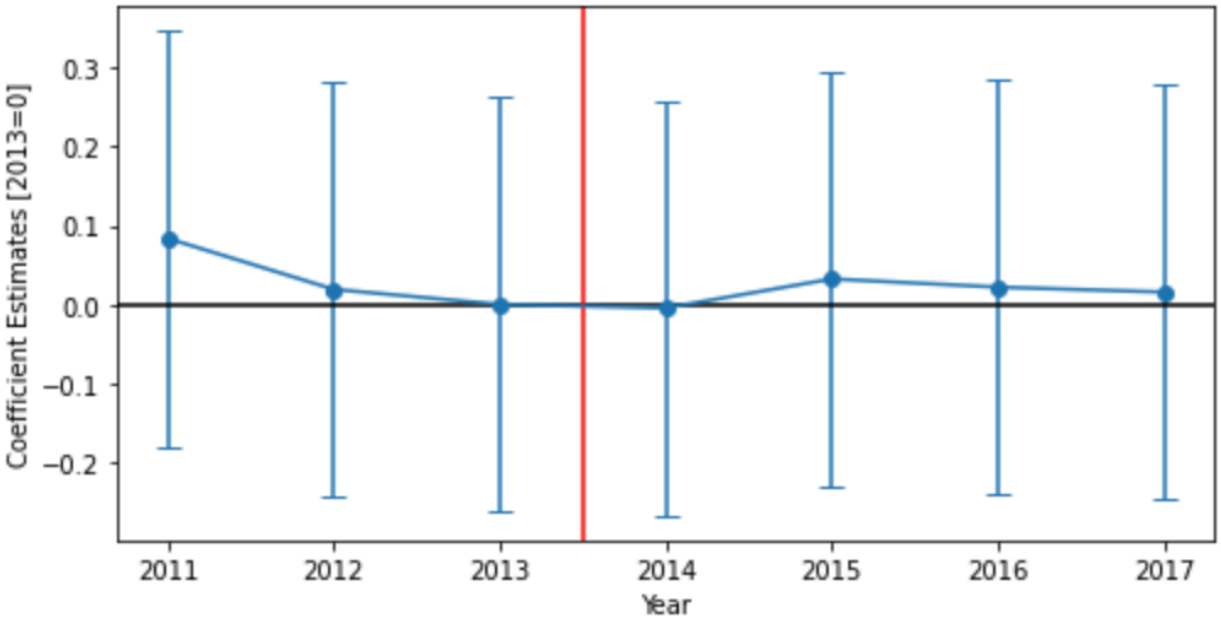
The table reports the triple difference coefficient estimates on $P \times M \times Q$ in Equation (2) for $log(Investment)$. M indicates whether the sector is in manufacturing, Q indicates whether the province is in Quebec, and P indicates whether the year is on or after the reform year (2014). Column (1) reports $log(Investment)$ for investment on total non-residential capital. Column (2) reports $log(Investment)$ for investment on machinery and equipment. Column (3) reports $log(Investment)$ for investment on intellectual property products.

Table 5: Triple Difference Estimates on Output

	log(Output)
$P \times M \times Q$	-0.4657
	(0.213)
95% Confidence Interval	[-0.909, -0.022]
Observations	28
Adjustment R^2	1.000

The table reports triple difference coefficients on $P \times M \times Q$ in Equation (2) for $log(Output)$. M indicates whether the sector is in manufacturing, Q indicates whether the province is in Quebec, and P indicates whether the year is on or after the reform year (2014).

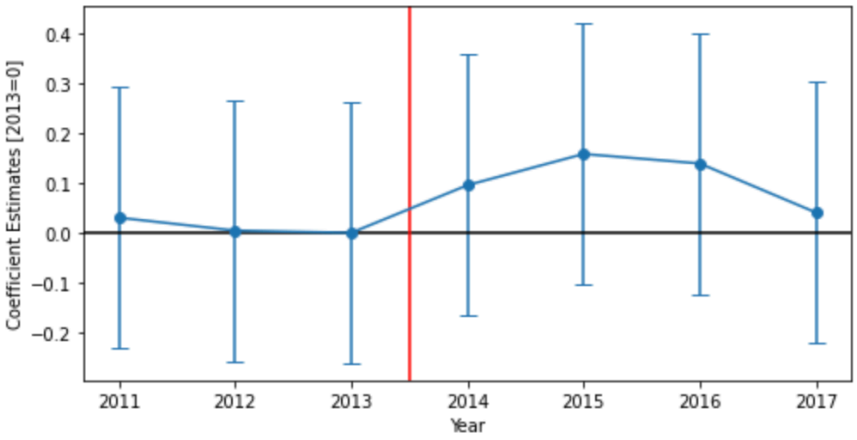
Figure 1: Triple Difference Validation: Year Fixed Effects on Employment



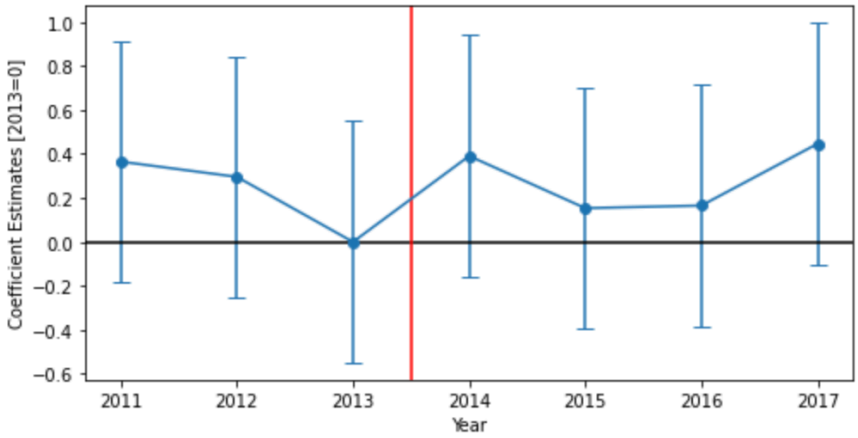
The figure shows θ_τ's, the coefficient estimates on $\mathbb{1}(t = \tau) \times M_s \times Q_p$ in Equation (1) for $log(Employment)$. Employment data is seasonally adjusted. Error bars represent 95% confidence interval. θ_τ's are normalized such that $\theta_{2013} = 0$.

Figure 2: Triple Difference Validation: Year Fixed Effects on Total Employees, All Wages

(a) Full-time Workers, All Age Groups, All Genders



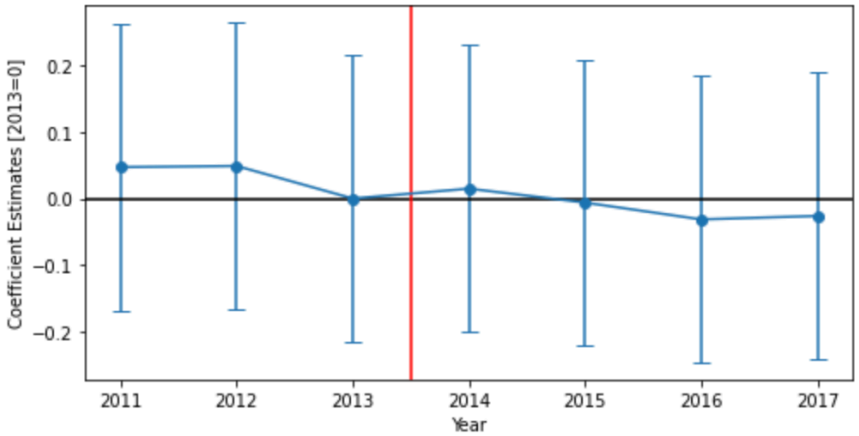
(b) Part-time Workers, All Age Groups, All Genders



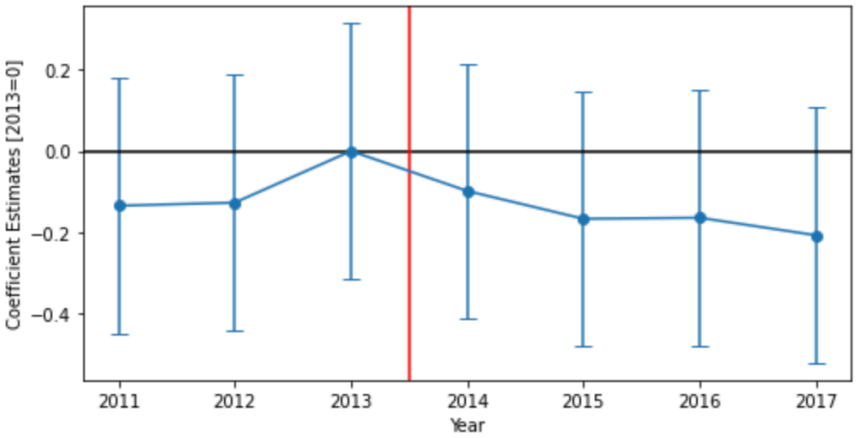
The figures show θ_τ's, the coefficient estimates on $\mathbb{1}(t = \tau) \times M_s \times Q_p$ in Equation (1) for $log(TotalEmploymentAllWages)$. Panel (a) reports the coefficients for full-time workers across all age groups and all genders. Panel (b) reports the coefficients for part-time workers across all age groups and all genders. Error bars represent 95% confidence interval. θ_τ's are normalized such that $\theta_{2013} = 0$.

Figure 3: Triple Difference Validation: Year Fixed Effects on Average Hourly Wage

(a) Full-time Workers, All Age Groups, All Genders



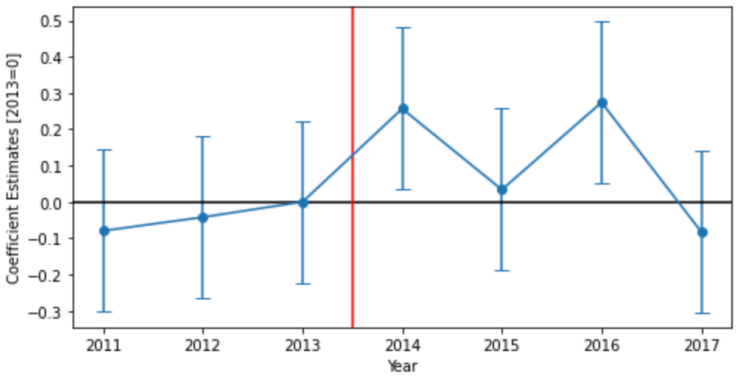
(b) Part-time Workers, All Age Groups, All Genders



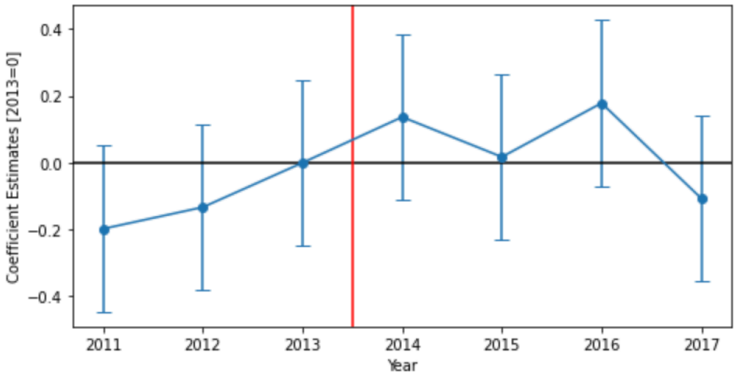
The figures show θ_τ's, the coefficient estimates on $\mathbb{1}(t = \tau) \times M_s \times Q_p$ in Equation (1) for $log(AverageHourlyWage)$. Panel (a) reports the coefficients for full-time workers across all age groups and all genders. Panel (b) reports the coefficients for part-time workers across all age groups and all genders. Error bars represent 95% confidence interval. θ_τ's are normalized such that $\theta_{2013} = 0$.

Figure 4: Triple Difference Validation: Year Fixed Effects on Investments

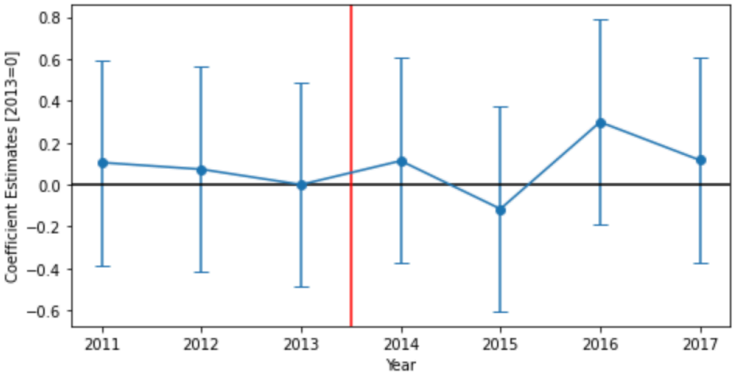
(a) Total Non-Residential Capital



(b) Machinery and Equipment

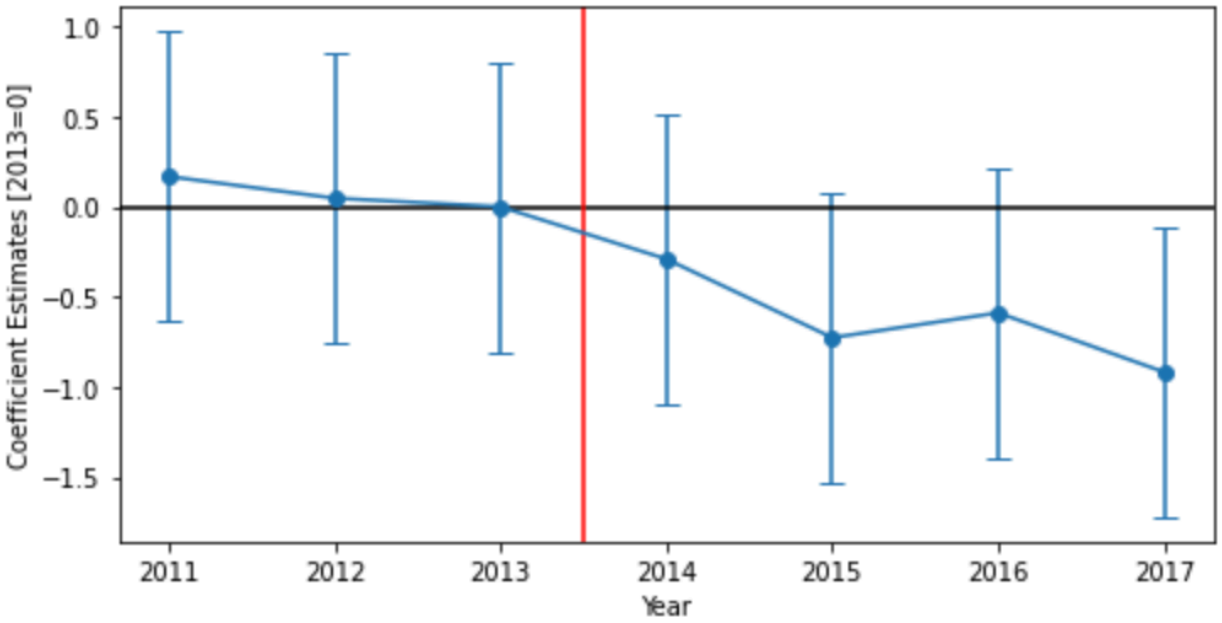


(c) Intellectual Property Products



The figures show θ_τ's, the coefficient estimates on $\mathbb{1}(t = \tau) \times M_s \times Q_p$ in Equation (1) for $log(Investment)$. Panel (a) reports the coefficients for investment on total non-residential capital. Panel (b) reports the coefficients for investment on machinery and equipment. Panel (c) reports the coefficients for investment on intellectual property products. Error bars represent 95% confidence interval. θ_τ's are normalized such that $\theta_{2013} = 0$.

Figure 5: Triple Difference Validation: Year Fixed Effects on Output



The figures show θ_τ's, the coefficient estimates on $\mathbb{1}(t = \tau) \times M_s \times Q_p$ in Equation (1) for $log(Output)$. Error bars represent 95% confidence interval. θ_τ's are normalized such that $\theta_{2013} = 0$.