

VAT invoice information and compliance behavior:

Evidence from Thailand

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Abstract

How do firms respond to increased information available to tax authority? We employ a difference-in-difference approach to examine the effects of a policy that increases the amount of information on VAT invoice on firm behavior in an environment with large informality. We use a de-identified panel of VAT and corporate income tax returns that comprises the universe of Thai firms. Our finding indicates that increasing the information available to tax authority has a large and significant impact on compliance of both VAT and corporate income tax.

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JEL Classifications: H21, H25, H32

Disclaimers: The views expressed in this paper are those of the authors and should not be interpreted as those of the Revenue Department.

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1. Introduction

Governments across the world have increasingly relied on value added tax (VAT) as its main revenue source. The global share of VAT revenue to GDP has risen from 5.0% in 2000 to 6.9% in 2018 with the increase being relatively larger among developing countries. While the VAT is often adopted for its ability to generate stable revenue source and its effective self-enforcement mechanism (Pomeranz, 2015; Naritomi, 2019), its design and implementation have important challenges especially in an environment with large informal economy. One example is implementing the VAT information trail that encourages tax compliance. Understanding how firms respond to key features of the VAT system is, therefore, crucial for the design of the VAT policy for developing countries.

Focusing on the developing country context, this paper investigates the effectiveness of increased information available to tax authority. We use a panel of de-identified VAT and corporate income tax return data that comprise the population of Thai firms from 2012-2017. Our identification strategy is based on a difference-in-difference approach before and after Thailand's introduction of a policy that strengthened its VAT information trail system in 2015.

Our finding indicates that expanding the set of information available to tax authority could yield significant effect on tax compliance. We examine the policy change in 2015 that requires all VAT sellers to include Taxpayer ID (TID) of business buyers on VAT invoices. The VAT TID policy ensures that a firm's book of sales contains documentation about purchase records of VAT-registered businesses. This essentially strengthens the information trail mechanism along the supply chain and, from firms' perception, raises their audit probability.

Our difference-in-difference analysis indicates that the VAT TID policy has limited the downscaling practice among retail firms. Following the program

implementation, retail firms significantly report higher inputs and sales relative to whole firms where the VAT enforcement is relatively strong (Pomeranz, 2015; Naritomi, 2019). We also find positive compliance spillover to corporate income tax revenue.

This paper adds to the small but growing empirical literature on how firms respond to the VAT enforcement mechanism. Examples are Pomeranz (2015), Carillo et al. (2017), Fan et al. (2018), Naritomi (2019), and Waseem (2019). Our findings emphasize the interaction of perceived information (available to tax authority) and tax compliance. We demonstrate that an expanded set of information (on firms' input purchases) available to tax authority strongly affect firms' tax compliance.

The remainder of this paper is organized as follows. Section 2 illustrates research design. Section 3 describes data and Section 4 discusses empirical findings. Section 5 concludes the study.

2. Research design

To study responses to the VAT enforcement mechanism, we examine the compliance effects associated with Thailand's policy to strengthen its VAT system in 2015.

Starting from 2015, the government requires all VAT sellers to include Taxpayer ID (TID) of VAT-registered buyers on VAT invoices. Before the policy implementation, buyers' information was not always recorded by sellers. With the TID policy, if a seller fails to seek TID from buyers, a fine is imposed on sellers and the invoice will not be deemed acceptable to the tax authority. The TID policy, therefore, ensures that a firm's book of sales contains documentation about purchase records of VAT-registered businesses. It effectively expands the set of information that can be utilized by the government for tax enforcement. Specifically, it facilitates the tax administration to cross-check the records of purchase and the records of sale.

The limited information during the pre-TID period facilitates an attempt to downscale reported business size—reducing the reported values of input and sale. Such downscaling practice potentially benefits firms by lowering their corporate income tax liability as well as letting them remain under the radars of the tax administration. Abstracting from collusive evasion, the TID policy makes it harder for firms to under-report their inputs. Consequently, we expect firms to report higher input purchases after the TID policy is in place. This may also impact reported sales since firms may try to maintain reasonable VAT ratio (input-to-output ratio).⁴ Changes in reported purchase and sale will impact corporate income tax liability (corporate income tax spillover effects).

The extent to which firms can engage in the downscaling practice, however, is likely to be different between retail and whole firms. For firms that sell mostly consumers, keeping sales out of official books is likely to be less costly than firms that sell mainly to businesses. This problem is known as the last mile problem (see, for example, Pomeranz 2015; Naritomi 2015; Waseem, 2020). We thus expect the TID policy to have greater impact on reported inputs and sales of retail firms than on wholesale firms.

We employ a difference-in-difference framework to estimate the impacts of strengthening the information-linking mechanism and the spillover of VAT enforcement to corporate income taxation. This allows us to understand the effectiveness of increased information for VAT enforcement. Specifically, we compare firm responses between retail and wholesale firms before and after the introduction of the 2015 TID policy. We define our treatment group to be retail firms and control groups to be wholesale firms. The estimation period ranges from 2012 to 2017.

⁴ Firms are likely to declare higher outputs in order to maintain reasonable VAT ratio (input-to-output ratio).

Wholesale firms are generally larger than retail firms. To alleviate the concerns that such difference may bias the result, we 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. Each retail firm is matched with a wholesale firm using log of total assets in the pre-TID-policy years. We also impose a common support restriction. The matching process yields two groups of retail and wholesale firms that are comparable in asset size. This matched sample is used in this section.

The estimation equation can be written as:

$$\log(y_{it}) = \alpha_0 + \alpha_1 post_{it} + \alpha_2 treat_{it} + \alpha_3 post_{it}treat_{it} + FirmFE + YearFE + \varepsilon_{it}, \quad (2)$$

where y_{it} denotes the dependent variable (immediate input, revenue and accounting profit), $post_{it}$ denotes a dummy variable that equals one for the years 2015-2017 and equals zero otherwise, $treat_{it}$ denotes a dummy variable that equals one for treatment group and zero otherwise. We also include firm- and year-fixed effects in order to control for unobserved differences across firms as well as common shocks over the estimation period. Under the identification assumption that unobserved determinants of revenue growth (ε_{it}) do not change differentially on average across the treatment and control groups around the TID policy, the coefficient α_3 represent the causal effect of the TID policy.

3. Data

We use a de-identified panel of VAT and corporate income tax return data for the population of Thai firms from 2012-2017. Table 1 shows summary statistics for our VAT enforcement mechanism analysis.

Table 1: Summary statistics

Variables	N	Mean	Median	SD
<i>VAT enforcement mechanism analysis (Difference-in-Difference identification)</i>				
Immediate Input (log)	208,080	15.84	15.87	1.89
Revenue (log)	208,080	16.17	16.16	1.77
Profit (log)	161,989	13.17	13.17	1.45
Treat	208,080	0.50	n/a	0.50
Post	208,080	0.50	n/a	0.50

Note: This table describes summary statistics for datasets used in the TID policy examination.

Source: Authors' estimate.

4. Empirical results

In this subsection, we investigate how firms respond to the policy to strengthen the VAT information trail system in 2015. Our difference-in-difference analyses illustrate that the VAT TID policy causes retailers to declare higher inputs and raise their reported revenue. Following the 2015 introduction, retail firms report 5.3% higher inputs, 6.0% higher output and 3.8% larger accounting profit relative to wholesale firms (Columns 1-3 of Table 2). This finding indicates positive spillover to corporate income taxation.

We also investigate heterogeneity of the policy impacts with respect to asset size. We divide firms into two groups based on the average asset size during the pre-TID-policy period. The findings indicate that the TID policy effects are concentrated among small firms. Following the TID introduction, small retail firms report 11.0% higher inputs, 11.8% higher sale and 8.4% higher profit relative to small wholesale firms (Columns 4-6 of Table 2). We do not find statistically significant effects among large firms. One explanation is that tax avoidance strategies that are likely relevant here involve maintaining double set of books and colluding with employees to hide operations. Such practice are difficult to sustain for large firms since they are relatively vulnerable to a

single whistle blower and are likely to have more complex business activities (Kleven, Kreiner and Saez, 2016).⁵

⁵ Kleven, Kreiner and Saez (2016) has also shown that tax compliance is increasing with firm size.

Table 2: Effects of the VAT TID policy on downscaling practice (Treat = retail; control = wholesale; matched sample)

	All			Small			Large		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Purchase	Sale	Profit	Purchase	Sale	Profit	Purchase	Sale	Profit
Post	-0.165*** (0.009)	-0.081*** (0.008)	0.151*** (0.011)	-0.086*** (0.014)	0.004 (0.013)	0.273*** (0.018)	-0.236*** (0.011)	-0.157*** (0.011)	0.054*** (0.014)
Treatment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Treatment x Post	0.053*** (0.013)	0.060*** (0.012)	0.038** (0.017)	0.110*** (0.020)	0.118*** (0.019)	0.084*** (0.025)	-0.027 (0.017)	-0.023 (0.016)	-0.031 (0.022)
Observations	208,080	208,080	161,989	104,040	104,040	78,018	104,040	104,040	83,971
R-squared	0.014	0.008	0.007	0.008	0.010	0.021	0.034	0.022	0.001
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
SecXYear	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of firms	34,680	34,680	33,643	17,340	17,340	16,691	17,340	17,430	16,952

Note: This table presents the estimated impacts of the VAT TID policy on the downscaling practice. Post is a dummy variable that equals one for the years 2015-2017. Treatment is a dummy variable that equals one for retail firms, and equals zero for wholesale firms. Treatment x Post is the interaction variable between Treatment and Post. Standard errors are heteroscedasticity-robust and clustered at firm level. Numbers in parentheses indicate standard error. ***, **, * denotes significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimate

5. Conclusion

Enhancing the government financing capability is crucial for fiscal sustainability and development. VAT has been a key tool towards that objective in many countries for the past three decades. This study enhances our understanding of how firms respond to the VAT information trail in the context of developing countries. We use a panel of de-identified tax returns comprising the universe of Thai firms from 2012 to 2017. This enables us to observe various characteristics of firms and document their tax compliance with respect to both value added tax and corporate income tax. Our empirical evidence illustrates the strong compliance impacts of the policy that increases the amount of information that can be utilized the government for tax enforcement. This underlines the importance of strengthening the information trail embedded in the VAT system.

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Appendix

Table A1: Effects of the VAT TID policy on downscaling practice (Treat = retail; control = wholesale; unmatched sample)

	All			Small			Large		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Purchase	Sale	Profit	Purchase	Sale	Profit	Purchase	Sale	Profit
Post	-0.168*** (0.009)	-0.085*** (0.008)	0.146*** (0.011)	-0.101*** (0.013)	-0.015 (0.012)	0.247*** (0.016)	-0.243*** (0.012)	-0.163*** (0.011)	0.046*** (0.015)
Treatment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Treatment x Post	0.087*** (0.012)	0.096*** (0.011)	0.050*** (0.015)	0.114*** (0.018)	0.127*** (0.017)	0.087*** (0.023)	0.076*** (0.016)	0.082*** (0.015)	0.040** (0.020)
Observations	239,544	239,544	188,056	119,772	119,772	90,486	119,772	119,772	97,570
R-squared	0.013	0.009	0.007	0.009	0.010	0.018	0.026	0.015	0.002
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
SecXYear	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of firms	39,924	39,924	38,805	19,962	19,962	19,260	19,962	19,962	19,545

Note: This table presents the estimated impacts of the VAT TID policy on the downscaling practice. Post is a dummy variable that equals one for the years 2015-2017. Treatment is a dummy variable that equals one for firms with average assets during the pre-policy-change period (2012-2014) not over the median, and equals zero for those with average assets during the pre-policy-change period (2012-2014) above the median. Treatment x Post is the interaction variable between Treatment and Post. Standard errors are heteroscedasticity-robust and clustered at firm level. Numbers in parentheses indicate standard error. ***, **, * denotes significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimate