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Athiphat Muthitacharoen

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Athiphat Muthitacharoen

Faculty of Economics, Chulalongkorn University, Thailand

(athiphat.m@chula.ac.th)

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ABSTRACT

How do firms' investment respond to a large corporate tax rate cut in developing countries? This study uses a matched difference-in-difference approach to estimate the investment responses of Thailand's 2012-13 corporate income tax cut. It finds that the tax cut has significantly boosted investment. The findings also underline the heterogeneity of the investment responses between local and foreign firms as well as the potential roles of policy uncertainty and market competition on investment response.

Keywords: Investment; Taxation

JEL classifications: G31; H25; H32

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1. Introduction

The effect of corporate taxation on investment has been documented in a number of empirical studies, such as Djankov et al. (2010), Zwick and Mahon (2017), and Zhang et al. (2018). There is, however, a relatively limited empirical evidence on the effects of direct cut in the statutory tax rate, especially that of the developing world. Dobbins and Jacob (2016), for example, shows that the German tax rate cut has a strong impact on investment of local firms. This represents an important gap in the literature since studies have shown that the tax sensitivity could vary with the country's development level (see, for example, Mutti and Grubert 2004) and the cuts in the corporate tax rate have been proposed in many developing countries as a way to boost private investment.

I fill this gap by using a difference-in-difference framework to study the investment responses associated with Thailand's large tax cut during 2012-2013. The identification strategy is based on difference in the sensitivity to headline tax rate between foreign and local firms. Propensity score matching is used to match foreign and local firms in order to account for potential differences in various characteristics.

The key threat to my empirical design is that other time-varying shocks may coincide with the 2012-13 tax cut and confound my result. I work to mitigate these concerns throughout my study. First, in addition to firm-fixed effects, I control for year- and industry-year-fixed effects in the model estimation. This allows me to account for changes in macroeconomic conditions and some events such as the 2011 flood that may influence investment activities of firms. Second, by identifying local firms which have ever received the Board of Investment (BOI)'s investment certificate, I illustrate that the baseline result mainly stems from local firms that have less opportunities to lower their taxes using international profit shifting or tax holiday incentives. Third and finally, I use

Malaysian firms as a placebo experiment and confirm that the baseline investment response is not driven by contemporaneous global shocks that affect multinational enterprises.

This article is also related to the literature on how policy uncertainty and market concentration influence the investment responses to taxes. Recent literature has shown that increased economic policy uncertainty and greater corporate market power have played a role in subduing private investment (see, for example, Baker et al., 2016; Kopp et al., 2019). I conduct heterogeneity analyses that examine the impacts of policy uncertainty and competition on firms' response.

2. The 2012-2013 Thai tax cut, data and method

The Thai government has announced the cut in headline tax rate from 30% in 2011 to 23% in 2012 and 20% in 2013 and thereafter. The Thai tax cut differs from typical large tax cuts in other countries in the sense that it was not accompanied with major provisions to broaden the tax base. This provides a quasi-experimental research design to identify the investment effects associated with the considerable reduction in the statutory tax rate.

My identification strategy is based on the difference-in-difference approach exploiting difference in the sensitivity to headline tax rate between foreign and local firms. Regarding investment decisions, foreign firms are likely to be less sensitive to the host country's headline tax rate than local firms due to two main reasons. First, foreign firms can take advantage of international tax avoidance via profit shifting to their foreign affiliates. This lowers their tax burden as well as their tax-induced investment costs. The literature has documented international tax avoidance activities by MNEs in developing countries (see, for example, Johannesen, Torslov and Wier, 2019 and Muthitacharoen and Sampantharak, 2019). Second, foreign firms in developing countries are more likely to benefit from the tax incentives aimed at attracting FDI.

I compare the investment responses before and after the 2012-13 tax cut. Under the identification assumption that unobserved determinants of investment do not change differentially on average across the local and foreign firms around the tax cut, this approach allows capturing the causal effect of the tax cut on the investment of local relative to foreign firms.

In addition to ownership status, foreign and local firms are likely to be different in various aspects that may bias the result. To alleviate the concerns that those differences may bias the result, I employ a non-parametric matching method (Rosenbaum and Rubin, 1985; Dehejia and Wahba, 2002). Specifically, I use a nearest neighborhood matching strategy within the 0.2 radius in terms of the propensity score.¹ Each foreign firm is matched with a local firm using characteristics of firms in the pre-tax-cut years (average values of log of fixed assets, log of total assets, log of sales during 2009-2011). I also impose a common support restriction and match each firm based on its two-digit ISIC. The matching process yields two groups of local and foreign firms that are comparable in asset size, capital stock level, sales volume and industry. size of assets, capital stock and sales. This matched sample is used throughout the study.

My baseline estimation equation is:

$$\begin{aligned}
 Inv_{i,t} = & \beta_0 + \beta_1 Local + \beta_2 Post + \beta_3 Local * Post + \beta_4 Turn_{i,t-1} \quad (1) \\
 & + \beta_5 ROA_{i,t-1} + \beta_6 Ass_{i,t-1} + firmFE + yearFE + sector * yearFE + \varepsilon_{it},
 \end{aligned}$$

where $Inv_{i,t}$ = investment, $Local = 1$ for local firm (0 otherwise), $Post = 1$ for years 2012-2016 (0 otherwise), $Turn_{i,t-1}$ = asset turnover ratio, $ROA_{i,t-1}$ = return on assets

¹ Rosenbaum and Rubin (1985) suggest that using a caliper width of 0.2 of standard deviation of the logit of the propensity score would eliminate 95% of the bias resulting from the measured confounders. Given that the standard deviation of the logit is roughly 1 in my baseline matching model, I use the caliper width of 0.2.

(EBIT/total assets), and $Ass_{i,t-1}$ = total asset. I also control for firm-, year- and sector-year-fixed effects. Standard errors are heteroscedasticity-robust and clustered at firm level.

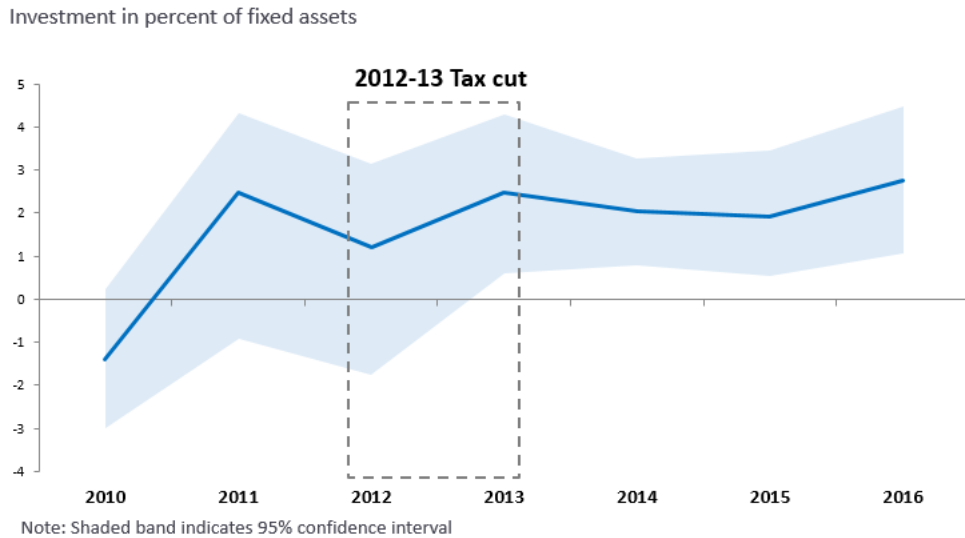
I use a firm-level panel data of Thai companies from Bureau van Dijk's Orbis database from 2009-2016. The analysis includes only firms that do not have any foreign subsidiary since the vast majority of Thai firms in Orbis report only consolidated accounts. A firm is considered a foreign firm if at least 50% of the shares are ultimately owned by a foreign shareholder. Given Orbis' inconsistent information coverage of small firms, I focus only on firms with the size of total assets at least 10 million USD (approximately 320 million baht) in 2009 in the baseline analysis. Firms are required to be in the sample throughout 2010-2016.

Investment is defined as change in fixed assets scaled by previous value of fixed assets. Asset turnover ratio is defined as total sales divided by total assets. Return on assets is defined as earnings before interest and tax divided by total assets. Table 1 provides summary statistics of the variable used in the baseline analysis. Figure 1 illustrates difference in investment between matched local and foreign firms before and after the 2012-2013 tax cut. While the difference is indistinguishable from zero before the tax cut, it becomes positive and statistically significant during 2013-2016.

Table 1: Summary statistics of variables used in the main analysis

Variables	N	Mean	SD	Median
Investment/lagged fixed assets	7,224	0.02	0.17	-0.01
log(Fixed assets)	7,224	9.83	1.49	8.93
Local	7,224	0.50	0.50	n/a
Lagged turnover ratio	7,224	1.64	1.37	1.36
Lagged ROA	7,224	0.01	0.16	0.07
Lagged log(assets)	7,224	10.99	1.08	10.17

Figure 1: Difference in investment between local and matched foreign firms



3. Empirical results

Columns (1)-(4) of Table 3 report the estimation of Equation (1) with and without fixed effects and control variables. The Post-x-Local coefficients are positive and statistically significant throughout these specifications. These findings indicate the robust and significant impact of the tax cut on investment. In the baseline specification (Column 4), the coefficient is 0.019. This implies that when the tax rate falls from 30% to 20%, the investment (in percent of fixed assets) of local firms, on average, rises by 1.9 percentage points relative to that of foreign affiliates.

This effect is also economically significant. To see this, consider average ratio of tax to total assets for local firms during 2009-2011 which is around 2.7%. The tax cut

represents the tax burden reduction by approximately 0.9% of total assets or 39 million baht on average (USD 1.2 million). The estimated 1.9 percentage-points increase in investment translates to 38 million baht. Local firms thus appear to replace the tax burden with investment in the proportion of roughly one to one. This suggests that the tax cuts from the relatively high level of tax rate could provide large impacts on investment of local firms. This finding is consistent with that of Dobbins and Jacob (2016) for a developed country.

I perform several robustness tests. One main concern is that some local firms may receive preferential tax treatment—making them less sensitive to the headline tax cut. To alleviate this concern, I divide local firms into those who have ever received investment promotion certificate from the BOI since 2008 (Local-with-BOI-certificate) and those who have not (Local-without-BOI-certificate).

There are, however, a few types of incentives provided by the BOI and they are not limited to only corporate tax incentives. Examples include tax holiday, waive of import tariffs, and exemption of personal income tax for certain foreign personnel. Unfortunately, I have no information about the exact type of incentives that firms receive. However, this still provides a good robustness check of my empirical setting since local firms which have never received the certificate are more sensitive to the tax reform and are consequently likely to exhibit stronger investment response.

Column 5 of Table 3 indicates that the coefficient of Post-x-Local-without-BOI-certificate is positive and significant whereas that of Post-x-Local-with-BOI-certificate is insignificant. This suggests that, while I cannot perfectly exclude local firms that have received corporate-tax incentives, the baseline investment response mainly stems from local firms that have less opportunities to lower their taxes using corporate-tax incentives or international profit shifting.

Column 6 of Table 3 reports the placebo test where I replicate the baseline analysis using Malaysian firms. The interaction coefficient is small and insignificant. These results help mitigate the concern that some other global factors rather than the Thai tax cut were driving the baseline result.

I further conduct heterogeneity analyses to gain additional insight on how policy uncertainty and competition may influence the investment responses to tax cut. Thailand's tax cut consists of two phases with the tax rate being reduced to 23% in 2012 and 20% in 2013 and thereafter. During 2012, firms may choose to value certainty and wait until the tax rate declines to its permanent rate (20%) before adjusting after-tax rate of return on their potential investment projects. The importance of certainty is emphasized by Bernanke (1983) which illustrates that, when investment is irreversible, uncertainty increases the value of waiting for more information and consequently delay firms' investment decisions.

To examine how the uncertainty impacts the investment in 2012, we split the post-reform period into: 2012 and 2013-2016(Post2013). While the coefficient of 2012-x-Local is insignificant, the coefficient of Post2013-x-Local is significantly positive (Column 7 of Table 3). Local firms thus appear to delay some of their investment when there is uncertainty regarding the tax policy.

Table 3: Baseline results and robustness tests (Dependent variable: investment/lagged fixed assets)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Baseline	BOI	Placebo	Policy uncertainty	Competition	
								Low	High
Post	-0.065*** (0.007)	-0.049*** (0.007)	-0.092*** (0.008)	-0.056 (0.040)	-0.055 (0.041)	-0.186*** (0.044)		-0.036 (0.041)	-0.099*** (0.014)
Post x Local	0.017* (0.009)	0.020** (0.009)	0.019** (0.009)	0.019** (0.009)		-0.001 (0.010)		-0.005 (0.012)	0.044*** (0.013)
Post x Local-without-BOI- certificate					0.031*** (0.010)				
Post x Local-with-BOI- certificate					0.003 (0.011)				
2012 x Local							0.011 (0.012)		
Post2013 x Local							0.021** (0.009)		
Observations	7,224	7,221	7,221	7,221	7,221	4,649	7,221	3,785	3,436
R-squared	0.030	0.055	0.161	0.165	0.166	0.251	0.166	0.181	0.160
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	YES	YES	YES	YES	YES	YES	YES
SecxYr FE	NO	NO	NO	YES	YES	YES	YES	YES	YES
Control	NO	YES	YES	YES	YES	YES	YES	YES	YES
Number of firms	1,032	1,032	1,032	1,032	1,032	668	1,032	541	491

Note: ***, **, * denotes significance at the 1%, 5%, and 10% levels, respectively.

Next, I examine the extent to which the tax response varies with the competition level. Using the sample comprising of all Thai firms in 2012, I measure competition degree at the two-digit ISIC level. I define the competition measure as one minus the industry-level Lerner index. Higher value of this measure indicates that the industry is more competitive. For a firm i in year t , the Lerner index is defined as: $\max(0, \frac{profit_{it}}{revenue_{it}})$, where profit denotes accounting profit and revenue denotes total revenue. The industry-level Lerner index is the sale-weighted average Lerner index of all firms in each industry. I define firms into two groups using the median value of this competition measure. The findings indicate that the investment response is concentrated only among firms in industries with high competition (Columns 8-9 of Table 3).

It is important to note that the results here are only suggestive since these factors may be correlated with many other firm characteristics. Further analysis is needed to better understand the relationship between tax cut, investment and policy uncertainty/market concentration.

4. Conclusion

Tax rate cut has been proposed in many developing countries as a policy to stimulate private investment. I use Thai firm data and show that firms' investment responds strongly to the large cut in the headline corporate income tax rate. The findings also suggest that the aggregate impact of the tax rate cut will depend on the relative size of local firms in the economy since foreign firms are less sensitive to the headline tax rate. I also document suggestive evidence illustrating that policy uncertainty and market concentration may have dampened the impact of taxes on investment.

5. References

- Baker, S. R., N. Bloom, and S. J. Davis, 2016. Measuring Economic Policy Uncertainty. *The Quarterly Journal of Economics*, 131(4), 1593–1636.
- Bernanke, B. S. (1983). Irreversibility, uncertainty, and cyclical investment. *The Quarterly Journal of Economics*, 98(1), 85-106.
- Dehejia, R. H., & Wahba, S. (2002). Propensity score-matching methods for nonexperimental causal studies. *Review of Economics and statistics*, 84(1), 151-161.
- Djankov, S., Ganser, T., McLiesh, C., Ramalho, R., & Shleifer, A. (2010). The effect of corporate taxes on investment and entrepreneurship. *American Economic Journal: Macroeconomics*, 2(3), 31-64.
- Dobbins, L., & Jacob, M. (2016). Do corporate tax cuts increase investments? *Accounting and Business Research*, 46(7), 731-759.
- Johannesen, N., Tørsløv, T., & Wier, L. (2019) Are Less Developed Countries More Exposed to Multinational Tax Avoidance? Method and Evidence from Micro-Data. *The World Bank Economic Review*.
- Kopp, E., Leigh, M. D., Mursula, S., & Tambunlertchai, S. (2019). US Investment Since the Tax Cuts and Jobs Act of 2017. IMF WP/19/119.
- Muthitacharoen, A., and Sampantharak, K. (2019). Tax-motivated profit shifting and anti-avoidance stringency: firm-level evidence from developing countries. PIER Discussion Paper No. 111.
- Mutti, J. and Grubert, H., 2004. Empirical asymmetries in foreign direct investment and taxation. *Journal of International Economics*, 62(2), pp.337-358.

- Rosenbaum, P. R., & Rubin, D. B. (1985). Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. *The American Statistician*, 39(1), 33-38.
- Zhang, L., Chen, Y., & He, Z. (2018). The effect of investment tax incentives: evidence from China's value-added tax reform. *International Tax and Public Finance*, 25(4), 913-945.
- Zwick, E., & Mahon, J. (2017). Tax policy and heterogeneous investment behavior. *American Economic Review*, 107(1), 217-48.