

# Effects of Temporary Corporate Income Tax Cuts: Evidence from Vietnam

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## **Abstract**

Using a quasi-experimental design and panel data from 2004 to 2014, I estimate how temporary 30% corporate income tax cuts affected firm investment, employment, profits, and tax revenue during the Global Financial Crisis in Vietnam. I find that investment increased during the policy year and came back to its pre-policy level after the policy ended. The evidence does not suggest there were any significant changes in employment. Reported profits of eligible foreign-owned firms doubled in the policy year and remained high after the policy ended. I find no evidence that profits of foreign-owned firms increased because of changes in labor or capital. Instead, multinational firms likely shifted reported profits to take advantage of the tax policy. Tax payments by foreign-owned firms increased, while those by domestic firms decreased.

**JEL Classification Codes:** H25, O12

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# 1 Introduction

Governments often use a temporary corporate income tax cut<sup>1</sup> and deferral policy<sup>2</sup> to encourage investment, despite a potential decrease in tax revenue. For example, during the Global Financial Crisis, the Netherlands temporarily reduced the rate for the first EUR 200,000 of profit by 13% in 2009 and 2010. Singapore decreased the rate by 5% in 2009. Taiwan offered a three-month deferral of corporate income tax in 2008 for firms that met certain criteria. Vietnam implemented a combination of a 30% corporate income tax cut and tax deferral for the last quarter of 2008 and all of 2009.<sup>3</sup> Because of their prevalence, it is important to understand the effects of a temporary corporate income tax cut, tax deferral, or the combination of the two policies.

This paper examines the effects of a temporary corporate income tax reduction and deferral policy on firm investment, employment, reported profits, and tax revenue. Vietnam provides an excellent opportunity for a causal study because of the policy design and data availability. Only firms with 300 or fewer long-term employees or ten billion VND (equivalent to \$500,000) in assets or less were eligible for the policies. In addition, Vietnam has annual firm panel data from 2004 to 2014. The eligibility requirement and long panel data allow me to compare firms just below and just above the 300-employee eligibility threshold that were not differentially affected by other policies several years before the policies were implemented and several years after they ended.<sup>4</sup> Since the policies were meant to be temporary, data from multiple years after the termination help explain how persistent or not persistent the temporary tax cuts were.

The identifying assumption is that firms just below and just above the 300-employee eligibility threshold would have trended similarly in the absence of the 2008-2009 policy.

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<sup>1</sup>In Vietnam, a corporate income tax is a tax on firm profits. Firms may or may not be publicly traded.

<sup>2</sup>A tax deferral allows firms to pay taxes later than the due date. For brevity, I sometimes refer to the combination of a corporate income tax cut and deferral as corporate income tax cuts.

<sup>3</sup>Deloitte: Tax Responses to the Global Economic Crisis in 2009.

<sup>4</sup>I define the treatment and control groups in terms of the employment cutoff rather than of the asset cutoff because there are many more observations around the employment cutoff. Additionally, there are too few observations around the cutoff for a regression discontinuity design.

Several pieces of evidence support this assumption. First, to address concerns about possible manipulation around the thresholds, I use criteria in 2007, the year before the policy was announced, to define control and treatment firms. Second, treatment and control firms were similar in industries, age, and ownership structure. Third, no concurrent policies used the 300-employee threshold because I restrict the sample to firms that were not differentially affected by other policies.<sup>5</sup> Fourth, dependent variables trended similarly before the policy was implemented.

There are two main findings on investment and reported profits. First, I find that a large increase in investment during the policy year relative to the level of investment during the pre-policy years. Specifically, for every dollar that a firm saved in tax as a result of the policy, it invested \$3.50–\$7.50.<sup>6</sup> These estimates are reasonable because the majority of firms in Vietnam are credit constrained. In addition, a firm can get a loan for an investment if it can pay 10 to 20% upfront, which translates to an investment of \$5–\$10 for every extra dollar that a firm saved (or for every dollar that the government lost in tax revenue) as a result of the tax cut policy.<sup>7</sup> In addition, investment in the post-policy year did not fall below the investment level prior to the policy. I find null results for employment.

As for profits, I examine domestic and foreign-owned firms separately because Vietnamese domestic firms generally do not have subsidiaries outside Vietnam. Thus, foreign-owned firms have more ability than domestic firms to shift profits across countries. Empirical results on reported profits vary between foreign-owned and domestic firms. Reported profits of eligible foreign-owned firms doubled in the tax cut year (2009) and remained high after the policy ended. As for domestic firms, I find no evidence of increases in profits. A tax revenue

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<sup>5</sup>From 2010 to 2014, some variations of the 2008–2009 policy were reimplemented. Appendix 9.1 discusses these policies in details.

<sup>6</sup>For interested readers, please see Section 7 for my discussion on how the investment responses in this paper compare to the figures in the tax policy literature in the United States.

<sup>7</sup>Some examples of legal documents on how businesses can get loans in Vietnam are Decision 193-2001, <https://thuvienphapluat.vn/van-ban/tien-te-ngan-hang/quyet-dinh-193-2001-qd-ttg-quy-che-thanh-lap-to-chuc-hoat-dong-quy-bao-lanh-tin-dung-cho-doanh-nghiep.aspx>, or Decision 368-2009 in Kien Giang Province, <https://vanbanphapluat.co/quyet-dinh-368-qd-ubnd-2009-quy-che-bao-lanh-tin-dung-doanh-nghiep-nho-vua-kien-giang>.

calculation exercise suggests that a foreign-owned firm that took advantage of the tax cut and deferral policy paid higher taxes due to a large increase in reported profits. Domestic firms did not report more profits and, thus, paid less taxes. The empirical findings are robust across different windows of employment sizes, balanced and unbalanced panel data, different measures of investment, and different definitions of treatment and control firms.

Additionally, I test how much the profits of foreign-owned firms changed because of capital and labor and how much it changed because of reporting behavior. I compare the coefficients of regressions that control for capital and labor and those of regressions without such controls. The two results are almost identical. Thus, multinational profit-shifting, rather than changes in labor or capital, was most likely the main mechanism. Increases in reported profits of foreign-owned firms after the policy ended suggest that multinationals cannot shift profits instantaneously across countries when tax policies change. For example, some foreign-owned firms might have been uncertain about when the policy was implemented or when it ended. In addition, it could have been because the chance of getting audited was higher for firms with unusually low profits than for those with unusually high profits.

This paper complements a large existing literature on the effect of taxes on firm investment.<sup>8</sup> Most of the studies focus mainly on developed countries; evidence on developing countries exists but is more scarce. Studies on developed countries generally find that a decrease in user cost of capital via a decrease in taxes, such as acceleration in investment depreciation,<sup>9</sup> increases investment (see Hassett and Glenn Hubbard (2002) for a survey of empirical works). An exception is Yagan (2015), who finds that the Bush dividend tax cut, the largest dividend tax cut in the United States, did not increase investment or employment. In developing countries, Cai and Harrison (2017) find that while a VAT exemption in China that focused on machinery and excluded physical structures did not increase the aggregate amount of net investment, it shifted the composition of investment toward machinery. Chen

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<sup>8</sup>Some examples are Cummins et al. (1994), Cummins et al. (1996), survey empirical work by Hassett and Glenn Hubbard (2002), Djankov et al. (2010), Ferde and Dahlby (2012), Yagan (2015), and Zwick and Mahon (2017).

<sup>9</sup>Some recent works are House and Shapiro (2008) and Zwick and Mahon (2017).

et al. (2018) study how a corporate income tax cut in a high tech sector incentivize R&D investment in China. Bustos et al. (2004) find that higher corporate income taxes did not affect long-term capital stock in Chile, while Cerda and Larrain (2010) find that higher corporate income taxes decreased investment in Chile. This paper contributes to the literature by studying the effect of a temporary, rather than a permanent, corporate income tax cut in a developing country where evidence is limited. The existing studies on temporary tax policies mostly focus on policies that accelerate depreciation, which are different policies from a temporary corporate income tax cut. Given the temporary corporate income tax cut was used widely as a vehicle for fiscal stimulus during the Global Financial Crisis, it is important to understand how it affects the economic growth, especially in the developing country context because of the potential reduction in tax revenue.

This paper also relates to the literature on the effect of taxes on reporting behavior and multinational profit-shifting.<sup>10</sup> The results are consistent with the general findings that multinationals report more profits in countries with lower tax rates. By examining a temporary tax cut in a long panel dataset, I am able to study firms' reporting behavior several years before the policy was implemented and several years after it ended. My findings suggest that multinationals cannot always shift profits instantaneously across countries when tax policies change, a finding that has not been shown in the literature. The uncertainty about the timing of a policy or the fear of getting audited may lead to a "wrong" ex-post decision about where firms report profits, even though ex-ante, it could have been the "right" decision.

What do we learn from the case study of Vietnam? The main purpose of the policy was to stimulate the economy during the Global Financial Crisis. A potential cost of a corporate income tax cut is a reduction in tax revenue because of lower tax rates. A potential

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<sup>10</sup>Some studies on tax-reporting behavior in the United States are Clotfelter (1983) and Feinstein (1991). Studies in developing countries include Fisman and Wei (2004) in China, Kopczuk et al. (2012) in Poland, and Gorodnichenko et al. (2009) in Russia. Some studies on multinational income-shifting are Swenson (2001), Clausing (2003), Huizinga and Laeven (2008), Weichenrieder (2009), Cristea and Nguyen (2016), Davies et al. (2017), and Liu et al. (2017).

benefit is that the policy may stimulate the economy through increased investment and/or employment. The paper examines whether the policy achieved its goal. From a budgeting perspective, the Vietnamese government faced a trade-off between gaining tax revenues from foreign-owned firms and losing them from domestic firms because foreign-owned firms reported more profits, while domestic firms did not. From an economic stimulus perspective, even though I do not find any changes in the number of employees, I find a large increase in investment. The large investment response is probably because firms in Vietnam were credit constrained. A tax cut provided firms with extra cash, which enabled them to get more loans for investment.

The paper proceeds as follows. Section 2 introduces the tax policy in Vietnam. Section 3 presents the dataset. Theoretical models are in Section 4. Section 5 presents the identification strategy. I then show empirical results on capital, labor, reported profits, and tax revenue in section 6. Section 7 compares the investment results of this paper with the estimates in the literature. I conclude the paper in Section 8.

## 2 The Tax Cut Policy

Vietnam applies a flat corporate income tax that has been decreasing over time. The tax rate was 32% before 2004, 28% from 2004 to 2008, 25% from 2009 to 2013, and has been 22% from 2014 to the present. The majority of firms choose a fiscal year that is the same as the calendar year. Firms effectively pay corporate income tax on an annual basis, which is due three months after the fiscal year ends.<sup>11</sup> For example, annual corporate income tax forms and payments for 2008 were due on March 31, 2009.

A temporary 30% corporate income tax cut and the nine-month deferral policy were first introduced in December 2008 and applied to the last quarter of 2008 and throughout 2009. Eligible firms were those with no more than an average of 300 long-term employees in

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<sup>11</sup>On paper, firms file and pay corporate income tax quarterly. However, most firms severely underestimate quarterly corporate income taxes and pay the majority of the income tax owed after the fiscal year ends, so that they can hold on to cash longer.

2008 or no more than ten billion VND (or \$500,000) in initial assets. Long-term employees are those whose contracts last for more than three months. In addition to the 300-employee threshold, the nine-month tax deferral program also applied to firms in some specific sectors, regardless of their size.<sup>12</sup> Approximately 20%–25% of firms that were ineligible according to the 300-employee threshold were eligible for the tax deferral under the sector-specific rule. The tax rate of eligible firms was reduced from 28% to 19.6% in the last quarter of 2008 and was further reduced from 25% to 17.5% in 2009.

Some variations in the combined tax policy for small- and medium-sized firms continued in later years using different eligibility requirements, despite the fact that the government planned to discontinue it after 2009. Because the eligibility requirements were different, I only consider the sample of firms that were not differentially affected by these later policies in the main analyses. Appendix 9.1 discusses these policies in details.

It is hard to know whether firms expect the corporate income tax cut in Vietnam to be permanent or temporary or whether control firms might have expected to eventually receive the policy. From an institutional perspective, the Vietnamese government clearly announced that the corporate income tax cut was temporary and would be suspended at the end of 2009. The tax cut policy indeed ended in 2010, even though it was later reintroduced in 2011. However, we do not know whether or not firms expected the government to follow through with its termination announcement, or whether they learned ahead of time about the reintroduction policy in 2011. Zwick and Manhon (2017) also pointed out this unclear expectation for the bonus depreciation policy in the United States. Fortunately, empirically estimating the baseline policy response does not require us to assume whether or not the policy is temporary or permanent, as also noted in Zwick and Manhon (2017).

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<sup>12</sup>These sectors are agriculture, aquaculture, wood processing, textile, leather, and computer compartments.

## 3 Data

### 3.1 Dataset

This paper uses annual enterprise surveys conducted by the Vietnamese General Statistical Office (GSO) from 2004 to 2014.<sup>13</sup> All registered firms in Vietnam are required to answer the survey. The dataset has information about firm balance sheets, income statements, and some basic tax variables, such as corporate income taxes paid and value-added tax liabilities.

The enterprise survey is rolled out on March 1 every year to ask about the previous year's information. All surveys must be returned to the GSO by July 15. As the survey is administered by the government, it is reasonable to assume that information in the enterprise dataset is relatively close to the actual numbers that firms report on their annual tax returns.

### 3.2 Variable Definitions and Winsorization

My main measure of investment is the annual dollar change in fixed assets, scaled by lagged fixed assets. I call this variable “the net investment capital ratio” for short. Fixed assets equal the book value of all fixed assets owned by firms, net of accumulated book depreciation. A change in fixed assets equals fixed assets at the end of the year minus fixed assets at the beginning of the year. Thus, this investment measure is the new annual investment in fixed assets less fixed asset retirements and accumulated book depreciation, scaled by lagged fixed assets.<sup>14</sup> This measure is also used in other papers, such as Yagan (2015) and Cai and Harrison (2017).

I also create other investment measures from new investments in machinery and equipment, a measure also used in Yagan (2015) and Zwick and Mahon (2017). About 38% of the observations of new investments spent on machinery and equipment are missing. I examine this investment measure as reported in the data, and I also construct another investment

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<sup>13</sup>The survey started in 2000.

<sup>14</sup>In the previous version of the paper, I use the log of the upfront cost of fixed assets.

measure by imputing missing values of the new investment variable with 0. I also called these two variables with lagged fixed assets “the new investment capital ratio without imputed zeros” and “the new investment capital ratio with imputed zeros.”<sup>15</sup> The general results of the two new investment capital ratio variables are qualitatively similar to each other and to the results of the regression with the net investment capital ratio.

Long-term employees are employees with contracts longer than three months who receive social insurance and benefits at the end of the year. Short-term employees have contracts for three months or less. Total employees are the sum of long-term and short-term employees at the end of the year. Employee compensation equals the sum of wages and salaries paid to employees, contributions to social insurance, and other compensations. Profits are before-tax profits at the end of the year.

A firm’s initial assets are its assets when it first registered. The data allow me to identify eligible firms through reported assets and employment. Since I do not observe a firm’s assets if it registered before 2000, when the data were first available, the initial asset variable is set equal to the firm’s assets in the first year that the firm appeared in the dataset. Thus, the constructed initial assets are accurate only for firms that registered after 2000. If a firm was established before 2000, its initial assets are those in 2000.

I winsorize profits and investment measures at the 99<sup>th</sup> and 95<sup>th</sup> percentile.<sup>16</sup> Section 6 and Appendix 9.2 show that results are similar to different levels of winsorization.

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<sup>15</sup>The main difference between the new investment ratio and the net investment capital ratio is that the net investment capital ratio accounts for depreciation, while the new investment ratio does not. According to Circular 45-2013, most assets in Vietnam can depreciate from 5 to 30 years. The straight line method implies that the depreciation rate ranges from 3.3% to 20% per year. As Table 4 will show, the difference between the net investment ratio and the new investment ratio with imputed zeros is around 5%. The difference between the net investment ratio and the new investment ratio without imputed zeros is around 13%. Thus, the range looks reasonable.

<sup>16</sup>Winsorizing at the ninety-fifth percentile of net investment means that for any observations with values above the 95<sup>th</sup> percentile, I assign the ninety-fifth percentile value. For any observations with values below the fifth percentile, I assign the fifth percentile value.

### 3.3 Treatment and control groups

To define compatible control and treatment groups, I borrow the idea from the regression discontinuity methodology that firms around a threshold are more likely than firms farther away from the threshold to be similar to each other. I use the 2007 number of employees to define the 300-employee eligibility threshold, even though the government uses the 2008 number of employees to define eligibility. I do this because firms might have manipulated their number of employees to stay under 300 long-term employees in 2008 and remain eligible for the policy. In addition, the 300 long-term employee threshold might have been an endogenous choice by the government. For instance, if firms just below the threshold in 2008 were affected by the financial crisis the hardest, the government might have chosen this threshold to alleviate some consequences of the crisis for these firms.<sup>17</sup> As mentioned earlier, to avoid capturing the possible effects of later policies, I restrict the sample to all firms that were not differentially affected by the policies in the later years.

I restrict the sample to firms whose initial assets were more than \$500,000 and had between 250 and 350 long-term employees in 2007, and were not differentially affected by the later policies. My treatment group consists of firms with 250–300 long-term employees in 2007 and initial assets greater than \$500,000. My control group consists of firms with 301–350 long-term employees in 2007 and initial assets greater than \$500,000.<sup>18</sup> Table 1 summarizes

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<sup>17</sup>I do not find evidence of bunching around the eligibility thresholds. The lack of evidence could be because firms did not manipulate or because the survey data are too noisy to detect the kink. Regarding concerns about firms manipulating the 2007 employment threshold in the survey data, I do not expect that firms would manipulate their 2007 number of employees when surveyed in 2008. First, the government clearly specified that the number of employees in 2008 would be used to determine the policy’s eligibility, not the 2007 number of employees. Second, the government did not use the survey data to determine the policy’s eligibility. The government obtained information about firms’ initial assets from the Tax Office and the number of long-term employees in 2008 from the Ministry of Labor at the end of 2008.

<sup>18</sup> Ideally, eligible and ineligible firms would be similar in both number of employees and initial assets. For example, eligible firms could have between 250–300 employees and initial assets between \$300,000–\$500,000 and ineligible firms between 301–350 employees and initial assets between \$500,000–\$700,000. However, there are very few firms around the \$500,000 initial asset thresholds, making the sample restriction based on the \$500,000 initial asset threshold small. Thus, in the main analysis of the paper, I restrict to firms that have greater than \$500,000 in initial assets to make the asset requirement of treatment and control firms somewhat similar. Fortunately, 75% of eligible firms (between 250–300 employees) had initial assets of more than \$500,000, so the sample size does not reduce too much by focusing on this population. Thus, leaving out the eligible firms with less than \$500,000 in initial assets does not substantially reduce the sample size.

eligibility defined by law and the control and treatment groups defined in this paper. My sample is an unbalanced panel dataset of about 360 firms per year from 2004 to 2014. These firms were all established in or before 2004. Thus, I do not worry about manipulation of initial assets when the policy was first introduced in December 2008. Another reason that I restrict the sample to firms born in or before 2004 is that I want to control firms' initial characteristics in 2004. Appendix 9.2 shows that the results are similar when I use balanced panel data; when I use the sample that includes firms born in or before 2007; or when I use the sample that does not restrict to eligible firms with certain asset levels.

There are two sources of measurement error that bias the estimates downward. First, the initial assets of firms that were registered before 2000 are not precisely measured. Second, the employment level in 2007, the pre-policy year, is not identical to the actual employment level that determined eligibility. Therefore, some firms that were eligible according to the rule might be categorized as ineligible in this paper and vice versa. If the tax cut and deferral policy actually increase profits, the eligibility misclassification deflates the average profit of eligible firms and inflates the average profit of ineligible firms. Thus, the difference between the average profit of eligible firms and that of ineligible firms is deflated. Due to measurement error, all regression coefficients in this paper are downwardly biased estimates of the intent-to-treat effects of the policy.

In addition, firms with around 300 long-term employees in 2007 were in approximately the 95<sup>th</sup> percentile. Firms whose initial assets were greater than \$500,000 were in approximately the 90<sup>th</sup> percentile in 2007. Therefore, this paper applies to relatively large firms.

Table 1: Program Eligibility in 2008 and 2009

<b>Definitions used in the paper</b>	
Eligible(treatment)	Ineligible(control)
250 – 300 employees in 2007 AND initial assets were greater than \$500,000	301 – 350 employees in 2007 AND initial assets were greater than \$500,000
<b>By Law, but not used in the paper</b>	
Eligible	Ineligible
$\leq 300$ employees in 2008 OR initial assets were smaller than \$500,000	$> 300$ employees in 2008 AND initial assets were greater than \$500,000

### 3.4 Summary Statistics

Tables 2 and 3 describe types of ownership and sectors of firms in my sample in 2006, before the policy was implemented. There are 218 firms in the treatment group and 136 firms in the control group in 2006. This means that about 60% of firms in the sample are treated firms and 40% are control firms. Table 2 shows that ownership types of eligible firms in 2006 were also similar to those of ineligible firms in the same year. Specifically, in both ineligible and eligible groups, around 30% of firms were foreign-owned, and the rest were domestic. Table 3 shows that, in 2006, firms were mostly in manufacturing (60%) and construction (20%). Industry types were similar among eligible and ineligible firms.

Table 4 and Figure 1 show that the treatment group and the control group were similar in the pre-policy years. As Figure 1 shows, only the log of the number of employees and the log of the total labor costs of the control and treatment groups are statistically different from each other prior to the policy. These differences are consistent with the criterion that the groups were based on the employment requirement.

Table 2: Percentage of Firms in 2006 by Ownership Types

Ownership type	All	
	Eligible	Ineligible
private domestic	34.40%	30.15%
central SOE	18.35 %	19.85%
local SOE	19.27%	19.85%
foreign-owned firms	27.98%	30.15%
Total	100%	100%
Observations	218	136

Eligible and ineligible firms in this paper are defined in Table 1.

Table 3: Percentage of Firms in 2006 by Industry Types

Industry type	All	
	Eligible	Ineligible
agriculture	4.13 %	5.88%
commerce	0.46 %	1.47 %
communication	0.46 %	0.00%
construction	20.18 %	15.44 %
electricity, gas, water	3.67 %	4.41 %
entertainment	0.46 %	0.00%
finance	0.00%	0.00%
health and social work	0.92 %	0.00%
hotels, restaurants	1.83 %	0.74 %
manufacturing	61.93 %	63.97%
other services	0.46 %	1.47 %
public admin&defense	0.92 %	0.74 %
real estate	0.00%	0.00%
sciences	1.83%	0.74%
transport&storage	1.83%	2.94%
Total	100%	100%
Observations	218	136

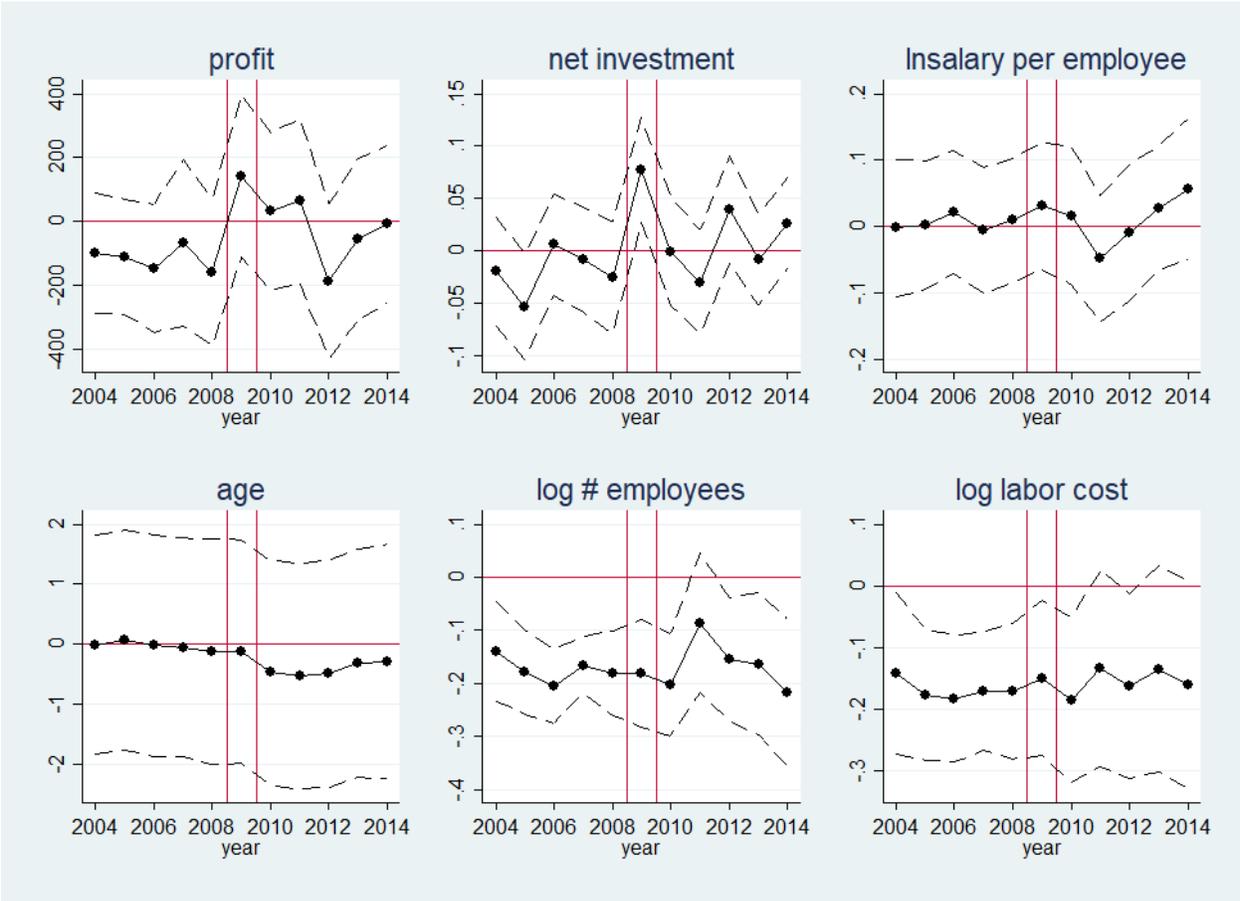
Eligible and ineligible firms in this paper are defined in Table 1.

Table 4: Summary Statistics From 2004 to 2007

	eligible	ineligible	Total
total profit before tax	367.8 (1143.6)	371.1 (945.0)	369.0 (1074.1)
profit/lagged capital	0.279 (0.954)	0.329 (0.976)	0.298 (0.962)
fixed asset	3053.9 (3104.5)	2297.8 (2389.8)	2774.3 (2883.4)
net investment	70.11 (614.9)	110.6 (578.9)	85.09 (601.9)
net investment/lagged capital	0.0664 (0.311)	0.0854 (0.328)	0.0734 (0.318)
total labor	366.6 (249.2)	414.6 (255.4)	384.3 (252.5)
labor cost	724.1 (599.9)	775.3 (702.9)	743.1 (640.2)
annual salary per labor	2.165 (1.844)	2.056 (2.070)	2.125 (1.931)
investment/lagged capital-impute 0	0.107 (0.195)	0.132 (0.213)	0.116 (0.202)
Observations	881	517	1398
investment/lagged capital- no impute 0	0.192 (0.285)	0.251 (0.311)	0.213 (0.296)
Observations	549	305	854

Firms have between 250-350 permanent employees in 2007 and initial assets of no more than ten billion VND. Total profit before tax, fixed assets, net investment, labor cost, and annual salary per labor are in 2005 thousand USD. Total profit before tax and profit/lagged capital are winsorized at a 99<sup>th</sup> percentile. Fixed assets, annual change in fixed assets, investment measures, labor cost, and annual salary per worker are winsorized at a 95<sup>th</sup> percentile.

Figure 1: Annual Differences Between Eligible Firms and Ineligible Firms From 2004-2014



Eligible and ineligible firms are defined in Table 1. Figures plot point estimates of the annual differences between eligible and ineligible firms and 90% confidence intervals. Profits are winsorized at the 99<sup>th</sup> percentile. Net investment is winsorized at the 95<sup>th</sup> percentile.

## 4 Theoretical Predictions

In this section, I present how a temporary tax cut and a tax deferral would theoretically affect firm capital stock and, thus, investment with and without credit constraints.

In the absence of credit constraints, the capital stock is at the steady state equilibrium. Firms invest until the present value of the after-tax return to a dollar of new investment equals a dollar. With a 30% temporary corporate income tax cut, the present value of the after-tax return from a dollar investment goes up by  $0.3\tau(f_K - d_1)$  relative to its prior value of a dollar. Here,  $f_K$  is the marginal return to capital,  $d_1$  is the first year depreciation allowance

(in the year of the tax cut policy), and  $\tau$  is the corporate income tax rate. Firms will increase their investment if  $f_K > d_1$  and decrease investment otherwise. Thus, if investment increases in the policy year, it will fall below the level of pre-policy years so that the capital stock can get back to its steady state. In practice, even though investment will fall eventually so that the capital stock gets back to its steady state, it might not fall immediately (House and Shapiro (2008)).

When firms are credit constrained, the capital stock is below the steady state equilibrium. Because of the temporary corporate income tax cut, firms have extra cash on hand to invest and/or hire more workers. Thus, the long-term capital stock and/or number of employees would increase. This means that if there is no adjustment cost, investment and/or the number of employees in the policy year will increase, and these increases would not be reversed after the policy ends. Therefore, if investment increases in the policy year, it will not fall below the level of pre-policy years.

Empirically, if we observe that investment increases in the policy year and immediately falls below its pre-policy level after the policy ends, we can conclude that there are no credit constraints. However, if the investment after the policy ends does not fall below its pre-policy level, it is hard to tell whether or not firms are credit constrained.

As for the tax-deferral policy, we can think of a tax deferral as an interest-free loan because firms can now pay taxes at a later date. This section shows that an interest-free loan increases investment and/or employment for credit-constrained firms and does not change investment or employment for unconstrained firms. Recall that the tax deferral in Vietnam lasted for nine months in 2009. A nine-month interest-free loan is similar to the case of the subsidized loan in Banerjee and Duflo (2014). If firms are credit constrained and have not reached their full investment potential, the interest-free loan will increase their investment. The same argument applies to employment. If firms are not credit constrained, they will substitute the interest-free loans for market-interest-rate loans. The size of the substitution is equal to the maximum of the total amount of lifetime market loans and the amount of the

interest-free loan. If the amount of the interest-free loan is smaller than that of the market loan, firms will borrow as much as they can using the interest-free loan. They will then borrow the remainder at the market-rate loan. Thus, investment does not go up because the price of the last unit of capital still depends on the unaffected market interest rate. If the size of the interest-free loan is greater than the size of the market loan, investment goes up because the price of the last unit of capital is now lower because of the interest-free loan. In the case of Vietnam, it is implausible that a nine-month interest-free loan equal to one quarter of the profit (because the tax rate is 25%) could substitute for all the money that a firm borrows during its lifetime. Thus, in the absence of credit constraints, we would not expect the long-term capital stock to increase.

## 5 Empirical Strategy

Since I have only approximately 360 firms per year around the eligibility threshold, regression discontinuity design results are noisy. Therefore, I use difference-in-differences with firm fixed effects around the employment eligibility threshold to control for variations across firms. The baseline estimation regression equation is:

$$Y_{it} = \alpha_i + year_t + \beta_t Eligible \times year_t + X_{it} + \epsilon_{it} \quad (1)$$

$Y_{it}$  is the dependent variable, such as before-tax profits, investment, the number of employees, and total employee compensation (total labor cost) of firm  $i$  in year  $t$ .

I run two types of regressions: one uses 2004 as a base year (the event study regressions), and the other uses the base years of 2004 to 2007 (the main regressions). In regressions in which 2004 is a base year,  $year_t$  are year dummies from 2005 until 2014. Years 2005 to 2007 are placebo years because they were before the tax cut and deferral policy. The policy years are 2008 and 2009, and the years after the policy ended are from 2010 to 2014. When I use the base years from 2004 to 2007 to eliminate yearly fluctuation,  $year_t$  are year dummies of

the policy years 2008, 2009, and a dummy for all years after the policy ended (from 2010 until 2014). I present the results of event study regressions in Figures 2, 3, and 4 and results of main regressions in Tables 5 and 8.

The coefficients of interest are the  $\beta_t s$ , which are the coefficients of the interactions between eligibility and the years from 2005 to 2014 for the set of regressions with 2004 as a base year. If the identification strategy is valid, then the interaction of years 2005 to 2007, the pre-policy years, and firm eligibility should not be statistically different from 0. All standard errors in the difference-in-differences regressions are clustered at the firm level.<sup>19</sup>

$X_{it}$  are time-variant control variables that allow for firms that had different initial characteristics to grow differently in different years. Specifically, I control for  $\ln(asset)_{i,2004} \times year_t$ ,  $\ln(labor)_{i,2004} \times year_t$ , and  $Y_{i,2004} \times year_t$ .  $\ln(asset)_{i,2004} \times year_t$  is the interaction between the log of assets of firm  $i$  in 2004 and a dummy variable for year  $t$ .  $\ln(labor)_{i,2004} \times year_t$  are interactions between the log of the number of employees of firm  $i$  in 2004 and year dummies from 2005 to 2014 in the event-study regressions and from 2008 on in the main regressions.  $Y_{i,2004} \times year_t$  is the interaction between the dependent variable in 2004 and a dummy variable for year  $t$ . These variables control for possible differential time trends by different initial firm characteristics. They also control for the fact that different-sized firms might have been affected differently by the Global Financial Crisis.

## 6 Results

This section shows the set of event-study figures, which indicate no pre-trend between eligible and ineligible firms. I also present the main regression results, for which I use 2004-2007 together as base years.

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<sup>19</sup>Bootstrap standard errors are similar to clustered standard errors.

## 6.1 Investment

Figure 2 shows the coefficient estimates of equation 1 using firm unbalanced data with the net investment capital ratio as a dependent variable and 2004 as a base year. The net investment capital ratio of eligible and ineligible firms did not exhibit differential trends before the 2008-2009 policy was implemented. Specifically, the coefficients of the interaction between the placebo years 2005, 2006, and 2007 and the eligibility indicator are not statistically different from 0, reducing concerns about endogeneity.

Figure 2: Yearly coefficients of the net investment capital ratio. Base year: 2004

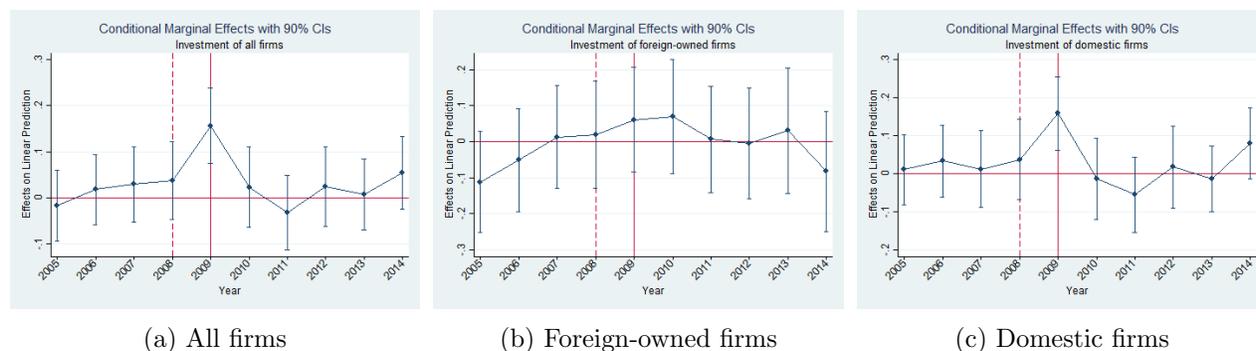


Table 5 shows the main regression results of equation 1 for the net investment capital ratio and number of employees with base years from 2004 to 2007. Along with Figure 2, Table 5 shows that the net investment capital ratio increased in the policy year. In addition, since the net investment capital ratio after the policy ended did not fall below the pre-policy level, it is hard to ascertain whether or not firms are credit constrained. As discussed in Section 4, post-policy investment will eventually fall when firms are not credit constrained and will not fall when firms are credit constrained. However, non-credit-constrained firms might not decrease their investment immediately, so empirically they may look like credit-constrained firms in the short run.

Table 6 shows that the results using the new investment capital ratios without imputed zeros and with imputed zeros as alternative investment measures are similar to results using the net investment capital ratio in Table 5. Table 12 in Appendix 9.2 shows that results are

Table 5: The effects of the tax cut on net investment and # of employees

	The Net Investment Ratio			Labor		
	all	domestic	foreign	all	domestic	foreign
eligible&2008	0.0238 (0.0388)	0.0107 (0.0473)	0.0688 (0.0686)	-0.0647 (0.0607)	-0.0336 (0.0743)	-0.0938 (0.0990)
eligible&2009	0.150*** (0.0377)	0.142*** (0.0454)	0.109* (0.0589)	-0.0180 (0.0769)	-0.0634 (0.0858)	0.172 (0.171)
eligible post-policy	0.00714 (0.0261)	-0.0141 (0.0309)	0.0530 (0.0515)	-0.0722 (0.0870)	-0.0828 (0.107)	0.0269 (0.133)
Constant	0.0573*** (0.00686)	0.0623*** (0.00843)	0.0423*** (0.0107)	5.834*** (0.0220)	5.899*** (0.0270)	5.665*** (0.0330)
N	3568	2631	937	3606	2652	954
F	3.501	2.595	2.695	8.471	9.260	2.751
r2	0.0276	0.0280	0.0563	0.106	0.158	0.0148

Standard errors in parentheses. The dependent variables are net investment winsorized at the 95<sup>th</sup> percentile and log of the number of employees. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables “eligible&2009” and “eligible post-policy” have similar interpretations. Cluster standard errors at the firm level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), and revenue in 2004 and the years from 2008 on. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 6: The Effects of The Tax Cut on the New Investment Ratio

	(1)	(2)
	with imputed 0	without imputed 0
eligible&2008	0.0383 (0.0253)	0.0508 (0.0482)
eligible&2009	0.0683*** (0.0249)	0.137*** (0.0459)
eligible post-policy	-0.00526 (0.0158)	0.0117 (0.0320)
Constant	0.108*** (0.00420)	0.200*** (0.00760)
N	3570	2156
F	1.751	1.656
r2	0.00944	0.0135

Standard errors in parentheses. The dependent variable is new investment winsorized at the 95<sup>th</sup> percentile. Missing values are imputed with 0 in column 1 and are left as missing in column 2. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables “eligible&2009” and “eligible post-policy” have similar interpretations. Cluster standard errors at the firm’s level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), and revenue in 2004 and the years from 2008 on. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

robust when I winsorize the net investment capital ratio at the 99<sup>th</sup> percentile instead of the 95<sup>th</sup> percentile; when I also include firms established between 2004-2007 in the sample; when I do not restrict asset levels of eligible firms; when I include firms that were ineligible for the policies from 2010 to 2012 in the analysis; when I use the balanced panel dataset from 2004-2014; or when I use firms with positive profits in 2009. Figure 5 shows that the results are robust in different employment windows. I also show that the results are consistent in the absence of and inclusion with different sets of control variables in Tables 19, 20, and 21 in the Appendix.

How large are the investment estimates? As Table 6 and Column 1 of Table 5 show, relative to before the policy, the new investment capital ratio with imputed zeros, new investment capital ratio without imputed zeros, and net investment capital ratio increased by 0.068, 0.137, and 0.15, respectively, in 2009. As shown in Table 4, the means of these variables before the policy were 0.107, 0.192, and 0.0664, respectively. Thus, relative to before the policy, investment increased about 63-225% in the policy year, depending on the investment measures.

How do these magnitudes map to dollar-to-dollar trade-offs between investment and tax revenue lost by the government (or tax saved by the firms)? According to Table 4, the profit-to-lagged-capital ratio before the policy was 0.279. In the policy year, the tax rate decreased by 7.5 percentage points (from 25 percentage points to 17.5 percentage points). Therefore, the ratio between the average total tax saved by firms (or tax revenue lost by the government) as the result of the policy and lagged capital was  $0.279 \times 0.075 = 0.02$ . Thus, for every dollar in tax saved by firms (or tax revenue losses by the government), firms invested \$3.40 ( $0.0683/0.02$ ), \$6.85 ( $0.137/0.02$ ), or \$7.50 ( $0.15/0.02$ ), respectively, if investment was measured in the new investment ratio with imputed zeros, the new investment ratio without imputed zeros, or the net investment ratio.<sup>20</sup> In Vietnam, a firm can get a loan for an

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<sup>20</sup>There are certainly caveats to these calculations because they do not take into account how increased investment changes future profits. In addition, this calculation is based on difference-in-differences estimates and does not account for aggregate and general equilibrium effects.

investment if it can pay 10 to 20% upfront.<sup>21</sup> Thus, if a firm has one dollar and if its investment plan is thought to be feasible by the bank, it can invest in a \$5–\$10 project. Therefore, the investment estimates in this paper are plausible. For interested readers, please see Section 7, Relation to Past Work, for my discussion on how the investment responses in this paper compared to the estimates in the tax policy literature in the United States.

Is the investment real or have firms overreported because the government expected them to invest more during the policy year? Unfortunately, I do not have audit data or any third-party data reporting firms' fixed assets. The lack of such data makes misreporting hard to verify in general. Here, I point out suggestive evidence that misreporting of the firms' fixed assets may not be a great cause for concern. If firms misreported assets, they would be more likely to misreport something harder to audit than something easier to audit. For example, if firms misreported assets, we would expect net investment of intangible fixed assets (patents, copyrights, trademarks, etc.) to respond more than tangible fixed assets (buildings, equipment, machinery, etc.) because it is easier to audit tangible fixed assets than intangible fixed assets. Table 7 shows that tangible fixed assets increased as a result of the policy, and I do not find evidence for changes in intangible fixed assets. This suggests asset misreporting might not be a concern. In addition, the government does not use the survey for any administrative purposes (such as to decide who to audit or to determine eligibility), so there is less incentive for firms to misreport.

## 6.2 Labor

Figure 3 shows that the employment numbers of eligible and ineligible firms did not experience differential trends before the policies were implemented. Specifically, the coefficients of the interaction between the placebo years 2005, 2006, and 2007 and the eligibility indicator

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<sup>21</sup>Some examples of legal documents on how businesses can get loans in Vietnam are Decision 193-2001, <https://thuvienphapluat.vn/van-ban/tien-te-ngan-hang/quyet-dinh-193-2001-qd-ttg-quy-che-thanh-lap-to-chuc-hoat-dong-quy-bao-lanh-tin-dung-cho-doanh-nghiep.aspx>, or Decision 368-2009 in Kien Giang Province, <https://vanbanphapluat.co/quyet-dinh-368-qd-ubnd-2009-quy-che-bao-lanh-tin-dung-doanh-nghiep-nho-vua-kien-giang>.

Table 7: The effects of the tax cut on net investment of tangible versus intangible assets

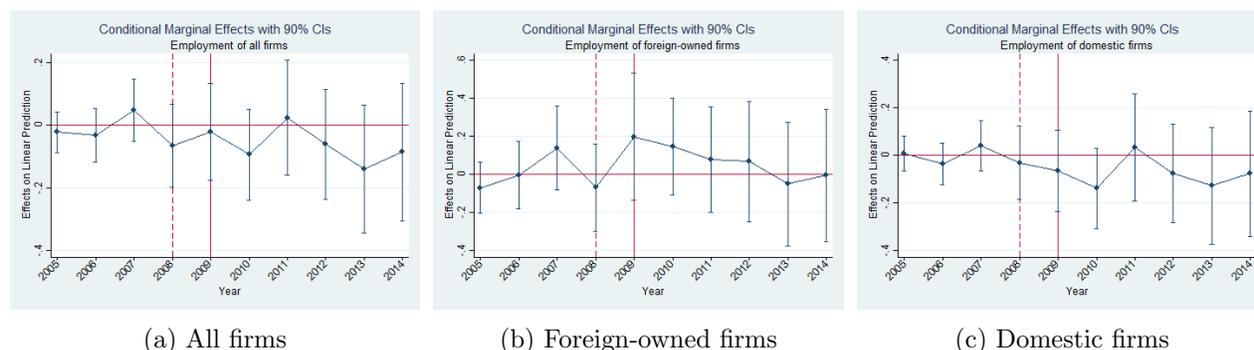
	Net investment of tangible assets			Net investment of intangible assets		
	all	domestic	foreign	all	domestic	foreign
eligible&2008	0.0189 (0.0402)	0.0215 (0.0490)	0.0236 (0.0694)	0.117 (0.178)	0.242 (0.222)	-0.221 (0.234)
eligible&2009	0.118*** (0.0392)	0.113** (0.0470)	0.0783 (0.0633)	0.122 (0.170)	0.285 (0.205)	-0.428 (0.387)
eligible post-policy	-0.0282 (0.0380)	-0.0518 (0.0464)	0.0402 (0.0694)	0.0292 (0.143)	0.0881 (0.162)	-0.274 (0.284)
Constant	0.0309*** (0.00900)	0.0394*** (0.0110)	0.00751 (0.0145)	0.146*** (0.0428)	0.137** (0.0556)	0.130** (0.0523)
N	1951	1427	524	908	647	261
F	2.781	2.489	1.777	1.821	4.085	3.158
r2	0.0348	0.0430	0.0617	0.0553	0.0796	0.103

Standard errors in parentheses. The dependent variables are net investment of tangible and intangible assets, winsorized at the 95th percentile. As mentioned in Section 3.2, net investment is measured by the change in annual fixed assets, scaled by lagged fixed assets. Unbalanced panel data from 2006-2011, which were when data on tangible and intangible fixed assets are only available. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2006 to 2007. Treatment years: from 2008 to 2011.

Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable eligible&2008 is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and eligible post-policy have similar interpretations. Cluster standard errors at the firm's level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), and revenue in 2004 and the years from 2008 on. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

are not statistically different from 0, reducing concerns about endogeneity. In columns 4,5, and 6 of Table 5 where base years are from 2004-2007, I do not find evidence of an overall change in employment among all firms and across firm types.

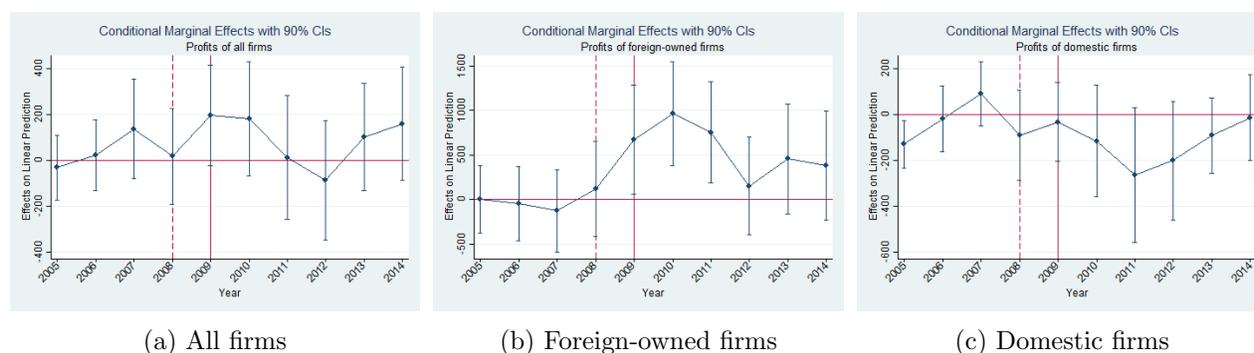
Figure 3: Yearly DID Coefficients of # of Employees. Base year: 2004



### 6.3 Profits

Figure 4 shows the coefficient estimates of equation 1 using firm unbalanced data and 2004 as a base year. Profits of eligible and ineligible firms do not exhibit differential trends before the implementation of the 2008-2009 policy. Specifically, the coefficients of the interaction between the placebo years 2005, 2006, and 2007 and the eligibility indicator are not statistically different from 0, reducing concerns about endogeneity.

Figure 4: Yearly Coefficients of Profits. Base year: 2004



The results for reported profits depend on the type of firm ownership. Columns 5 and 6 of Table 8 show that there is an increase in reported profits for foreign-owned firms. Eligible

Table 8: The Effects of The Tax Cut on Profits.

	(1)	(2)	(3)	(4)	(5)	(6)
	all	all	domestic	domestic	foreign	foreign
eligible&2008	-21.03 (97.67)	-0.586 (96.89)	-53.49 (103.9)	-82.82 (104.1)	101.8 (231.0)	32.61 (223.4)
eligible&2009	142.7 (103.9)	143.0 (100.9)	-6.661 (91.86)	-25.72 (94.41)	632.3** (284.0)	535.5** (259.0)
eligible post-policy	40.70 (97.88)	66.15 (92.95)	-103.7 (89.09)	-132.3 (97.70)	536.9** (220.7)	524.3** (214.4)
Constant	305.6*** (30.01)	-2043.0*** (534.9)	-2094.2*** (588.8)	242.4*** (27.52)	491.8*** (77.73)	-1849.6 (1179.4)
N	3596	3593	2642	2644	952	951
F	3.006	4.030	9.129	8.261	2.008	2.284
r2	0.0736	0.108	0.136	0.0838	0.0982	0.122
Control A	yes	yes	yes	yes	yes	yes
Control B	no	yes	no	yes	no	yes

Standard errors are in parentheses. The dependent variable is the profit before tax in 2005 currency and converted to dollars. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. The dependent variables are the log number of employees and changes in fixed assets. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable eligible&2008 is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and eligible post-policy have similar interpretations. Cluster standard errors at the firm level. Control variables A: interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), and revenue in 2004 and the years from 2008 on. Control variables B: control variables A and log fixed asset, log number of employees, and log labor cost. \* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

foreign-owned firms reported around \$600,000 more in 2009 and \$536,000 more in 2010 and 2011 compared to ineligible foreign-owned firms. These figures are approximately 1.5 times larger than the average profit of eligible and ineligible firms from 2004 to 2007.

Table 13 in Appendix 9.2 shows that results are robust when I winsorize profits at the 99th percentile instead of the 95th percentile; when I also include firms established between 2004-2007 in the sample; when I do not restrict asset levels of eligible firms; when I include firms that were ineligible for the policies from 2010 to 2012 in the analysis; when I use the balanced panel dataset from 2004-2014; or when I use firms with positive profits in 2009. Figure 5 shows that the results are robust in different employment windows.

Two broad mechanisms that explain the results in reported profits are changes in factor inputs and changes in reporting behavior. I provide evidence suggesting that the increase in reported profits among foreign-owned firms did not come from changes in factor inputs by demonstrating that the results are robust when including controls for capital and labor. Factor inputs are firm fixed assets, the number of employees, and total labor cost. Assuming that workers get paid their marginal product, total labor cost, conditional on the number of workers, is a measure of labor productivity. Results are reported in column 6 of Table 8. The magnitude and the significance level of the eligibility coefficients do not change when I include factor input variables (comparing column 5 of Table 8 with column 6 of Table 8). This finding implies that the changes in profits were not caused by firms increasing real factor inputs, such as the number of workers, labor productivity, or capital. <sup>22</sup>

With a temporary tax cut and deferral policy, foreign-owned firms could save money by shifting profits from the non-tax-cut years to the tax cut years. Firms could shift profits from 2008 and 2010 to 2009 because 2009 had the lowest tax rates of these three years. Such behavior predicts negative coefficients in 2008 and 2010 and a positive coefficient in 2009. However, the coefficients of foreign-owned firms in 2008 and 2010 are not negative

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<sup>22</sup>I recognize that capital and labor can be bad controls in the regressions where profits is a dependent variable. Nevertheless, the consistent response in profits with and without controlling for capital and labor provides evidence suggesting that an increase in profits is not driven by changes in factor inputs.

and statistically significant. Therefore, I do not find evidence that the increase in reported profits from 2009 to 2011 among foreign-owned firms came from profit-shifting across years (Figure 4).

Multinational businesses could shift profits from countries with high tax rates to countries with low tax rates. I find an increase in reported profits among foreign-owned firms, but not among domestic firms (columns 5 and 6 versus columns 3 and 4 of Table 8). This evidence supports the theory that multinationals shifted profits across countries to take advantage of the tax cut and deferral program.

Profits continued to remain high for eligible foreign-owned firms after the policy ended, suggesting that multinationals could not instantaneously change their reported profits when tax policies changed. Foreign-owned firms might have been uncertain about when the policies started and ended. Additionally, perhaps the changes in behavior leading to the increase in reported profits in the tax cut year were costly to undo in the years following the policy's repeal. For example, foreign-owned firms might have reported a higher output price to increase profits in the tax cut year. It might have been hard to report a very low output price for the same item in the years after the tax cut was repealed because the chance of getting audited is higher for firms with unusually low profits than for those with unusually high profits. Thus, firms would report more after the policy ended if they reported more during the policy year in 2009. Figure 4 shows that firms seemed to overreport more in 2010 and 2011 compared to 2009 because the point estimates of 2011 and 2012 are larger than that of 2009. However, these point estimates are not statistically different from each other and may just result from the yearly sample fluctuations.

I find no evidence for increases in reported profits among domestic firms as a result of the tax cut and deferral policy, as columns 3 and 4 of Table 8 indicate. One natural question might be why profits of domestic firms did not increase despite the increase in investment. It could be because investment did not materialize into profits within the five-year horizon for which data are available. Yagan (2015) also recognized that investment may take a long time

to generate profits. Alternatively, it could be that firms made poor investment decisions, or that the profit margin is too noisy to detect the impact of investment on profits.

### 6.3.1 Tax Revenue

This section shows that foreign-owned firms that took advantage of the policy paid more in taxes as a result of the higher profits they reported. I start by calculating the present discounted value of the tax payments that the government received as a result of the 2009 tax cut and deferral policy. Assume that  $t$  was the normal tax rate of foreign-owned firms, and  $0.7t$  was the reduced rate. A nine-month tax deferral lowered the present value of their tax payment due to the later payment. With an average nominal interest rate of 9%,<sup>23</sup> the average nominal interest rate over the nine-month period was  $9\%/12*9=6.75\%=0.0675$ . The present value of the tax amount that eligible firms owed the government as a result of the tax cut and deferral policy was  $(0.7t \times profit)/(1 + 0.0675) \approx 0.65 \times t \times profit$ . Thus, the combined tax reduction from both policies was a  $[1 - (0.65t \times profit/t \times profit)] =$  a 35% decrease in the corporate income tax rate.

Looking at reported profits alone does not provide a definitive story about tax revenues. First, tax revenues are affected not only by profits, but also by tax rates. It is unclear whether or not a firm would have had to pay more in taxes if it reported a higher profit in a low-tax year. In addition, if a firm reported \$100,000 more in profits and faced a corporate tax rate of 17.5%, it is not necessarily true that the firm would have had to pay \$17,500 more in taxes. This is because firms with negative or zero profit did not need to pay the corporate income tax. Consider a firm that had a loss of \$99,900 last year and a profit of \$100 this year. The firm's reported profit increases by \$100,000. However, its tax liability goes from 0 to \$17.5, not to \$17,500. Or if a firm made a loss of \$101,000 last year and a loss of only \$1000 this year, the firm's reported profit also increases by \$100,000, but its tax liability stays at zero.

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<sup>23</sup>See <http://vietstock.vn/2011/01/lai-suat-2010-kich-ban-lap-lai-nhieu-bien-dong-va-kho-khan-757-177985.htm>

I create a taxable profit variable that replaces all negative profits with 0. In other words, taxable profit =  $\max(0, \text{reported profit})$ . If  $t$  is the tax rate that a foreign-owned firm is supposed to pay, estimated tax payments would then equal  $t \times \text{taxable profits}$  for ineligible foreign-owned firms. Eligible foreign-owned firms would pay  $0.65 \times t \times \text{taxable profits}$ , reflecting the combined effect of the 30% tax cut and the nine-month tax deferral.<sup>24</sup>

Let  $a$  be the profits that a firm would report if it received no tax cut, and  $b$  the extra profits that a firm would report if the firm received the tax cut. The total taxes to be paid if the firm did not receive the tax cut is  $t \times a$ . The total taxes to be paid if the firm received a 30% tax cut and a deferral is  $0.65ta + 0.65tb$ . Tax revenue would increase if  $t \times a > 0.65ta + 0.65tb$ . Thus,  $b/a > 0.54$ .

I now calculate  $a$  and  $b$  of foreign-owned firms in 2009. Column 3 in Table 9 controls for firm fixed effects, year dummies, and interaction terms between the eligibility indicator, year dummies, and differential time trend of firms with different initial sizes in 2004. The “Mean dependent variable” row in column 3 of Table 9 represents the average profits of eligible and ineligible foreign-owned firms from 2004 to 2007. In other words, a foreign-owned firm would report \$648,740 in 2009 if it did not get the tax cut and deferral—i.e.,  $a = \$648,740$ . Because of the tax cut and deferral policy, foreign-owned firms reported about \$467,600 more than they would have in the absence of the policy. Thus,  $b = \$467,600$  in 2009. I have  $\frac{467,600}{648,740 \times (1.09)} > 0.54$ . Note that the factor 1.09 accounts for the average inflation rate in 2009. Thus, eligible foreign-owned firms paid more taxes than their ineligible counterparts in 2009. Eligible foreign-owned firms continued reporting more after the policy ended, so they also paid more taxes than ineligible firms in the later years because of the tax rate returning to normal.

Column 2 of Table 9 shows that the taxable profits of domestic firms did not increase. Thus, as a result of the 2008-2009 policy, the tax revenues of domestic firms decreased.

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<sup>24</sup>The tax liability variable is available, but a lot of observations are missing. Ten percent of these missing observations also reported negative profits before tax. Approximately 15% of firms with positive profits did not report their tax liability data.

Table 9: The Effects of The Tax Cut on Tax Revenue

	(1)	(2)	(3)
	all	domestic	foreign
eligible&2008	-23.63 (81.88)	-57.32 (90.51)	68.70 (186.3)
eligible&2009	94.39 (88.07)	-29.50 (84.98)	467.6** (225.7)
eligible post-policy	-9.984 (85.15)	-150.5* (86.14)	397.5** (191.4)
year2008	-283.8 (608.4)	411.7 (679.7)	-1645.4 (1478.4)
year2009	-452.8 (782.7)	568.5 (903.8)	-2280.2 (1688.9)
post-policy	-413.7 (650.5)	203.9 (826.5)	-1745.0 (1264.9)
Constant	400.2*** (26.99)	293.3*** (25.35)	703.2*** (69.35)
Mean dependent variable	414.32	312.9	648.74
N	3596	2644	952
F	2.331	5.289	1.467
r <sup>2</sup>	0.0661	0.0658	0.0926

Standard errors are in parentheses. The dependent variable is the constructed taxable profits in 2005 currency and converted to dollars, which equals profits if the profits > 0, and 0 otherwise. I winsorize profits at a 99<sup>th</sup> percentile to avoid outliers. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and eligible post-policy have similar interpretations. Cluster standard errors at the firm level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), revenue in 2004, and 2009-positive profits indicators in 2004 and the years from 2008 on. \* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 7 Relation to Past Work

This section compares the investment estimates of my paper with the existing literature on the impact of tax policy on the investment capital ratio in the United States. First, I compare my coefficients with the tax term coefficients presented in Desai and Goolsbee (2004), Edgerton (2010), and Zwick and Mahon (2017). I will then compare my estimates with the elasticity of the investment capital ratio with respect to the user cost of capital reported in Hassett and Glenn Hubbard (2002).

The tax term is  $\frac{1-\tau z}{1-\tau}$ . Here,  $\tau$  is the corporate income tax and  $z$  is the present discounted value for one dollar of investment. Specifically,  $z = D_0 + \sum_{t=1}^T \frac{1}{(1+r)^t} D_t$ , with  $D_t$  as the depreciation rate at time  $t$  and  $r$  as the nominal interest rate. The coefficients for the effects of the tax term on investment capital ratio are -0.89, -0.85, and -1.6, respectively, in Desai and Goolsbee (2004), Edgerton (2010), and Zwick and Mahon (2017).

In the next few paragraphs, I lay out the detailed calculations on how I derive the tax term coefficients from the estimated coefficients of investment capital ratios in this paper. The average nominal interest rate  $r$  in Vietnam in this period was 0.075, so  $(1+r) = 1.0725$ . The average number of depreciation years for firms in this sample was 9.75 years. By the straight line method, this would translate to the average  $D_0 = 1/9.75$ . Thus, we have:

$$z = D_0 + \sum_{t=1}^T \frac{1}{(1+r)^t} D_t = \frac{1}{9.75} \times \frac{1.0725 - (1/1.0725)^{9.75}}{1.0725 - 1} \approx 0.8$$

To make a compatible comparison between the corporate income tax cut in Vietnam and the literature in the United States, I assume for a moment that the corporate income tax cut in Vietnam decreased permanently from 25% to 17.5%. Thus,  $\tau$  decreased from 25% to 17.5%. The tax term  $\frac{1-\tau z}{1-\tau}$  when the corporate income tax rate was 25% was  $\frac{1-0.25 \times 0.8}{1-0.25} = 1.067$ . The tax term  $\frac{1-\tau z}{1-\tau}$  when the corporate income tax rate was 17.5% was  $\frac{1-0.175 \times 0.8}{1-0.175} = 1.042$ . When the corporate income tax rate decreased from 25% to 17.5%, the tax term decreased by  $1.067 - 1.042 = 0.025$ .

The point estimates for the new investment capital ratio with imputed zeros, new investment capital ratio without imputed zeros, and net investment capital ratio were 0.0683, 0.137, and 0.15, respectively (Tables 5 and 6). The tax term decreased by 0.025. Therefore, the tax term coefficients in this paper are -2.73, -5.48, and -6, respectively. These estimates are much larger than the estimates of -0.89, -0.85, and -1.6, respectively, in Desai and Goolsbee (2004), Edgerton (2010), and Zwick and Mahon (2017).

For the rest of the section, I calculate the elasticity of investment capital ratios with respect to user cost of capital using the coefficient estimates in this paper to compare with the elasticity reported in Hassett and Glenn Hubbard (2002). Under the assumption that the investment price in Vietnam does not change as a result of the corporate income tax cut and deferral policy, the user cost of capital is:

$$c = \frac{p(1 - \tau z)}{1 - \tau}(\rho + \delta - E(\Delta p/p))$$

where  $z$  is defined in the above paragraph,  $p$  is the price of capital goods relative to output,  $\rho$  is the firm's real required rate of return,  $\delta$  is the rate of economic depreciation, and  $E(\Delta p/p)$  is the expected percentage change in the price of capital goods over the period. If the user cost of capital changes because of a change in the corporate income tax, the percentage change in the user cost of capital  $c$  is equal to the percentage change in the tax term. In other words,  $\Delta c/c = \Delta(\frac{1-\tau z}{1-\tau})/(\frac{1-\tau z}{1-\tau})$ .

The above calculation shows that when the corporate income tax rate decreased from 25% to 17.5%, the tax term decreased by 0.025 from 1.067 to 1.042. Therefore, the percentage change in the tax term as the result of the policy is  $-0.025/1.067 = -0.023$  or -2.3%.

The point estimates for the new investment capital ratio with imputed zeros, new investment capital ratio without imputed zeros, and net investment capital ratio were 0.0683, 0.137, and 0.15, respectively (Tables 5 and 6). The unconditional means of these variables before the policy were 0.107, 0.192, and 0.0664, respectively (Table 4). Thus, the percentage

changes in the new investment capital ratio with imputed zeros, the new investment capital ratio without imputed zeros, and the net investment capital ratio were 64%, 71.4%, and 226%, respectively. Therefore, the elasticity of the investment capital ratios with respect to the tax term (or user cost of capital) were -27.8, -31.04, and -98.3, which were much larger than the range between -1 and -0.5 reported in Hassett and Glenn Hubbard (2002).<sup>25</sup> <sup>26</sup>

The reason why Vietnam has higher elasticity than the United States could be the same reason why coefficient estimates in Zwick and Mahon (2017) are greater than the average estimates in the literature summarized by Hassett and Glenn Hubbard (2002). Zwick and Mahon (2017) point out that credit constraints or non-convex adjustment costs could be a reason why their estimate is much larger than that in the literature. The non-convex adjustment costs function in Vietnam or in developing countries may differ from that in the United States. A temporary tax cut in Vietnam can make firms shift investments from one year to another, resulting in a big response in the policy year. Additionally, credit constraints might be a reason why firms were very responsive to the tax policy. Firms in Vietnam may be more credit-constrained than firms in the United States. As briefly explained in Section 4 of the paper, credit-constrained firms do not face the same optimization problem as unconstrained firms. A tax cut brings credit-constrained firms extra cash to invest. Therefore, credit-constrained firms can be very responsive to a change in corporate income taxes, especially if the amount of loan that they can get for an investment depends on how much they can afford upfront. As discussed earlier, given the Vietnamese institutional structure, any extra money that a firm saved in taxes enabled it to borrow for an investment that was worth five

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<sup>25</sup>Alternatively, one can calculate the elasticity of investment with respect to the net of tax rate, which is  $1 - \tau z$  (Zwick and Mahon (2017)). In absence of the policy, the net of tax rate was  $1 - \tau z = 1 - 0.25 \times 0.8 = 0.8$ . With the policy, the net of tax rate was  $1 - \tau z = 1 - 0.175 \times 0.8 = 0.86$ . Thus, the percentage change in the tax rate was  $(0.86 - 0.8) / 0.8 = 7.5\%$ . Therefore, the elasticity of the investment capital ratios with respect to the net of tax rate are -8.53, -9.52, or -30, respectively, if investment is measured by the new investment capital ratio with imputed zeros, the new investment capital ratio without imputed zeros, and the net investment capital ratio.

<sup>26</sup>Another calculation one can do is to calculate the changes in the investment capital ratios to the percentage changes in the tax term, which were -2.97 (-0.0683/0.023), -5.96 (-0.137/0.023), or -6.5 (-0.15/0.023), respectively, for the new investment capital ratio with imputed zeros, the new investment capital ratio without imputed zeros, and the net investment capital ratio.

to ten times the money it had in hand. In fact, the Vietnamese government implemented the tax cut and deferral policy in 2009 because they wanted to alleviate firms' credit constraints during the Global Financial Crisis.

## 8 Conclusions

This paper evaluates the impact of a temporary 30% corporate income tax cut and a nine-month corporate income tax deferral in Vietnam from the end of 2008 throughout 2009. I find that both investment and profits responded to the policy.

First, I find that investment increased enormously during the policy year. Specifically, for every tax dollar saved by firms (or tax revenue lost by the government), firms invested \$3.40, \$6.85, or \$7.50, depending on what the investment measures. In Vietnam, a firm can get a loan for an investment if it can pay a 10% to 20% down payment. Thus, if a firm has one dollar and its investment plan is thought to be feasible by the bank, it can invest in a \$5–\$10 project. Therefore, the investment estimates in this paper are plausible. These estimates translate to tax term coefficients that range from between -6 to -2.7, which are much larger than the US literature range of -1.6 to -0.8 in Desai and Goolsbee (2004), Edgerton (2010), and Zwick and Mahon (2017). Our tax term elasticities range from -27.8, -31.04, and -98.3, which are much larger than the range between -1 and -0.5 reported in Hassett and Glenn Hubbard (2002). One possible reason for this large investment response is that firms in Vietnam are credit constrained. In addition, the Vietnamese institutional structure enables firms to borrow for an investment that is worth five to ten times any extra money that firms saved as a result of the tax cut policy.

Second, eligible foreign-owned firms reported a large increase in profits in the policy year and after the policy ended. Multinational profit-shifting was the most likely mechanism. The persistence of high reported profits in later years implies that multinationals cannot instantly change their reporting behavior when tax policies change. Tax payments by foreign-owned

firms that took advantage of the tax cut and deferral program increased due to higher reported profits.

Multinational profit-shifting has been one of the central topics in corporate taxation in developed countries.<sup>27</sup> Despite a heavy reliance on the corporate income tax for government revenues, in developing countries, multinational profit-shifting has only recently attracted the attention of policy makers, and academic research on this issue is rare.<sup>28</sup> What capacity do developing countries have to assess profits that multinational corporations earn in their jurisdictions? What is the appropriate penalty for misreporting profit? How much should a developing country tax multinational corporations? These are important questions that must be addressed to help developing countries retain profits earned by foreign-owned corporations in their jurisdictions.

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<sup>27</sup>The new G20-OECD project on base erosion and profit-shifting (BEPS) aims to strengthen the international corporate tax system by limiting illegal multinational profit-shifting.

<sup>28</sup>See Crivelli et al. (2015). Also in 2012, Vietnam for the first time convicted some foreign-owned firms for undue shifting abroad of profits attributable to operations in Vietnam. After 2012, the Vietnam government created a new office to monitor asset profit-shifting of multinational corporations.

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## 9 Appendices

### 9.1 Tax Policy From 2010-2014

#### *The policies*

The tax deferral was available for three months in 2010 and in 2011 for one year. The 30% tax cut policy was reintroduced in 2011 and 2012. In 2013 and 2014, the corporate income tax rate of small and medium-sized firms was 20%, which represented a 20% and a 9% tax cut, respectively.

The definition of small and medium-sized firms in these later years changed drastically compared to the rules in 2008-2009. The eligibility rule from 2010 to 2012 depended on firm sizes and industries. In general, firms in service sectors were eligible if they had fewer than 100 employees or if their assets were less than 50 billion VND. Firms in the non-service sectors were eligible if they had fewer than 300 employees or had less than 100 billion VND in assets.<sup>29</sup> In 2013 and 2014, firms with less than 20 billion VND in revenue were eligible in most industries.

The timing of these policies varied: the 2010 policy was introduced in February 2010; the 2011 policy was introduced in August 2011; and the 2012 policy was introduced in late July 2012. The policies in 2013 and 2014 were introduced in June 2013. Table 10 summarizes the policies in different years.

*How well the 300-employee threshold in 2007 predicts eligibility for the policies in later years.*

The regression equation for Table 11 is  $eligible_t = \beta_0 + \beta_1 eligible_{2007}$ . We have  $eligible_t = 1$  if the firm is eligible for the policies in year  $t$ , and 0 if this firm is ineligible for the policies in year  $t$ .  $eligible_{2007}$  equals 1 if the firm is eligible under the 2007 thresholds (to keep the terminology simple, I call this group the original treated firms), and 0 if it is ineligible under the 2007 thresholds (original control firms).  $\beta_1$  represents the difference between the fraction of the original treated firms that got treated in the subsequent years and the fraction of the original control firms that got treated in the subsequent years.

Table 11 shows that in the sample defined in Section 3.3 and Table 1, the eligibility threshold in 2007 predicts 2008-2009 eligibility 44% of the time ( $\beta_1 = 44\%$ ).<sup>30</sup> This figure drops to approximately 10% for eligibility in 2010-2012 ( $\beta_1 = 10\%$ ), and there is almost no predictive power for eligibility in 2013-2014 ( $\beta_1 = 0\%$ ). In addition, the constant terms in columns 2 and 3 in Table 11 show that around 60% of the original control firms ( $eligible_{2007} = 0$ ) in this sample were eligible for the policies in 2010, 2011, and 2012 ( $\beta_0 = 60\%$ ), and about 5% were eligible for the policies in 2013 and 2014 ( $\beta_0 = 5\%$ ). Combining  $\beta_0 + \beta_1$ , 70% of

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<sup>29</sup>In 2010, the nine-month tax deferral policy also applied to firms in specific sectors regardless of their size. These sectors were agriculture, aquaculture, wood processing, textiles, leather, and computer compartments. Subsidiaries whose parent companies were not small or medium-sized businesses were not eligible for the tax cut in 2011 and 2012. Also in 2011 and 2012, firms in agriculture, aquaculture, forestry, textiles, leather shoes, electronic compartments, and public construction were always eligible, regardless of how many workers they employed.

<sup>30</sup>The eligibility definition in the paper only predicts 44% of real policy treatment in 2008 and 2009 because the government uses the number of employees in 2008 to determine eligibility, while my paper uses the number of employees in 2007 to avoid firms manipulating the number of employees in 2008 to qualify for the tax cuts.

Table 10: Vietnamese Tax Cut and Deferral Policies

year	Policy	Sector	Eligibility	Time Announced	Regular Rate
2009 & end 2008	30% cut & 9-month deferral	all sectors	long-term employees assets (billionVND) initial assets: $\leq 10$	December 2008	25%
2010	3-month deferral	service non-service	$\leq 100$ in 2009 OR $\leq 50$ in 2009 OR $\leq 100$ in 2009	February 2010	25%
2011	30% tax cut & 1-year deferral	service non-service	$\leq 100$ in 2011 OR $\leq 50$ in 2011 OR $\leq 100$ in 2011	August 2011	25%
2012	30% tax cut	service non-service	$\leq 100$ in 2011 OR $\leq 50$ in 2011 OR $\leq 100$ in 2011	July 2012	25%
2013	20% cut	most sectors	$< 20$ in 2012	June 2013	25%
2014	9% cut	most sectors	$< 20$ in 2013	June 2013	22%

Note: In 2010, the nine-month tax deferral policy also applied to firms in specific sectors regardless of their size. These sectors were agriculture, aquaculture, wood processing, textile, leather, and computer compartments. Subsidiaries whose parent companies were not small or medium-sized businesses were not eligible for the tax cut in 2011 and 2012. Also in 2011 and 2012, firms in agriculture, aquaculture, forestry, textiles, leather shoes, electronic compartments, and public construction were always eligible, regardless of how many workers they employed. The information on this table is collected from ND101-2011/ND-CP, Cong Van 8336-BTC-CST.

Table 11: How Well Does the Threshold in 2007 Predict Eligibility for The Policy in Later Years

	Eligible in 2008-2009	Eligible in 2010	Eligible in 2011-2012	Eligible in 2013	Eligible in 2014
eligible in 2007	0.445*** (0.0419)	0.105** (0.0449)	0.0984** (0.0444)	0.0198 (0.0212)	-0.00834 (0.0235)
Constant	0.297*** (0.0328)	0.608*** (0.0351)	0.619*** (0.0349)	0.0459*** (0.0150)	0.0711*** (0.0183)
N	478	456	466	470	468
F	112.6	5.518	4.909	0.870	0.125
r2	0.194	0.0123	0.0107	0.00176	0.000274

Standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Eligible and ineligible firms in this paper are defined in Table 1.

original treated firms were treated again in 2010-2012, and 5% of the original treated firms were treated again in 2013 and 2014. So, from 2010 to 2012, the majority of firms in the sample were eligible, while in 2013 and 2014, almost all firms in the sample were ineligible. In addition, the 300-employee threshold for the 2008-2009 policy is 10% predictive of policy eligibility from 2010-2012 but is not predictive of policy eligibility from 2013-2014.

Note that in the main regression analysis, I only use the sample of firms that was not differentially affected by the policies after 2009. Thus, all firms in the main regression analyses were eligible for the tax policies from 2010-2012. Column (6) on Tables 12 and 13 show results of the sample that also includes ineligible firms for the 2010-2012 policies.

## 9.2 Robustness Check

Table 12: The Effects of The Tax Cut on Net Investment

	99 <sup>th</sup> percentile			(4) include established04-07	(5) no restricting assets of the eligible	(6 ) include ineligible firms in 2010-2012	(7 ) balanced panel	(8 ) only firms (+)profits09
	(1 ) all	(2 ) domestic	(3) foreign					
eligible&2008	0.0298 (0.0648)	0.0178 (0.0806)	0.0518 (0.100)	0.0207 (0.0363)	0.0534 (0.0401)	-0.00311 (0.0374)	0.0173 (0.0434)	0.0351 (0.0437)
eligible&2009	0.245*** (0.0775)	0.255*** (0.0939)	0.107 (0.101)	0.134*** (0.0367)	0.129*** (0.0369)	0.120*** (0.0338)	0.148*** (0.0426)	0.151*** (0.0422)
eligible post-policy	-0.0125 (0.0519)	-0.0379 (0.0636)	0.0171 (0.0921)	0.00767 (0.0265)	0.0124 (0.0268)	0.0404* (0.0221)	0.0155 (0.0281)	0.000634 (0.0270)
Constant	0.119*** (0.0143)	0.125*** (0.0176)	0.102*** (0.0232)	0.0769*** (0.00732)	0.0769*** (0.00702)	0.0893*** (0.00653)	0.0613*** (0.00741)	0.0526*** (0.00713)
N	3568	2631	937	4315	4167	5275	3091	2992
F	2.363	1.692	1.906	2.518	3.983	4.054	3.108	3.601
r2	0.0192	0.0206	0.0417	0.0165	0.0257	0.0200	0.0280	0.0309

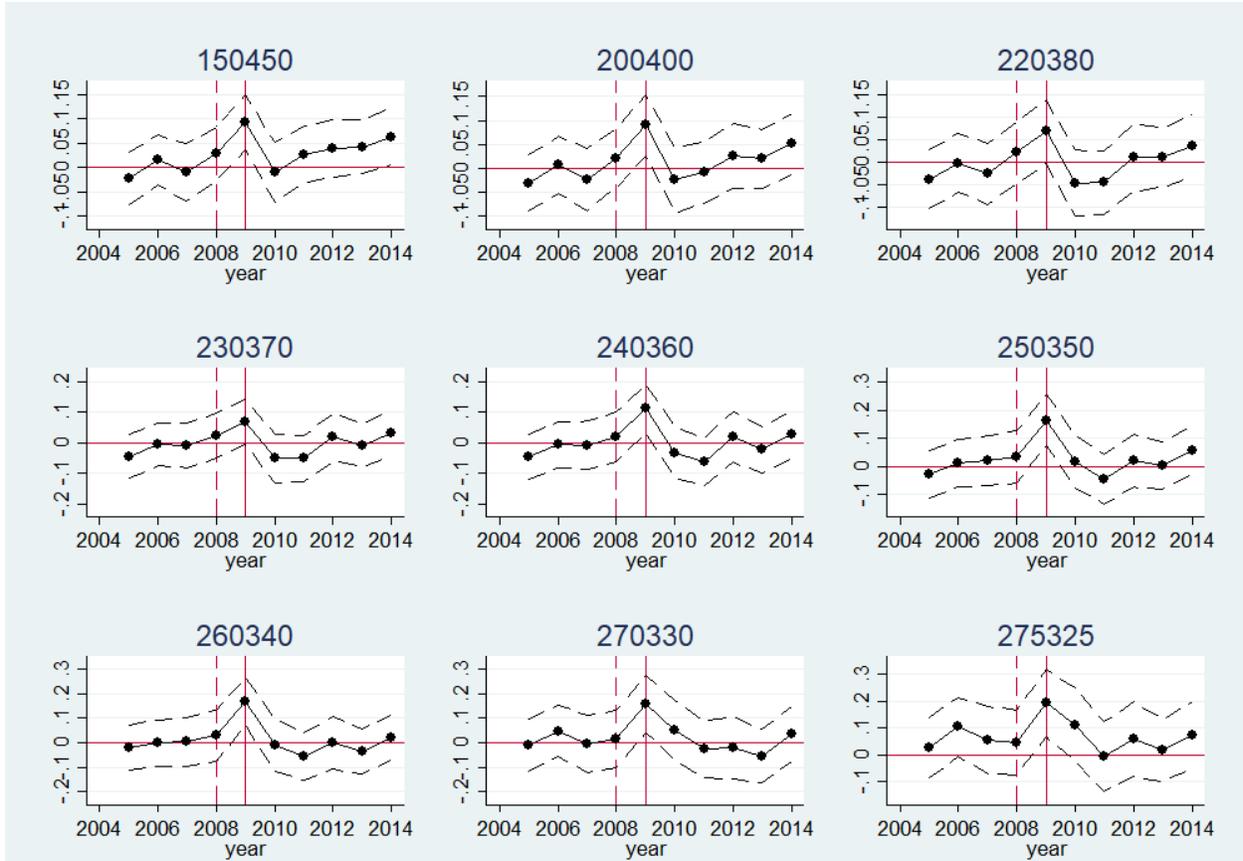
Standard errors are in parentheses. The dependent variable is net investment, which is winsorized at the 99<sup>th</sup> percentile in the first 3 columns and 95<sup>th</sup> percentile in the last 5 columns. Column (4) includes firms established after 2004; eligible firms of column (5) are between 250-350 employees, with no restrictions in assets; in addition to firms in the main analysis, the sample of column 6 also includes ineligible firms for the 2010-2012 policies; column (7) is a balanced panel data from 2004-2014; column 8 only includes firms with positive profits in 2009. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The samples of all columns except for column (6) only consist of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and eligible post-policy have similar interpretations. Cluster standard errors at the firm’s level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), revenue in 2004, and 2009-positive profits indicators in 2004 and the years from 2008 on. \* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 13: The effect of the tax cut on profits.

	95 <sup>th</sup> percentile			(4) include established04-07	(5) no restricting assets of the eligible	(6) include ineligible firms in 2010-2012	(7) balanced panel
	(1) all	(2) domestic	(3) foreign				
eligible&2008	-2.097 (61.95)	-41.25 (68.13)	13.79 (132.4)	14.11 (240.3)	51.11 (206.4)	57.96 (282.6)	19.99 (220.8)
eligible&2009	60.20 (61.97)	-31.25 (68.00)	280.6** (126.2)	626.3** (272.4)	487.0** (226.5)	718.4** (336.6)	310.8 (243.9)
eligible post-policy	46.67 (52.46)	-63.73 (51.86)	305.5*** (114.3)	540.6* (283.2)	455.8** (214.6)	629.7** (293.7)	454.0** (209.0)
Constant	281.2*** (15.07)	247.9*** (15.50)	378.9*** (34.46)	314.5*** (78.95)	404.1*** (62.71)	727.9*** (89.56)	561.4*** (90.66)
N	3596	2644	952	1260	1103	1395	803
F	3.694	5.877	2.236	3.144	2.515	11.42	1.967
r2	0.0519	0.0857	0.0625	0.123	0.0908	0.130	0.112

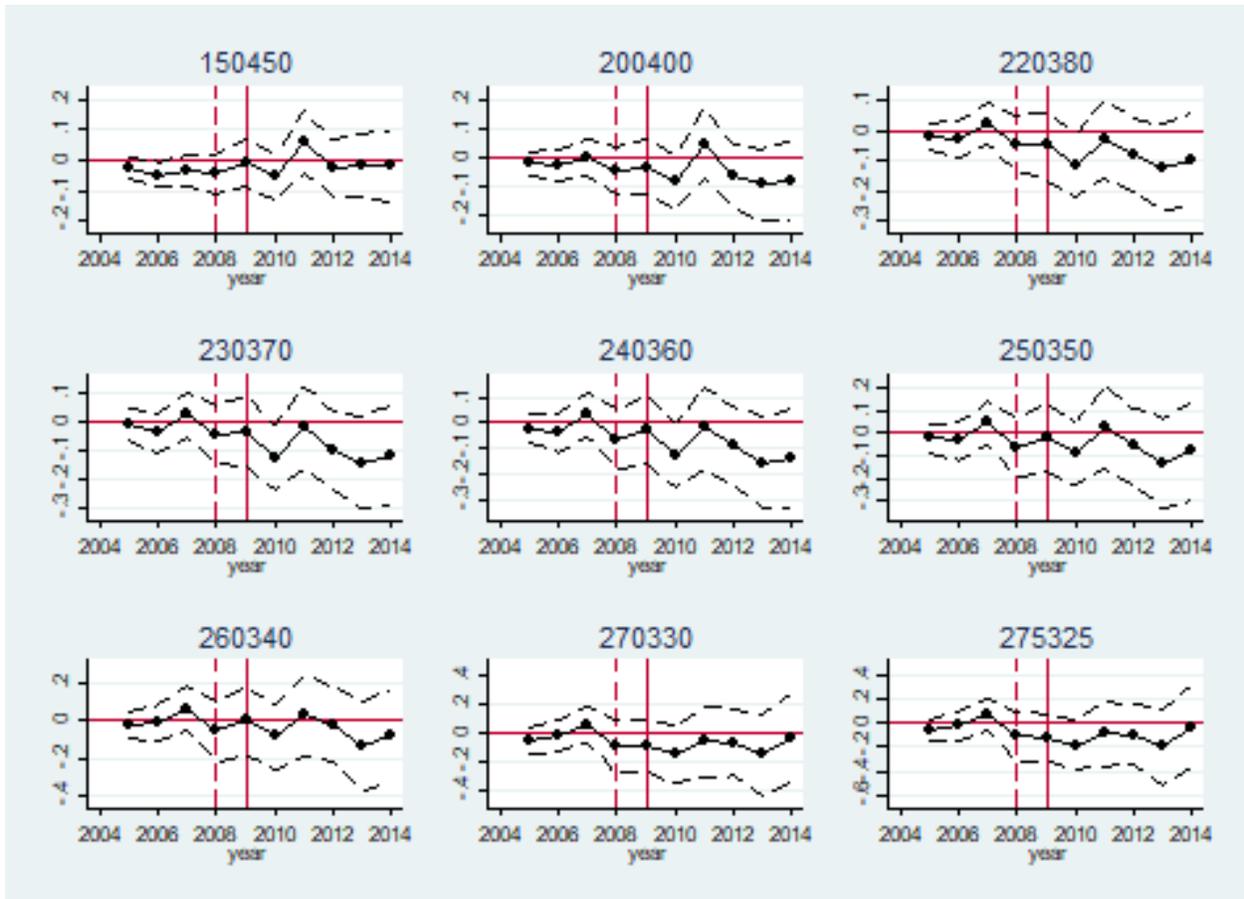
Standard errors are in parentheses. The dependent variable profits in 2005 currency and converted to dollars, which are winsorized at the 95<sup>th</sup> percentile in the first 3 columns and at the 99<sup>th</sup> percentile in the last 4 columns. I winsorize profits at a 99<sup>th</sup> percentile to avoid outliers. Column (4) includes firms established after 2004; eligible firms of column (5) are between 250-350 employees, with no restrictions in assets; in addition to firms in the main analysis, the sample of column 6 also includes ineligible firms for the 2010-2012 policies; column (7) is a balanced panel data from 2010-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The samples of all columns except for column (6) only consist of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and eligible post-policy have similar interpretations. Cluster standard errors at the firm’s level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), revenue in 2004, and 2009-positive profits indicators in 2004 and the years from 2008 on. \* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Figure 5: Investment



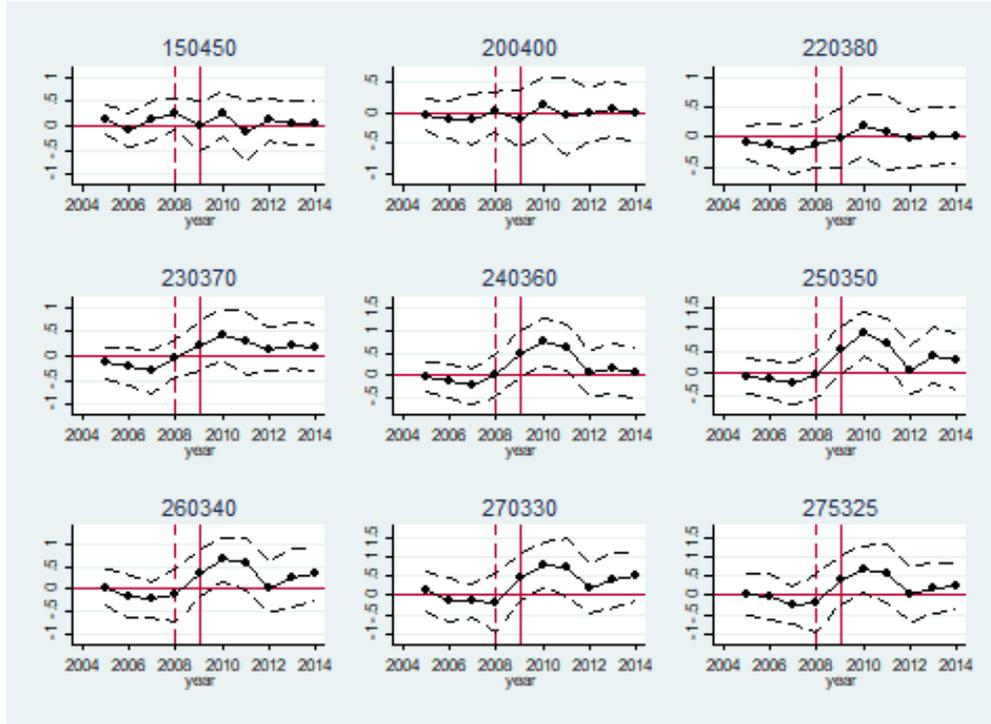
This graph plots yearly point estimates of regression equation (1) using samples from 150-450 employees (+/-150 employees from each side of the 300-employee threshold) to 275-325 employees (+/- 25 employees from each side of the eligibility). The solid lines connect the yearly point estimates. The dashed lines connect the upper and lower bounds of 90% confidence intervals. Eligible and ineligible firms are defined in Table 1. Net investment is winsorized at the 95<sup>th</sup> percentile.

Figure 6: Log number of employees

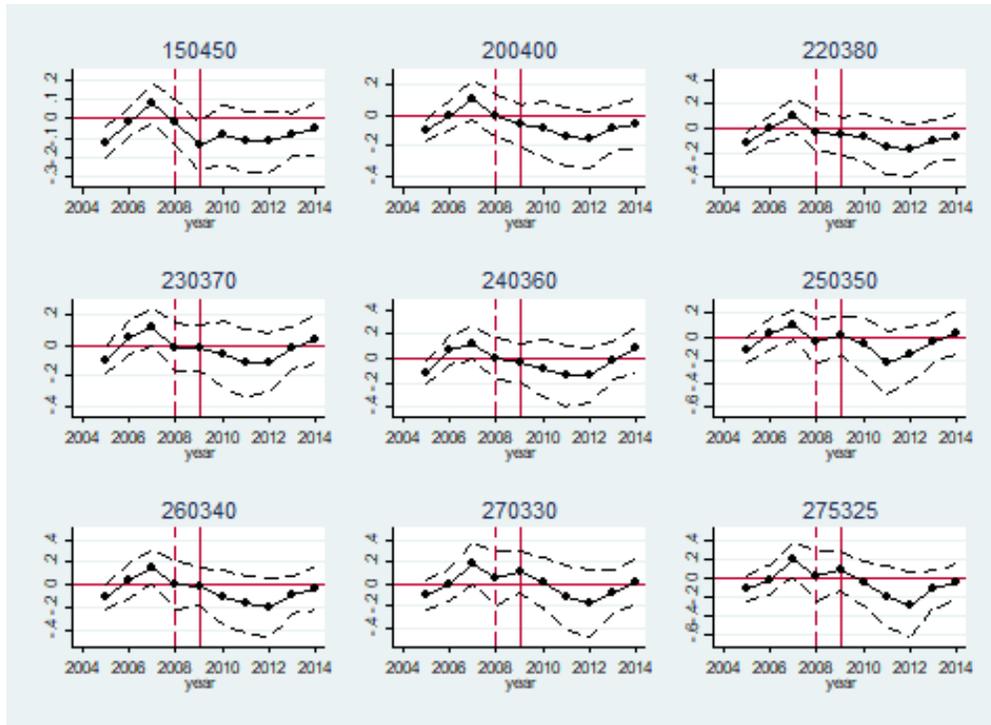


These graphs plot yearly point estimates of regression equation (1) using samples from 150-450 employees (+/-150 employees from each side of the 300-employee threshold) to 275-325 employees (+/- 25 employees from each side of the eligibility). The solid lines connect the yearly point estimates. The dashed lines connect the upper and lower bounds of 90% confidence intervals. Eligible and ineligible firms are defined in Table 1.

Figure 7: Profit results using different windows.



(a) foreign-owned firms



(b) domestic firms

This graph plots yearly point estimates of regression equation (1) using samples from 150-450 employees (+/-150 employees from each side of the 300-employee threshold) to 275-325 employees (+/- 25 employees from each side of the eligibility). The solid lines connect the yearly point estimates. The dashed lines connect the upper and lower bounds of 90% confidence intervals. Eligible and ineligible firms are defined in Table 1. Profits are winsorized at the 99 percentile.

Table 14: The Effect of the Tax Cut on Wage, Labor productivity, and Labor Educational Level

	Wage			Labor Productivity			Education		
	all	domestic	foreign	all	domestic	foreign	4years	2years	trained
eligible&2008	0.0364 (0.0406)	-0.0213 (0.0476)	0.204*** (0.0703)	0.00193 (0.0519)	-0.0584 (0.0606)	0.122 (0.0952)			
eligible&2009	0.0203 (0.0398)	-0.00910 (0.0458)	0.107 (0.0708)	0.0251 (0.0522)	-0.0146 (0.0624)	0.0936 (0.0867)	0.0103 (0.0999)	0.0620 (0.0879)	0.0469 (0.137)
eligible post-policy	0.00773 (0.0399)	-0.00200 (0.0469)	-0.00158 (0.0662)	0.0280 (0.0577)	0.0194 (0.0696)	0.0112 (0.0845)			
eligible&2011							-0.0142 (0.117)	-0.0349 (0.102)	0.116 (0.148)
Constant	0.534*** (0.0101)	0.489*** (0.0122)	0.655*** (0.0157)	5.169*** (0.0142)	5.066*** (0.0177)	5.454*** (0.0208)	2.375*** (0.0273)	2.119*** (0.0237)	0.813*** (0.0350)
N	3596	2644	952	3587	2638	949	991	992	993
F	26.74	25.31	10.09	63.32	47.56	25.83	7.709	12.55	25.33
r2	0.199	0.219	0.192	0.490	0.490	0.511	0.0974	0.151	0.276

Standard errors in parentheses. The dependent variable of the first three columns is wage, which is the average log annual salary per worker. The dependent variable of the next three columns is labor productivity, which is measured by average log revenue per worker because I do not have output per hour of all workers. The dependent variable of the last three columns is educational level. Specifically, the dependent variable of column “4years” is the number of employees with at least a bachelor degree, column “2years” is the number of employees with at least a community college degree, and column “trained” is the number of employees with at least some training. Note that data on educational level were only available in 2007, 2009, and 2011. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007 for the first 6 columns and 2007 for the last 3 columns. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2008 or 2006 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2008 or 2006 and initial assets of > 500,000 USD. The variable “eligible2008” is the interaction between the eligibility indicator and the year 2008. Variables eligible2009 and eligible post-policy have similar interpretations. Cluster standard errors at the firm’s level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), revenue in 2004, and 2009-positive profits indicators in 2004 and the years from 2008 on. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Table 15: The Effects of The Tax Cut on Net Investment Using 2008 and 2006 Employment Thresholds

	2008 employment threshold			2006 employment threshold		
	all	domestic	foreign	all	domestic	foreign
eligible&2008	0.0412 (0.0416)	0.0358 (0.0521)	0.0440 (0.0617)			
eligible&2009	0.0984** (0.0469)	0.102* (0.0611)	0.0798 (0.0526)			
eligible post-policy	0.0352 (0.0319)	0.00672 (0.0370)	0.113* (0.0634)			
eligible&2008				0.0196 (0.0371)	0.0553 (0.0441)	-0.0526 (0.0675)
eligible&2009				0.0281 (0.0446)	-0.0113 (0.0544)	0.149** (0.0630)
eligible post-policy				0.00308 (0.0260)	-0.0232 (0.0296)	0.110** (0.0522)
Constant	0.0878*** (0.00845)	0.0972*** (0.0102)	0.0616*** (0.0151)	0.0574*** (0.00707)	0.0665*** (0.00854)	0.0331*** (0.0115)
N	3206	2324	882	3826	2864	962
F	4.469	3.006	6.156	1.720	1.629	3.207
r <sup>2</sup>	0.0306	0.0312	0.0694	0.0103	0.0131	0.0422

Standard errors are in parentheses. The dependent variable is net investment, winsorized at a 95<sup>th</sup> percentile to avoid outliers. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2008 or 2006 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2008 or 2006 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and eligible post-policy have similar interpretations. Cluster standard errors at the firm’s level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), revenue in 2004, and 2009-positive profits indicators in 2004 and the years from 2008 on. \* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 16: The Effect of The Tax Cut on Profits using 2008 and 2006 Employment Thresholds.

	2008 employment threshold			2006 employment threshold		
	all	domestic	foreign	all	domestic	foreign
eligible&2008	28.69 (92.45)	88.24 (94.30)	-274.8 (231.4)			
eligible&2009	147.3 (135.9)	-27.71 (143.7)	561.8* (320.5)			
eligible post-policy	-6.838 (121.9)	-191.9 (126.6)	543.0* (321.5)			
eligible&2008				-98.86 (103.9)	-116.6 (84.31)	-131.7 (315.7)
eligible&2009				-248.2 (169.9)	-291.1*** (96.92)	-84.84 (583.3)
eligible post-policy				-222.7* (128.3)	-226.1** (109.9)	-172.4 (397.6)
Constant	341.1*** (27.95)	244.5*** (28.43)	588.0*** (69.95)	378.4*** (38.28)	270.1*** (28.66)	713.4*** (118.3)
N	3239	2343	896	3857	2886	971
F	6.861	11.62	6.155	4.158	3.845	2.462
r2	0.0874	0.113	0.110	0.0623	0.0464	0.0962

Standard errors are in parentheses. The dependent variable is profits in 2005 dollar currency, winsorized at a 99<sup>th</sup> percentile to avoid outliers. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2008 or 2006 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2008 or 2006 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and eligible post-policy have similar interpretations. Cluster standard errors at the firm’s level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), revenue in 2004, and 2009-positive profits indicators in 2004 and the years from 2008 on. \* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 17: Summary Statistics From 2004 to 2007 Among Firm with Positive Profits.

	eligible	ineligible	Total
total profit before tax	422.1 (1189.1)	434.9 (965.2)	426.5 (1117.2)
profit/lagged capital	0.324 (1.001)	0.344 (0.928)	0.331 (0.976)
fixed asset	3045.3 (3115.6)	2386.9 (2489.8)	2820.1 (2932.2)
net investment	59.75 (604.7)	114.6 (610.8)	78.53 (607.1)
net investment/lagged capital	0.0620 (0.301)	0.0870 (0.334)	0.0706 (0.313)
total labor	370.2 (260.9)	419.4 (276.0)	387.0 (267.0)
labor cost	747.4 (622.8)	785.9 (680.9)	760.6 (643.2)
annual salary per labor	2.224 (1.912)	2.027 (1.752)	2.156 (1.861)
investment/lagged capital-impute 0	0.108 (0.194)	0.143 (0.223)	0.120 (0.205)
Observations	773	402	1175
investment/lagged capital- no impute 0	0.192 (0.278)	0.259 (0.321)	0.215 (0.295)
Observations	483	252	735

Firms have between 250-350 permanent employees in 2007 and initial asset of no more than ten billion VND. Total profit before tax, fixed assets, net investment, labor cost, and annual salary per labor are in 2005 thousand USD. Total profit before tax and profit/lagged capital are winsorized at a 99<sup>th</sup> percentile. Fixed assets, annual change in fixed assets, investment measures, labor cost, and annual salary per worker are winsorized at a 95<sup>th</sup> percentile.

Table 18: The effect of the tax cut on investment among firms with positive profits and negative profits in 2009

	Positive Profit			Negative Profit		
	(1) net investment	(2) new investment imputed 0	(3) new investment no imputed 0	(4) net investment	(5) new investment imputed 0	(6) new investment no imputed 0
eligible&2008	0.0351 (0.0437)	0.0479 (0.0293)	0.0493 (0.0530)	-0.0663 (0.0978)	-0.0335 (0.0544)	0.0463 (0.136)
eligible&2009	0.151*** (0.0422)	0.0830*** (0.0287)	0.153*** (0.0516)	0.0870 (0.0767)	-0.0222 (0.0476)	-0.0430 (0.0795)
after policy	0.000634 (0.0270)	-0.00373 (0.0172)	0.0199 (0.0344)	-0.00507 (0.0817)	-0.0252 (0.0420)	-0.0622 (0.0961)
Constant	0.0526*** (0.00713)	0.112*** (0.00456)	0.200*** (0.00814)	0.0841*** (0.0193)	0.0922*** (0.0112)	0.200*** (0.0208)
N	2992	2994	1875	539	539	266
F	3.601	1.771	1.778	6.125	2.065	1.881
r2	0.0309	0.0115	0.0177	0.0875	0.0280	0.0840

Standard errors in parentheses. The dependent variables are investment capital ratios winsorized at the 95th percentile. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and “eligible post-policy” have similar interpretations. Cluster standard errors at the firm level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), and revenue in 2004 and the years from 2008 on. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Figure 8: Pre-trends of the net investment capital ratio among firms with positive profits in 2009

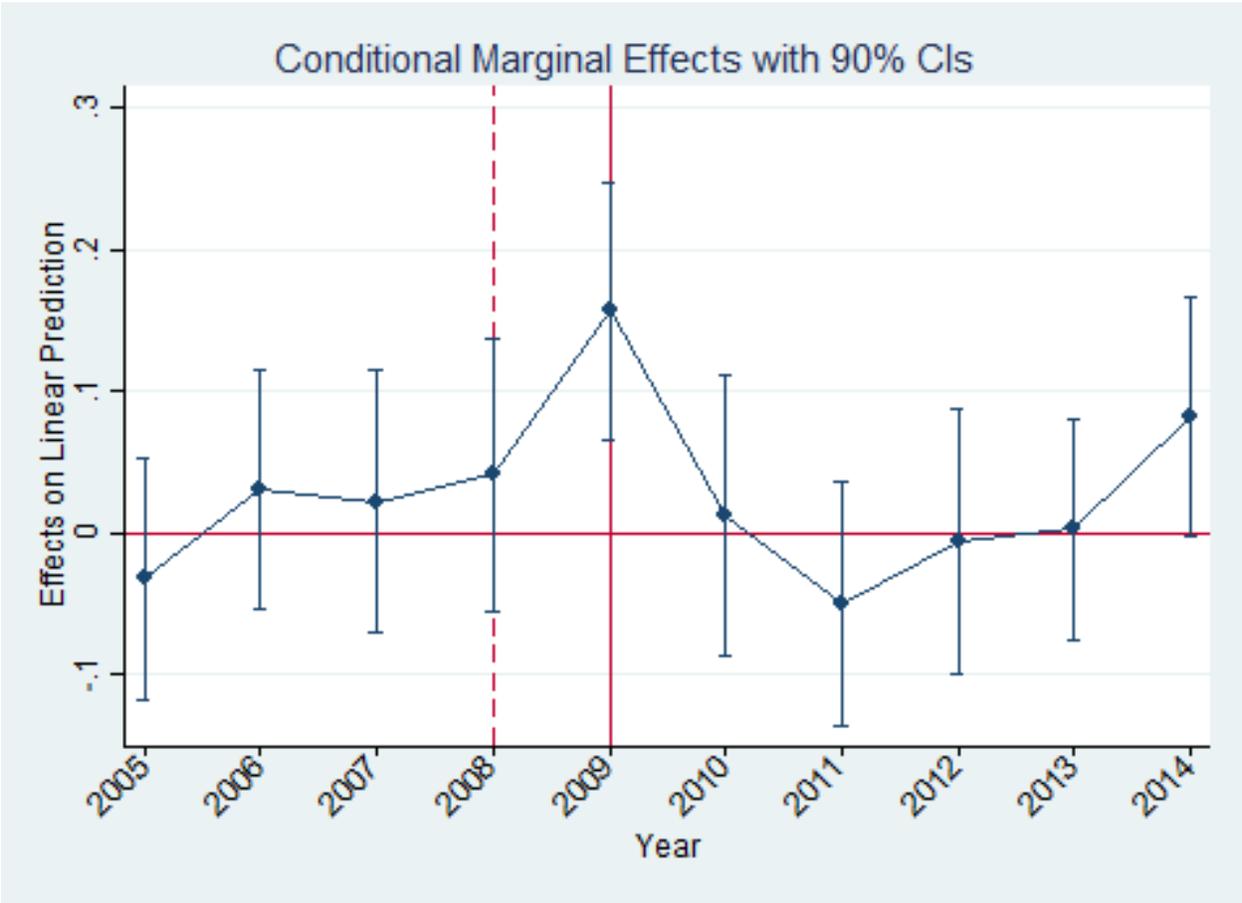


Table 19: The effect of the tax cut on the net investment capital ratio, gradually adding in the control variables

	(1)	(2)	(3)	(4)	(5)
eligible&2008	0.0101 (0.0358)	0.0282 (0.0387)	0.0197 (0.0391)	0.0215 (0.0389)	0.0238 (0.0388)
eligible&2009	0.111*** (0.0344)	0.146*** (0.0365)	0.143*** (0.0371)	0.149*** (0.0376)	0.150*** (0.0377)
after policy	0.00898 (0.0253)	0.0176 (0.0257)	0.00644 (0.0256)	0.00630 (0.0259)	0.00714 (0.0261)
Constant	0.0758*** (0.00727)	0.0580*** (0.00694)	0.0577*** (0.00682)	0.0573*** (0.00687)	0.0573*** (0.00686)
N	4383	3622	3622	3568	3568
F	5.038	5.743	5.338	4.061	3.501
r2	0.00849	0.0192	0.0242	0.0274	0.0276
Labor		yes	yes	yes	yes
Asset			yes	yes	yes
Profit				yes	yes
Revenue					yes

Standard errors in parentheses. The dependent variable is net investment capital ratio winsorized at the 95th percentile. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and “eligible post-policy” have similar interpretations. Cluster standard errors at the firm’s level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), and revenue in 2004 and the years from 2008 on. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 20: The effect of the tax cut on the new investment capital ratio without imputed zeros, gradually adding in the control variables

	(1)	(2)	(3)	(4)	(5)
eligible&2008	0.0453 (0.0448)	0.0548 (0.0473)	0.0495 (0.0467)	0.0517 (0.0482)	0.0508 (0.0482)
eligible&2009	0.105** (0.0419)	0.134*** (0.0445)	0.128*** (0.0453)	0.134*** (0.0462)	0.137*** (0.0459)
after policy	0.0173 (0.0299)	0.0160 (0.0311)	0.00878 (0.0312)	0.0114 (0.0319)	0.0117 (0.0320)
Constant	0.214*** (0.00813)	0.199*** (0.00766)	0.199*** (0.00754)	0.200*** (0.00758)	0.200*** (0.00760)
N	2576	2177	2177	2156	2156
F	2.198	2.182	2.272	1.677	1.656
r2	0.00560	0.00918	0.0109	0.0132	0.0135
Labor		yes	yes	yes	yes
Asset			yes	yes	yes
Profit				yes	yes
Revenue					yes

Standard errors in parentheses. The dependent variable is new investment capital ratio without imputed zeros winsorized at the 95th percentile. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and “eligible post-policy” have similar interpretations. Cluster standard errors at the firm’s level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), and revenue in 2004 and the years from 2008 on. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 21: The effect of the tax cut on the new investment capital ratio with imputed zeros, gradually adding in the control variables

	(1)	(2)	(3)	(4)	(5)
eligible&2008	0.0278 (0.0228)	0.0395 (0.0248)	0.0378 (0.0246)	0.0388 (0.0252)	0.0383 (0.0253)
eligible&2009	0.0503** (0.0220)	0.0661*** (0.0238)	0.0631** (0.0244)	0.0675*** (0.0250)	0.0683*** (0.0249)
after policy	-0.00356 (0.0145)	-0.00224 (0.0156)	-0.00653 (0.0156)	-0.00558 (0.0159)	-0.00526 (0.0158)
Constant	0.110*** (0.00416)	0.108*** (0.00419)	0.107*** (0.00415)	0.108*** (0.00419)	0.108*** (0.00420)
N	4386	3624	3624	3570	3570
F	2.936	2.109	2.350	1.860	1.751
r2	0.00507	0.00627	0.00793	0.00923	0.00944
Labor		yes	yes	yes	yes
Asset			yes	yes	yes
Profit				yes	yes
Revenue					yes

Standard errors in parentheses. The dependent variable is new investment capital ratio with imputed zeros winsorized at the 95th percentile. Unbalanced panel data from 2004-2014. Method: difference-in-differences approach with firm fixed effects regressions. The policy was implemented in the last quarter of 2008 and the whole year of 2009. Base years were from 2004 to 2007. Treatment years: from 2008 to 2014. Observations are firms of different ownership structure. The sample only consists of firms that are not differentially affected by policies after 2009. Eligible firms had no more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. Ineligible firms had more than 300 long-term employees in 2007 and initial assets of > 500,000 USD. The variable “eligible&2008” is the interaction between the eligibility indicator and the year 2008. Variables eligible&2009 and “eligible post-policy” have similar interpretations. Cluster standard errors at the firm’s level. Control variables are interactions between profits in 2004, total original fixed assets in 2004, labor in 2004 (if the dependent variable is not labor or asset), and revenue in 2004 and the years from 2008 on. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .