Fiscal Incentives for Hiring Female Workers? Evidence from Vietnam

Duy Duong

Abstract

I study the effect of a two-percentage point corporate tax reduction on female employment and wages across small and medium-sized firms in Vietnam. Using a nationally representative survey of Vietnamese firms, I employ a difference-in-differences strategy and find that firms eligible for this two-percentage point reduction do not significantly change their share of female workers or the total number of female workers. However, I do find that at the employee level, the presence of a tax reduction allows eligible firms to increase wages for the female workers by 69 percent relative to male workers and women at ineligible firms. Intuitively, this suggests that a corporate tax reduction might not increase female labor demand, but it could increase welfare for current female workers via higher compensation.

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Introduction

Given the lowered worldwide average corporate tax rate, the economic literature has been overwhelmed by theoretical and empirical evidence of its expansionary effect on total economic output and its positive impact on firms' various investment channels. Little attention, however, has been given to studying the impact of such a tax change on the labor market, and even less attention has been devoted to understanding its role in developing economies. To inform future studies and discussions, this study asks whether a corporate tax reduction for small and medium-sized firms increases or decreases the labor demand, particularly for female workers, and wage rates. This population is of particular interest because of its sizable share in the Vietnamese labor market and its important economic implications.[1] The findings in this paper can provide insights on future research or policy actions that can support the female Vietnamese labor force.

To identify a causal relationship between corporate tax reduction and employment and wages, I rely on a unique tax reduction provided to firms meeting an eligibility requirement on revenue and labor size. This paper examines Vietnam's corporate income tax (CIT) between 2014 and 2016. The standard CIT was 22% for most firms during this period; however, a 20% CIT rate applied to small- and medium-sized firms with less than 200 full-time employees and annual revenue not exceeding VND 20 billion (or approximately US$900,000 at current exchange rate). This difference in tax rates could adjust the resources of a firm, which can in turn affect hiring practices. I exploit this difference to examine whether an effective tax reduction causes any variation in firms' female labor demand.

However, two concerns arise from using tax policies as an exogenous factor. First, there are many variables contributing to the variation in both tax changes and employment levels. For instance, a tax cut might be triggered to stimulate investment and employment. Then, low levels of investment are likely associated with low employment and a higher probability of reduced taxes, which introduced bias to the coefficient estimates. Second, causality might occur in reverse. Low levels of employment and output at the state-level or country-level might incentivize the government to adjust tax rates, which could further attenuate coefficient estimates. As a result, an effective model must account for issues of omitted variable bias and reverse causality due to the endogenous nature of tax changes.

I use the Vietnam Small and Medium Enterprises survey (Vietnam SME), which is available via the publicly accessible database at the United Nations University (UNU-WIDER). I follow Pham and Ljungqvist & Smolyansky and use a difference-in-differences identification strategy to identify the causal effect of corporate tax reduction on female labor demand.[23] The control group consists of firms marginally above the eligibility threshold for the unique reduction, and the treatment group consists of firms marginally meeting the requirement. To reduce the risk of omitted variable bias, I include provincial fixed effect and controls at the firm-level, which accounts for any time-invariant characteristics common among firms in a province. I also construct a triple-difference estimate for female workers at an eligible firm (where male workers at an ineligible firm are the counterfactual) to observe any effects on worker's welfare, such as wage rate.

The channel through which corporate taxation can affect female labor demand and wages can be subtle and ambiguous in theory. For example, a decrease in corporate tax rate increases a firm's retained earnings via higher net profits. With the additional cash flow, a firm can engage in a variety of expenditures or investment activities, some of which can influence its female labor demand. If a firm is simply interested in increasing its output level, it can do so by directly increasing its labor inputs; the only trade-off is that marginal output diminishes with every additional unit of labor. This applies an upward pressure on labor demand, and if female labor supply is already low, it will likely increase. If a firm decides to increase total factor productivity, e.g. by adopting new technology or investing in human capital, then labor inputs can respond directly or inversely depending on the complementarity or substitutability of labor inputs and technology advancement. However, a reduced corporate tax might not affect labor demand at all, if firms choose to spend the additional cash elsewhere, such as reducing outstanding debt.[45] In terms of wages, increased cash flow, if allocated to additional research and development, could be either labor-augmenting (increase labor demand) and increase wages, or labor-saving (decrease labor demand) and decrease wages. In short, the relationship between corporate tax versus female labor demand and wages is theoretically ambiguous, and quantifying this relationship is an empirical question.

While literature specifically addressing female labor demand in developing countries in response to tax changes is sparse, there is literature addressing these aspects separately. In terms of the impacts of taxes on labor demand, empirical evidence has not found consensus regarding direction and magnitude. Pham studies the effect of a temporary corporate tax cut in Vietnam following the Great Recession and finds that for domestic firms, there are no changes in capital, labor and profits.[6] Ljungqvist and Smolyansky exploit variation in corporate tax rates between counties straddling across a U.S. state border and find that a reduction in corporate tax rate does not boost employment and wages. However, they establish that the effect of tax changes is not linear throughout, since an increase in corporate taxation discourages employment and lowers wages.[7] Da Rin et al. use panel data of European firms to study how labor inputs, relatively to capital inputs, increase for every unit of reduction in the effective corporate tax rate, but this effect is ambiguous in absolute terms.[8] However, when Shuai & Chmura study employment growth in the U.S., rather than employment levels, they find that a corporate tax cut is significantly associated with faster job creation.[9]

Other related literature includes Bishop & Montgomery (1993) and Faulk (2002). Both papers study the impact of an employment tax credit on labor demand. Bishop & Montgomery focus on the Targeted Job Tax Credit (TJTC) and find that the subsidy incentivizes employers to hire younger workers. However, most claims for the tax credits are for workers who would have been hired in absence of the program.[10] Faulk examines the Georgia's Jobs Tax Credit program and discovers that firms participating the program create 25 percent more jobs than eligible firms that do not participate.[11]

Finally, this paper also speaks to literature studying changes in female labor supply in response to tax adjustments. For example, Bosch & van der Klaauw study the 2001 Dutch tax reform and how it lowers the fixed cost of working for married women with high-income partners. As a result, the reform has a positive, significant impact on female labor force participation.[12]

My own contribution with this paper primarily comes from the combined analysis of three elements: corporate tax reduction and female labor demand in a developing economy. There are also some minor differences. For example, while my paper shares Pham's examination

of Vietnamese firms, it differs in terms of methodology: I exploit a *permanent* change in corporate tax rate, rather than a temporary adjustment. This paper also differs from Bishop & Montgomery and Faulk in that it studies a general corporate tax reduction, instead of a specific type of tax credit.

The rest of this paper is organized as follows. Section 2 presents the data and methodology, including a detailed description of the endogeneity concern and identifying assumptions. Section 3 discusses the main regression results and secondary findings. Section 4 addresses some robustness checks. Section 5 concludes with some policy implications.

Data and Methodology

Datasets

This paper uses the Vietnam Small and Medium Enterprises surveys (Vietnam SME), collected biennially between June and August by the Central Institute for Economic Management (CIEM), the Institute of Labour Science and Social Affairs (ILSSA), the Development Economics Research Group (DERG) at the University of Copenhagen, and the United Nations University (UNU-WIDER). Data are available for 2011, 2013 and 2015. The surveys report a representative sample of firms across 18 sectors in ten provinces of the country: Hanoi, Ha Tay, Hai Phong, Ho Chi Minh City, Phu Tho, Nghe An, Quang Nam, Khanh Hoa, Lam Dong, and Long An. Stratified sampling allows for a balanced sample of firms in each province of different ownership forms.

For each year's survey, there are three modules: enterprise, economic, and employee. The enterprise module reports on firm's performance, history, employment, business environment, and demographic information about the owner. The employee module collects information on educational background, work experiences, union membership, and household characteristics of a representative sample of employees. Finally, the economic module lists revenues, expenses, asset, liability, and capital accounts of firms.

Control and Treatment Groups

Based on Decree No. 32/2013/QH13, the unique CIT rate of 20% only applies to firms whose total number of full-time employees is below 200 and annual revenue not exceeding VND

20 billion. Then, the treatment group consists of firms whose labor size and nominal revenue are below the mentioned threshold. Firms not meeting either requirements make up the control group.

Without any restriction, the control and treatment groups are extremely unbalanced. Particularly, only 9 percent of the observations in 2013 and 2015 belongs to the control group, and 91 percent belongs to the treatment group. To re-balance the samples, I restrict the sample to only firms with at least 50 employees and at most 500 employees. This returns a sample of 346 observations for years 2013 and 2015, with 60 percent of the sample are control firms and 40 percent are treatment firms.[13]

Identification Strategy for Enterprise Regression

I pursue a difference-in-differences identification strategy. The first difference compares firms that were not eligible for a differential tax treatment (control group) and firms eligible for the differential tax treatment (treatment group). The second difference compares firms before and after the tax change; the timing of the Vietnam SME surveys allows me to use 2013 as pre-treatment and 2015 as post-treatment. The difference-in-difference estimate of the effect of a CIT reduction (β_1) is estimated by the following regression:

$$(1)\quad y_{idc} = \beta_0 + \beta_1 Post_{idc} \times Treat_{idc} + \beta_2 Post_{idc} + \beta_3 Treat_{idc} + \beta_4 X_{idc} + \delta_c + \varepsilon_{idc}$$

where y_{idc} is the outcome variable of interest, corresponding to a firm i in district d in province c; $Post_{idc}$ is an indicator for being in 2015; $Treat_{idc}$ is an indicator for being in the treatment group (i.e. eligible for the differential tax treatment); X_{idc} is a set of controls for firm's characteristics; δ_c is a fixed-effect at the provincial level, to account for any time-invariant differences common among firms in each of the ten provinces. Standard errors are robust to heteroscedasticity and clustered at the district-level.

By estimating any causal relationship at the enterprise-level, my main assumption requires that policymakers make decisions independently of a single firm's female employment levels. If the difference-in-differences regression is estimated at any level greater than the firm-level, such as district-level or province-level, then it might run the risk of reverse causality. For example, if two largest provinces of the country like Hanoi and HCMC have low level of female

employment, then policymakers might be encouraged to adjust current laws to boost employment. This would bias our coefficient estimate downward.

The use of fixed effect at the provincial level and other controls at the firm-level minimizes omitted variable bias. Suppose a firm in Hanoi is more likely to hire female workers than a firm in Ha Tay because of some inherent differences between the two provinces, e.g. urban versus rural. If urban firms are also more affected by tax changes than rural firms, then the coefficient estimate is biased upward. The inclusion of province fixed-effect corrects for this bias. Suppose certain characteristics at the firm-level are also correlated with female employment and tax changes, then the inclusion of firm-level controls corrects for this bias as well.

Table 1–Descriptive Statistics, Enterprise-level Data: 2011 and 2013

	Control Firms			Treatment Firms		
VARIABLES	N	Mean	SD	N	Mean	SD
Panel A: Outcome Variables						
Share of Female Workers	87	0.437	0.216	75	0.515	0.255
Total Female Workers	87	53.10	45.63	75	46.87	37.23
Panel B: Explanatory Variables						
Total Labor Force	87	117.0	69.41	75	86.95	39.47
Share of Union Workers	68	0.782	0.226	46	0.802	0.230
Firm Investment (million VND)	87	6,713	11,543	75	2,104	3,588
Access to Road	87	0.943	0.234	75	0.947	0.226
Net Profit per Worker +1 (log)	75	3.384	1.301	68	1.913	1.074
Asset per Worker + 1 (log)	87	5.241	0.970	75	4.349	1.119
Debt per Worker + 1 (log)	68	3.425	1.512	51	2.432	1.364
Tax Payment per Worker + 1 (log)	87	1.897	1.115	75	1.469	0.997

Notes: Data have been restricted to include only observations closely positioned around the threshold of 200. The remaining observations included firms whose sizes range from 50 employees to 500 employees; the choice of bounds was arbitrary and only reflected a more balanced sample for control and treatment firms.

To better understand the characteristics of the control and treatment firms before the policy, I provide summary statistics of control and treatment firms in Table 1. The outcome variables of interest in this regression are share of female workers and total female workers. Control firms appear to have a lower share of female workers, but higher total number of female workers than treatment firms. However, these differences are not statistically significant. With my definition of treatment group, the control firms clearly have a large labor size on average. As a result, the output potential for control firms is larger, as seen in their higher investment, net profit, asset, debt, and tax payment.

Figure 1. Parallel Trends, Average Share of Female Labor

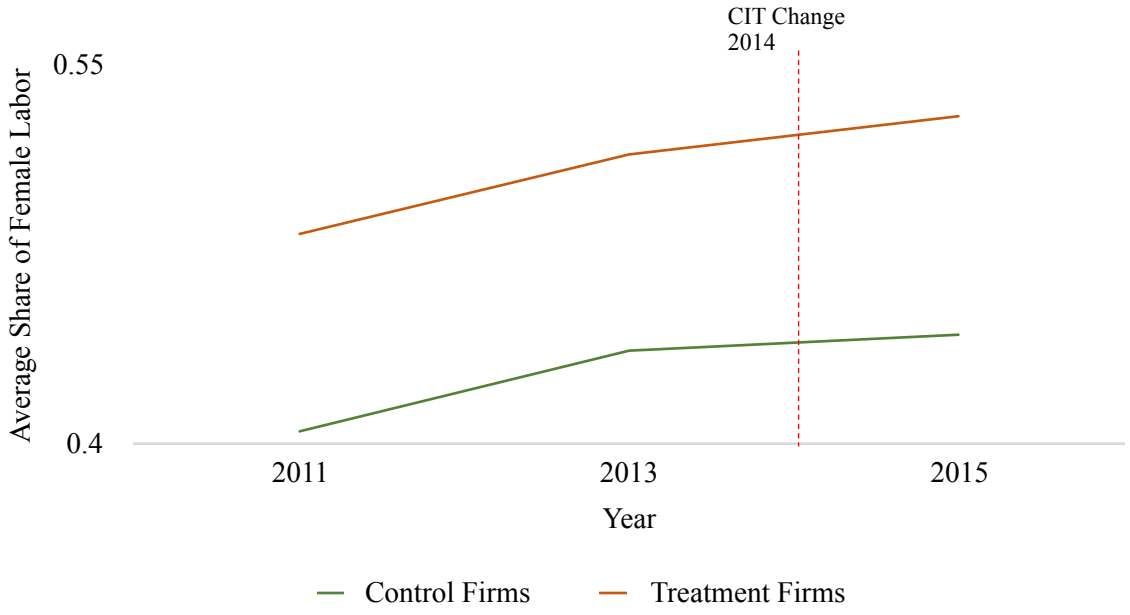

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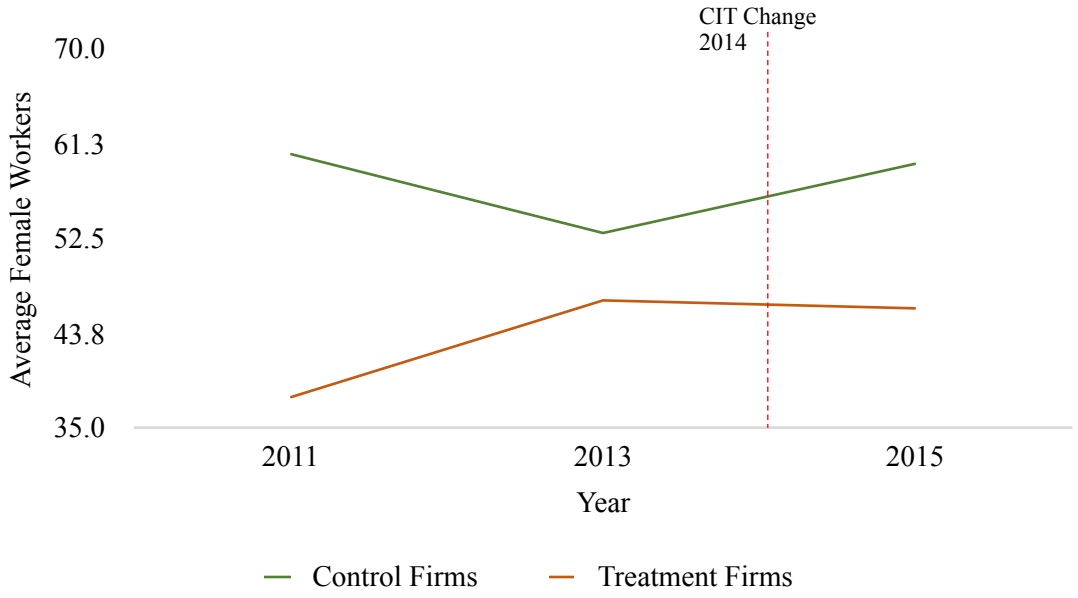
Figure 2. Parallel Trends, Average Female Workers



I test for the parallel trends between control firms and treatment firms' share of female labor and total female workers prior to the CIT change. Figure 1 visualizes the parallel trend for average share of female labor between the control and treatment firms, and fails to reject the null hypothesis that there is a parallel trend. Figure 2 visualizes the parallel trends for average female workers, and rejects the null hypothesis. The lack of parallel trend in growth of total female workers between the control and treatment firms violates the assumption of the difference-in-differences identification, and the coefficient estimates should only be taken as suggestive.

Identification Strategy for Employee Regression

To estimate the effect the tax change at the employee-level, I construct a triple difference estimate, similar to what Muralidharan & Prakash use to estimate the effect of the Cycle program on girl's average schooling.[14] The first difference is between eligible and ineligible firms; the second difference compares outcomes before and after implementation of the tax change. The third difference compares female and male workers. Then, the triple difference estimate (β_1) of the effects of a CIT change is as follows:

$$(2)\ y_{ijdc} = \beta_0 + \beta_1 Post_{ijdc} \times Treat_{ijdc} \times Female_{ijdc} + \beta_2 Post_{ijdc} \times Female_{ijdc} + \beta_3 Treat_{ijdc} \times Female_{ijdc} + \beta_4 Post_{ijdc} \times Treat_{ijdc} + \beta_5 Post_{ijdc} + \beta_6 Treat_{ijdc} + \beta_7 Female_{ijdc} + \omega_j + \beta_8 C_{ijdc} + \beta_9 D_{ijdc} + \varepsilon_{ijdc}$$

where y_{ijdc} is the outcome variable for a worker *i* at firm *j* in district *d* and province *c*; $Post_{ijdc}$ is an indicator for being in 2015; $Treat_{ijdc}$ is an indicator for being in the treatment group; $Female_{ijdc}$ is an indicator taking a value of 1 if the worker is female, and 0 if the worker is male. ω_j is a fixed-effect at the firm-level, which accounts for common time-invariant characteristics among workers in a firm. C_{ijdc} is a set of controls for job characteristics, and D_{ijdc} is a set of controls for worker demographics; the inclusion of these terms minimizes the risk of omitted variable bias and prevents intensifying the coefficient estimate. Standard errors are robust to heteroscedasticity.

Table 2–Descriptive Statistics, Employee-level Data: 2011 and 2013

	Male			Female		
VARIABLES	N	Mean	SD	N	Mean	SD
Panel A: Outcome Variables						
Monthly Wage in 1000 VND	213	7,327	49,655	233	3,683	1,626
Derived monthly wage (log)	213	8.222	0.516	233	8.131	0.394
Panel B: Explanatory Variables						
Age	214	34.18	8.253	233	32.01	8.035
Employee has formal labor contract	214	0.930	0.256	233	0.936	0.246
Number of years working at current firm	214	6.439	4.504	233	6.004	5.481
Employee lives and works in same province	214	0.771	0.421	233	0.815	0.389
Employee receives on-the-job training	214	0.477	0.501	233	0.343	0.476
Employee is a union member	126	0.825	0.381	159	0.893	0.310
Employee owns a house	214	0.710	0.455	233	0.742	0.438

Notes: Data have been restricted to include only employees working at firms whose total labor size is close to 200. The remaining observations included employees in firms whose sizes range from 50 employees to 500 employees; the choice of bounds was arbitrary and only reflected a more balanced sample for control and treatment firms.

I provide summary statistics for male and female workers in 2011 and 2013 in Table 2, to observe any differences between the two groups prior to the tax change. I observe that prior to the tax change, female workers earn 4 million VND less than male workers every month (approximately $175 at the current exchange rate). However, other attributes such as average age, years working at current firm, union membership, and homeownership are very similar between the two groups. For the triple-difference regression, the main outcome variable of interest is the log of monthly wage rate, derived by scaling hourly, daily, and weekly wages to a monthly basis.[15] The log-transformation is used since the distribution of wages is highly right-skewed.

Table 3–Testing Parallel Trends Assumption, Triple Difference Estimate

	(1)
VARIABLES	Derived Monthly Wage (log)
Post x Treated x Female	-0.256
	(0.158)
Post x Female	0.119
	(0.101)
Treated x Female	-0.0684
	(0.105)
Post x Treated	0.219
	(0.161)
Post	0.207*
	(0.110)
Treated	0.232*
	(0.138)

Female	-0.127*
	(0.0703)
Constant	8.032***
	(0.464)
Observations	210
R-squared	0.766

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Regression includes firm fixed-effect and controls for job characteristics and worker demographics. These include job junctions, whether the worker has a formal contract, number of years working in current firm, whether the worker's residence is in the same province as the firm, whether the worker receives on-the-job training, and the sector of the worker's previous job, as well as relationship with owner, age, education level, whether the worker is in a union, house ownership status, and type of housing. Standard errors are robust.

I test for parallel trends between female workers in eligible firms and male workers in ineligible firms by derived wage rate for the years prior to the CIT change. Since a triple difference estimate can be difficult to visualize, result for the test of parallel trends is summarized in Table 3. I find that the coefficient for the triple interaction term is not significantly different from zero, and do not reject the null hypothesis that there is a parallel trend in wages between female workers in eligible firms and male workers in ineligible firms.

Results

Impact on Female Labor Demand

The difference-in-differences estimates for the impact of the CIT reduction based on equation (1) are presented in Table 4. Column 1 and 2 present the effect of a two-percentage points reduction in CIT on share of female labor. Column 3 and 4 present the effect of the CIT reduction on total female workers. The estimates with only province fixed-effect are presented in column 1 and 3. The estimates with province fixed-effect and controls for firm's characteristics are presented in column 2 and 4. My preferred method will be the difference-in-differences regression with both province fixed-effect and firm-level controls.

Table 4–Diff-in-diff Regression for Share of Female Labor and Total Female Workers

	Share of Female Labor		Total Female Workers	
VARIABLES	(1)	(2)	(3)	(4)
Post x Treated	0.0169	-0.0137	-7.110	-6.185
	(0.0476)	(0.0657)	(7.704)	(8.477)
Post	0.000659	0.0584	5.086	11.23**
	(0.0233)	(0.0379)	(6.060)	(4.803)
Treated	0.0703**	0.0778	-6.785	8.952
	(0.0340)	(0.0580)	(6.049)	(6.513)
Constant	0.399***	0.764***	46.56***	11.94
	(0.0247)	(0.162)	(6.367)	(29.32)
Observations	346	170	346	170
R-squared	0.079	0.231	0.065	0.608
Controls for Firms' Characteristics	No	Yes	No	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: All regressions include province fixed-effect; other controls for firm's characteristics include total labor size, firm's investment (in million VND), log of last year's debt (in million VND) per worker (plus one), log of last year's asset (in million VND) per worker (plus one), log of last year's net profit (in million VND) per worker (plus one), log of last year's tax payment (in million VND) per worker (plus one), share of union workers and whether firms have road access. Robust standard errors are clustered at the district level.

Table 4 shows that the additional two-percentage points reduction in CIT reduces the share of a firm's female labor by 1 percentage point and the total number of female workers by 6 workers. However, the estimates of β_1 do not significantly differ from zero, which suggests that eligibility for the differential CIT rate does not affect firms' female labor size. A few points are worth noting:

When estimating for share of female labor, the β_1 estimate falls by 0.02 when including controls for firm's characteristics, from 0.017 to -0.014, which raises concerns over omitted variables even though the parallel trends assumption is met. In addition, the sign of β_1 changes from positive to negative, but since its magnitude remains relatively close to zero, I conclude that the effect of the CIT reduction is ambiguous or absent.

When estimating for total number of female workers, the β_1 estimate falls from -7.11 to -6.19. However, both coefficient estimates are statistically insignificant, and since the parallel trends assumption does not hold, the result should only be suggestive.

Impact on Female Workers' Wages

To study the effect of the CIT reduction on employees, I use equation (2) to estimate the impact of a firm being eligible on its worker's derived monthly wage. Table 5 presents the triple difference coefficient estimates without any controls (column 1), with controls for job characteristics (column 2), with controls for worker demographics (column 3), and with both types of control (column 4). All four regressions include a firm fixed-effect to account for any common time-invariant attributes of workers in a single firm.

The inclusion of controls for job characteristics raises the β_1 estimate from 0.236 to 0.386 (column 1 to column 2). This might suggest that job characteristics are correlated with being a female worker in an eligible firm and with a worker's wage rate, but in different direction. For example, female workers at an eligible firm might be more likely to live and work in the same province, but workers who live in the same province generally receive lower wages, since employers do not need to compensate for traveling expenses.

The inclusion of worker demographics also increases the estimated β_1 coefficient from 0.236 to 0.439 (column 1 to column 3). Then, worker demographics are also correlated with worker's gender in an eligible firm and with wage rate, and in opposite direction. For instance, having a better education will likely raise wage rate, but male workers on average might have higher educational attainment than female in Vietnam.

When including both types of controls, the estimated coefficient β_1 increases from 0.236 to 0.688 (column 1 to column 4), and becomes statistically significant at the 1% level. Then,

including both controls in the model must further explain the remaining variation in wage rates, and it is ideal to include them in later regressions. In the context of the paper, when considering common time-invariant attributes of workers in a single firm and other characteristics of the workers' job and demographic, an additional two-percentage points reduction in CIT rate leads to an increase of 69% in monthly wage rate for female workers (relative to male workers at an ineligible firm).

Robustness Checks

Selection Bias

It is possible that firms can adjust their hiring decision prior to the implementation of the CIT change. This would lead to a selection bias, where firms whose labor size and annual revenue are near the threshold might contract their output and employment to receive the additional tax benefits. One solution is to identify eligibility of a firm prior to the announcement of the tax change, assuming the eligibility status of firms remains constant prior to and after the announcement of the pending tax change.

Table 5–Triple Difference Regression for Derived Monthly Wage (log)

	Derived Monthly Wage (log)			
VARIABLES	(1)	(2)	(3)	(4)
Post x Treated x Female	0.236	0.386**	0.439**	0.688***
	(0.144)	(0.159)	(0.208)	(0.226)
Post x Female	-0.219**	-0.226**	-0.177	-0.188
	(0.0960)	(0.111)	(0.126)	(0.141)
Treated x Female	-0.0689	-0.215*	-0.382**	-0.476***
	(0.100)	(0.121)	(0.189)	(0.167)
Post x Treated	-0.215	-0.174	-0.374	-0.476
	(0.160)	(0.151)	(0.245)	(0.404)

Post	0.354***	0.375***	0.414***	0.422***
	(0.124)	(0.143)	(0.151)	(0.131)
Treated	-0.161	0.0390	-0.256	-0.153
	(0.164)	(0.256)	(0.310)	(0.305)
Female	0.0211	0.0711	0.0383	0.0564
	(0.0605)	(0.0817)	(0.0955)	(0.0995)
Constant	8.876***	8.851***	7.440***	8.239***
	(0.180)	(0.389)	(0.652)	(0.688)
Observations	442	313	283	205
R-squared	0.597	0.676	0.641	0.751
Controls for Job Characteristics	No	Yes	No	Yes
Controls for Worker Demographics	No	No	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: All regressions include firm fixed-effect; controls for job characteristics include job functions, whether the worker has a formal contract, number of years working in current firm, whether the worker's residence is in the same province as the firm, whether the worker receives on-the-job training, and the sector of the worker's previous job; controls for worker demographics include relationship with owner, age, education level, whether the worker is in a union, house ownership status, and type of housing.

First, I set up a panel data of firms with data in both 2013 and 2015. I then determined a firm to be “eligible” if their labor size in 2013 is less than 200 employees and their annual revenue in 2013 is less than 20 billion VND. Eligibility status for a firm will be carried over to that same firm in year 2015. Then, equation (1) and (2) will be used to estimate the regressions on share of female labor and log of derived monthly wage. Table 6 and Table 7 present the regression results.

Table 6–Testing for Selection Bias, Enterprise-level

VARIABLES	(1) Share of Female Labor
Post x Treated	-0.0276
	(0.0733)
Post	0.0440
	(0.0400)
Treated	0.0340
	(0.0775)
Constant	0.957***
	(0.257)
Observations	116
R-squared	0.226

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Regression includes province fixed-effect and other controls for firm's characteristics: total labor size, firm's investment (in million VND), log of last year's debt (in million VND) per worker (plus one), log of last year's asset (in million VND) per worker (plus one), log of last year's net profit (in million VND) per worker (plus one), log of last year's tax payment (in million VND) per worker (plus one), share of union workers and whether firms have road access. Robust standard errors are clustered at the district level.

Table 7–Testing for Selection Bias, Employee-level

VARIABLES	(1) Derived Monthly Wage (log)
Post x Treated x Female	0.601*

	(0.338)
Post x Female	-0.158
	(0.161)
Treated x Female	-0.220
	(0.191)
Post x Treated	-0.105
	(0.355)
Post	0.449***
	(0.143)
Treated	0.168
	(0.265)
Female	0.0992
	(0.110)
Constant	8.302***
	(0.930)
Observations	153
R-squared	0.798

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Regression includes firm fixed-effect, controls for job characteristics and worker demographics. Controls for job characteristics include job junctions, whether the worker has a formal contract, number of years working in current firm, whether the worker's residence is in the same province as the firm, whether the worker receives on-the-job training, and the sector of the worker's previous job. Controls for worker demographics include relationship with owner, age, education level, whether the worker is in a union, house ownership status, and type of housing.

If there is selection bias, then we might expect the coefficient estimate in Table 4 column 2 to be more negative if firms intentionally fire workers to reduce labor size. However, the new estimation of β_1 in Table 6 is -0.0276, which is very similar to, if not smaller than the β_1 estimation of -0.0137 in Table 4. This suggests that firms might not intentionally contract their

output and employment to receive differential tax treatment. In addition, since both estimations are statistically insignificant, I conclude that selection bias does not significantly influence the regression results.

Similarly, if selection bias significantly influences female worker's wages, then we would observe a drastic change in the coefficient estimate β_1 in equation (2) from Table 5 to Table 7. However, an estimate of 0.601 is hardly different from 0.688 (in Table 5 column 4), even though this estimate is only significant at the 10% level. The loss of significance likely suggests that the new definition of eligibility may not have the most predictive power. In short, selection bias does not significantly affect wage rates of female workers in eligible firms relative to male workers in ineligible firms.

Heterogeneity in Wage Rates by Pay Period

Another limitation of this paper stems from the calculation of monthly wage rate. And while this calculation might be prone to measurement errors, it is at greater risks of violating another crucial assumption: that workers paid on an hourly, daily, and monthly basis are similar. If this assumption is violated, the estimated coefficient might be overestimated.

To test for any heterogeneity among workers by their pay period, I re-run the regression using equation (2), with the inclusion of a fixed-effect for pay period (hourly, daily, monthly). Table 8 presents the regression result; I find that there is a decline in the coefficient estimate β_1, from 0.688 to 0.577, when difference in pay period is considered. I observe that workers paid on an hourly basis receive a derived monthly wage rate six times greater than workers paid daily. Then, the calculation of monthly wage for workers paid hourly is inflated, which biases the coefficient estimate of the triple-difference upward. However, the direction of the triple-difference coefficient is still positive, and its magnitude still large. When controlled for heterogeneity by pay period, female workers in an eligible firm receive a monthly wage 58% greater than male workers in an ineligible firm. In other words, differences among workers by pay period do not significantly change our conclusion on the wage increase for female workers in eligible firms.

Heterogeneity from Other Policies

A threat to the internal validity of this paper is the presence of other policies between 2013 and 2015 that could confound the effect of the CIT change on female labor and female wages. Two examples of such policies are Decree 05/2015/ND-CP and Decree 85/2015/ND-CP. The first decree, implemented in March 2015, details rules regarding contract negotiations, such as wage equality, overtime compensation, and other non-wage benefits.[16] The second decree, implemented in November 2015, details several articles of the Labor Code regarding company policies toward female workers.[17] The timing of these policies might confound the impact of the CIT reduction, since firms could adjust their wage negotiations process with female workers; the coefficient estimate might be biased upward.

As an attempt to correct for these confounding policy implementations, I proxy the impact of these policies using a firm owner's self-reported knowledge about gender equality laws. The assumption behind this proxy is that in firms that are more affected by gender equality laws, their owners will have a better understanding of these laws. Table 9 summarizes the owners' self-reported knowledge of these laws.

Table 8–Testing for Heterogeneity in Pay Period

	(1)
VARIABLES	Derived Monthly Wage (log)
Post x Treated x Female	0.577***
	(0.188)
Pay Period FE (Base Case = Daily)	
Pay Period = Hourly	6.021***
	(0.301)
Pay Period = Monthly	1.360***
	(0.0633)
Constant	7.666***

	(0.405)
Observations	205
R-squared	0.905

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Regression includes firm and pay period fixed-effects, and controls for job characteristics and worker demographics. Controls for job characteristics include job junctions, whether the worker has a formal contract, number of years working in current firm, whether the worker's residence is in the same province as the firm, whether the worker receives on-the-job training, and the sector of the worker's previous job; controls for worker demographics include relationship with owner, age, education level, whether the worker is in a union, house ownership status, and type of housing. Standard errors are robust.

Using the values from Table 9, I create a dummy variable taking value of 1 if the owner has average or good knowledge about gender equality laws, and 0 if the owner has poor or no knowledge about these laws. I then construct a quadruple-difference regression similar to Muralidharan & Prakash as follows:

$$(3)\ y_{ijdc} = \beta_0 + \beta_1 Post_{ijdc} \times Treat_{ijdc} \times Female_{ijdc} \times AboveAverage_{ijdc} + \sum_{i=2}^{5} \beta_i \times (4\ Triple\ Interactions) +$$

$$\sum_{i=6}^{11} \beta_i \times (6\ Double\ Interactions) + \sum_{i=12}^{15} \beta_i \times (4\ Linear\ Terms) + \omega_j + \beta_{16} C_{ijdc} + \beta_{17} D_{ijdc} + \varepsilon_{ijdc}$$

where $AboveAverage_{ijdc}$ is the dummy variable created above; other terms in the model are as described in equation (2).[18] Table 10 presents the triple-difference estimate for Post x Treated x Female, and the quadruple-difference coefficient estimate. The coefficient estimate for the quadruple-interaction is negative but not significantly different from zero. Then, for firms whose owners have at least average knowledge of gender equality laws, being a female and working in a firm eligible for the additional CIT reduction does not lead to any changes in wages. However, the triple-difference estimate for Post x Treated x Female remains highly positive and significant

at the 1% level. The magnitude of this estimate suggests that for all eligible firms regardless of owners' knowledge about gender equality laws, the presence of the CIT reduction raises wages for female workers by 72%.

Table 9–Descriptive Statistics, Self-reported Knowledge of Gender Equality Laws

	(1)
VALUES	Frequency
Good	27
Average	121
Poor	143
No Knowledge	229
Total	520

Notes: Data have been restricted to include only observations closely positioned around the threshold of 200. The remaining observations included firms whose sizes range from 50 employees to 500 employees; the choice of bounds was arbitrary and only reflected a more balanced sample for control and treatment firms.

These results could hint at a lack of heterogeneity caused by these confounding policies, but more likely they suggest that owner's knowledge of these policies is not an accurate proxy of these policies' actual effect. Further research, and perhaps a more comprehensive data source, is needed to account for confounding policy effects.

Table 10–Heterogeneity from Other Policies

	(1)
VARIABLES	Derived Monthly Wage (log)
Post x Treated x Female x Above Average	-0.322
	(0.446)
Post x Treated x Female	0.723***

	(0.246)
Constant	8.528***
	(0.871)
Observations	205
R-squared	0.768

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Regression includes firm fixed-effect, controls for job characteristics, worker demographics and fixed-effect for owner's knowledge about gender equality laws. Controls for job characteristics include job junctions, whether the worker has a formal contract, number of years working in current firm, whether the worker's residence is in the same province as the firm, whether the worker receives on-the-job training, and the sector of the worker's previous job; controls for worker demographics include relationship with owner, age, education level, whether the worker is in a union, house ownership status, and type of housing

Conclusion

This paper studies the impact of a two-percentage points CIT reduction on female labor demand and female wages in small- and medium-sized firms. The difference-in-differences estimate suggests an insignificant change in female labor size. On the other hand, the triple-difference estimate confirms an increase by 69% in female wages in eligible firms relative to male wages in ineligible firms. One possible explanation is that when firms received two additional percentage points reduction in CIT, they did not adjust their employment levels, and the extra cash flow either allowed them to better compensate female workers, or allowed them to replace previous unskilled female workers with new skilled female workers, whose wage demand were higher.

This paper might support future corporate tax cuts in developing countries like Vietnam. However, certain precautions must be taken in terms of econometrics and policy analysis. First, there remains concerns about heterogeneity from confounding policies. There are most likely unobservable effects from policy implementations or social movements in Vietnam that could significantly drive the results. Without finding an accurate proxy or measurement of other effects, no definite conclusions can be drawn about the true causal effect of a tax reduction. Second, from a policy analysis perspective, the benefit of a corporate tax reduction could be

outweighed by its cost in the government budget. Usually, a current tax cut would be followed by a future tax hike, so that governments could reduce its budget deficit. At the same time, lower tax revenue might also imply reduced provision of necessary public services, which might have long-term consequences for traditionally disadvantaged groups like female workers. This intersection between econometric analysis and cost-benefit policy analysis would make an excellent addition to any strands of literature studying the impact of taxes or the female labor market.

Notes

[1] General Statistics Office of Vietnam: Report on labor force survey Q3, 2017.

[2] Pham, A. (2017). A Temporary Corporate Income Tax Reduction and Its Effects on Investment and Reported Profits: A Case Study of Vietnam. *Working Paper*.

[3] Ljungqvist, A., & Smolyansky, M. (2016). To Cut or Not to Cut? On the Impact of Corporate Taxes on Employment and Income. In *Finance and Economics Discussion Series 2016-006*. Washington: Board of Governors of the Federal Reserve System. https://doi.org/10.3386/w20753

[4] Graham, J. R., Lemmon, M. L., & Schallheim, J. S. (1998). Debt, Leases, Taxes, and the Endogeneity of Corporate Tax Status. *The Journal of Finance*, *53*(1), 131–162. https://doi.org/10.1111/0022-1082.55404

[5] Ohrn, E. (2017). The Effect of Corporate Taxation on Investment and Financial Policy: Evidence from the DPAD. *American Economic Journal: Economic Policy*. https://doi.org/10.1257/pol.20150378

[6] Ibid.

[7] Ibid.

[8] Da Rin, M., Sembenelli, A., & Di Giacomo, M. (2010). Corporate Taxation and the Size of New Firms: Evidence from Europe. *Journal of the European Economic Association*, *8*(2–3), 606–616. https://doi.org/10.1111/j.1542-4774.2010.tb00530.x

[9] Shuai, X., & Chmura, C. (2013). The Effect of State Corporate Income Tax Rate Cuts on Job Creation. *School of Professional and Continuing Studies Faculty Publications*, *56*.

[10] Bishop, J. H., & Montgomery, M. (1993). Does the Targeted Jobs Tax Credit Create Jobs at Subsidized Firms? *Industrial Relations: A Journal of Economy and Society*, *32*(3), 289–306. https://doi.org/10.1111/j.1468-232X.1993.tb01051.x

[11] Faulk, D. (2002). Do State Economic Development Incentives Create Jobs? An Analysis of State Employment Tax Credits. *National Tax Journal*, *55*(2), 263–280.

[12] Bosch, N., & van der Klaauw, B. (2012). Analyzing female labor supply — Evidence from a Dutch tax reform. *Labour Economics*, *19*(3), 271–280. https://doi.org/10.1016/j.labeco.2012.01.002

[13] The restriction originally returns 347 observations, but one outlying observation with extremely high annual revenue was omitted. Removing this observation did not significantly affect the result.

[14] Muralidharan, K., & Prakash, N. (2017). Cycling to School: Increasing Secondary School Enrollment for Girls in India. *American Economic Journal: Applied Economics*, *9*(3), 321–350. https://doi.org/10.3386/w19305

[15] The derivation assumes that workers working on an hourly basis works 8 hours a day, in 26 days in a month. Workers paid daily works 26 days in a month. Workers paid weekly works 4 weeks in a month. These assumptions are based on the maximum hours and days worked specified by law in Vietnam.

[16] Ministry of Labour – Invalids and Social Affairs: 05/2015/ND-CP

[17] Ministry of Labour – Invalids and Social Affairs: 85/2015/ND-CP

[18] Ibid.