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Three Essays on Tax Compliance in Indonesia

Himawan Saputro
University of Kentucky, himawansaputro@gmail.com
Author ORCID Identifier:
https://orcid.org/0000-0001-7023-2745
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Himawan Saputro, Student

Dr. David R. Agrawal, Major Professor

Dr. Rajeev Darolia, Director of Graduate Studies

THREE ESSAYS ON TAX COMPLIANCE IN INDONESIA

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
Graduate School at the University of Kentucky

By

Himawan Saputro

Lexington, Kentucky

Director: Dr. David R. Agrawal,

Associate Professor of Economics and Public Policy

Lexington, Kentucky

2021

https://orcid.org/0000-0001-7023-2745

ABSTRACT OF DISSERTATION

THREE ESSAYS ON TAX COMPLIANCE IN INDONESIA

This dissertation studies the impacts of major tax reforms designed to improve tax compliance, particularly in the context of developing countries with limited enforcement capacity due to informality and lack of third-party data using the Indonesian tax administrative data as well as relevant empirical research methods. In order to describe this dissertation, I discuss each essay as the following.

The first essay is titled "How Do Small Taxpayers Respond to Tax Simplification? Evidence from the Indonesian Turnover Tax Reform." This essay studies the firms' behavioral responses to tax simplification in Indonesia by exploiting the implementation of turnover tax in 2013 and the expansion of value added tax (VAT) registration threshold in 2014 as well as the fact that both turnover tax eligibility and VAT registration thresholds are at the same value. I find that firms intentionally bunch just above the threshold in order to avoid turnover tax regime. I also document that some firms started to bunch just below the threshold in order to avoid VAT registration when the threshold expanded. The results suggest that rms can face different types of notch at the same threshold and thus respond differently conditional on tax and non-tax incentives.

The second essay is titled "Tax Evasion and Forgiveness: Evidence from the Indonesian Tax Amnesty Program." This essay examines the determinants of tax evasion and the compliance impacts of forgiving tax evaders using the 2016 Indonesian tax amnesty program where the government offers a set of discounted tax rates and penalties exemption on declaration of unreported net assets as an equivalent of unreported income. I document that the intensity in withholding tax, tax rates, level of income, as well as types of employment influence the decision to evade taxes. I further compare reported income between wage earners and self-employed individuals in each income percentile before and after the amnesty and find that the program provides no meaningful effect except limitedly for those in the very top of income distribution, e.g., around 6.1 percent increase in reported net income. The results are consistent with the argument that external factors motivate tax compliance.

The third essay is titled "Compliance Effect of Tax Administration Reform on Wealthiest Individuals: Evidence from the Indonesian High-Wealth Individuals (HWI) Office." This essay investigates the effect of intensification of tax administration on HWIs

compliance using the establishment of an HWI office in 2009 which administer individuals with gross assets of more than 100 billion IDR (around 10 million USD in 2009) and who reside in Indonesian capital city Jakarta. The policy creates quasi-experimental variation in the intensity of tax administration depending on the date of HWI office implementation (before and after the policy) and the types of tax office (HWI office and ordinary tax offices). I document that the HWIs reported income and income taxes at the HWI office decreased by about 40 percent over six years relative to those of HWIs administered by ordinary tax offices. The results support the literature that predicts that in the face of a certain examination the optimal strategy for high-income earners might involve some underreporting of income. The results also imply that the improvement of third-party data availability that can affect the likelihood of detection is a crucial factor in tax administration reform.

KEYWORDS: Tax Simplification, Tax Compliance, Tax Notch, Tax Amnesty, Tax Administration Reform

Himawan Saputro

May 7, 2021

Date

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By
Himawan Saputro

Dr. David R. Agrawal
Director of Dissertation

Dr. Rajeev Darolia
Director of Graduate Studies

May 7, 2021
Date

Dedicated to my mother Mudrikah and my late father Suhadi

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Chapter 1

How Do Small Taxpayers Respond to Tax Simplification? Evidence from the Indonesian Turnover Tax Reform

1.1 Introduction

A large share of small firms in the developing economies with lack of administrative capacity to maintain proper recordkeeping and estimate accurate tax bases, hampers governments in observing true tax bases and levying taxes on them (Gordon and Li, 2009; Besley and Persson, 2014). The literature on compliance costs estimation suggests that small firms regressively spend more costs to comply with tax law relative to large firms (Tran-Nam et al., 2000). Presumed tax bases such as turnover, value of assets, and deemed profit are reasonable alternatives when the preferred tax bases such as income and value added are difficult for governments to measure, verify, and monitor (Tanzi and de Jantscher, 1986; Slemrod and Yitzhaki, 1994). This efficacy of presumed tax bases to simplify tax collection and reduce compliance costs has attracted governments to adopt various types of presumptive taxes (Bird et al., 2003). Moreover, governments exclude small firms from VAT system by imposing registration threshold (Keen and Mintz, 2004; Kanbur and Keen, 2014). Previous empirical works document firms responses to the implementation of presumptive taxes (Fajnzylber et al., 2011; Bruhn and Loeprick, 2016) as well as to the VAT registration threshold (Onji, 2009; Liu and Lockwood, 2016; Harju et al., 2019). However, few studies examine firms concurrent responses to both turnover tax and VAT registration threshold, specifically when they are at the same level.

This paper exploits the implementation of the 2013 Indonesian turnover tax regime and the 2014 VAT registration threshold expansion where the turnover tax eligibility threshold and the expanded VAT threshold are placed at the same value as well as use the population of Indonesian corporate tax returns from 2012 to 2017 to study the impact of tax simplification (e.g., turnover tax reform and VAT registration threshold expansion) on the behavior of firms around the threshold. The turnover tax allows taxpayers with previous year turnover of up to 4.8 billion IDR to be taxed at a final rate of 1 percent on the turnover instead of taxed at 25 percent on profit.[1] The turnover tax was designed to simplify tax system and reduce compliance costs for small firms as well as minimizing governments monitoring costs. Theoretically, the scheme would dismiss small firms from the complexity of profit calculation in order to pay taxes. Despite the implementation of turnover tax, the Indonesian tax laws that mandate all firms to maintain a proper book keeping and report financial information such as balance sheet and profit and loss statements in tax return have

[1]In 2013, the exchange rate for 1 USD is around 10,000 IDR. Thus, 4.8 billion IDR is around 480,000 USD.

not been repealed. These requirements imply that small firms eligible for turnover tax regime potentially still bear similar compliance costs. Moreover, the average income effective tax rates around the threshold is around 0.85 percent of turnover or slightly below the turnover tax rate of 1 percent. In 2014, the government further simplify taxation of small firms by increasing the VAT registration threshold from 600 million to 4.8 billion IDR in annual turnover. This expansion reduces small firms' compliance costs yet removes firms' rights to claim VAT on inputs. The impact of these policies on small firms' behavior would be determined by the change in tax and non-tax (e.g. compliance costs and benefits) incentives.

I use a bunching approach developed by Saez (2010) and Chetty et al. (2011) which further extended by Kleven and Waseem (2013) to investigate the firms responses to the turnover tax and VAT registration thresholds. The approach uses excess mass near the threshold that represents discontinuity in incentives to obtain behavioral responses and estimate structural parameters. The turnover tax implementation in 2013 and VAT threshold expansion in 2014 produce several incentive discontinuities at the 4.8 billion IDR threshold, namely income tax rates, VAT rates, and compliance costs and benefits which determine whether small firms obtain benefits from the tax simplification or not. I use a framework discussed in Calonico et al. (2014) to estimate discountinuities at the threshold that study whether the mechanism behind the bunching responses is real responses, e.g., change in economic output, or evasion responses, e.g., misreporting output.

I find that the implementation of turnover tax in 2013 induces observable bunching responses just above the threshold due to a discrete fall in tax to turnover ratio from around 1 percent to 0.85 percent. Moreover, firms just below the threshold proportionally increase their turnover as well as direct input to locate just above the threshold and avoid the turnover tax regime, keeping the continuity of tax to turnover ratio around the threshold. This response can be considered as a real economic response because the increase in turnover is accompanied with increase in productivity as well as tax liabilities. The results translate into tax elasticity of around 0.726.

Moreover, I find that the expansion of VAT registration threshold in 2014 drives some firms to bunch just below the threshold due to discrete jumps in tax and non-tax (e.g., VAT compliance costs) incentives. These firms move from just above the threshold to just below the threshold by decreasing their turnover to escape from the VAT registration threshold. Moreover, the decrease in turnover is bundled with a disproportionately larger decrease in direct input, suggesting that evasion mechanism may occur behind the bunching responses. Moreover, I find that the bunchers' direct input reduction creates a discontinuity in direct input to turnover ratio of about 7.3 percentage points at the threshold which suggests that firms with larger value added would stay away from the VAT system. The results translate into tax elasticity of approximately 1.02.

Interestingly, after the VAT threshold expansion, some firms remain just above the threshold and stay eligible to both VAT and income tax regime although facing larger VAT burden and compliance costs. This response may be driven by a positive significant non-tax benefits that firms receive from adopting and complying the income tax regime of around 11.6 percent of the value added. This compliance benefits

is greater than the sum of increases in VAT burden and compliance costs and thus encourage firms to stay in the income tax regime. Moreover, I find that the exclusion of the non-tax incentive leads to an overestimation of tax elasticity of around 14.12 percent.

This paper contributes to the literature on bunching responses (Kleven, 2016) by providing evidence on firms responses to multiple tax notches at a single threshold. Specifically, firms can face different tax notches (e.g., downward vs upward tax notches) at a single threshold conditional on both tax and non-tax incentives. Moreover, this paper reinforces an argument that non-tax incentive (VAT compliance costs) has a key role in firms behavioral responses to size-based tax policy (Harju et al., 2019). In addition to VAT compliance costs, this paper finds that the compliance benefits from income tax regime may influence taxpayers' movement around the tax notches.

Furthermore, this paper contributes to the policy debate on the impacts on presumptive taxes on taxpayers behavior, e.g., Bruhn and Loeprick (2016) and Fajnzylber et al. (2011). Many governments often simplify taxation for small firms and reduce compliance costs to encourage small firms' compliance and participation in tax system by enacting a presumptive tax regime. This paper provides evidence that the size of effective presumptive tax burden is also a vital consideration in designing a presumptive tax system. Particularly, without a considerable reduction in compliance costs, firms would prefer a more complex income tax system with lower effective tax burden relative to a simpler turnover tax with higher effective tax burden.

Finally, this paper contributes to the literature on compliance costs measurements that argue that compliance costs have been overestimated due to the absence of compliance benefits estimates (Johnston, 1963; Tran-Nam et al., 2000). This paper particularly find that compliance benefits from income taxes can exceed VAT compliance costs and influence taxpayers' decision making with respect to size-based tax policies (e.g., VAT registration and turnover tax eligibility thresholds).

1.2 Setting and Data

1.2.1 Taxation of Small Firms in Indonesia

In general, the Indonesian firms are taxed at around 25 percent on profit. Moreover, the tax schedule for firms with turnover of up to 50 billion IDR is a flat rate of 25 percent with a 50 percent reduction of the tax rate to taxable income corresponding to turnover of up to 4.8 billion IDR. On the other hand, small firms in Indonesia has been subject to a couple alternatives of presumptive tax regimes. The first regime is a deemed profit tax implemented in 1986 and the second regime is the turnover tax regime enacted in 2013. Under the deemed profit tax regime, small firms calculate their income tax liabilities using a range of profit ratios determined by the government which often are more than 20 percent.[2] The second regime is a turnover

[2]There are around 1,435 industry categories that their profit ratios are determined by the government. For example, the profit ratio for wholesaler, retailer, and event organizer are around 20 percent, 25 percent, and 50 percent. These ratios are then multiplied by the turnover in order to

tax regime which imposes a final tax rate of 1 percent on gross income to small firms instead of 25 percent on profit. Prior to the implementation of turnover tax regime, firms below the threshold can elect their preferred tax regime, i.e. deemed profit tax or corporate income tax regime. However, since 2013, most firms below the threshold must elect the turnover tax regime.

The government sets an eligibility threshold for presumptive tax regimes in terms of annual turnover. The presumptive tax threshold is typically similar to the VAT registration threshold. For example, the annual turnover threshold for the deemed profit tax and VAT registration is 600 million for the year 2010 to 2013. In 2014, annual turnover threshold for turnover tax and VAT registration is exapanded to 4.8 billion IDR . In other words, the government has been removing small firms from the VAT system as well as offering them with less complicated presumptive tax regime. Despite this tax simplification, the laws that requires firms to maintain book keeping, estimate profit, and report financial information to tax authority have not been repealed. This book keeping provision allows me to observe firms financial reporting near the threshold and study how they respond to tax simplification.

The general provision and procedures of taxation law mandates all Indonesian firms to maintain a book keeping practice.[3] The book keeping practice includes consistent recording financial information such as gross income, cost of good sold, profit, expenses, assets, liabilities, and capitals as well as compiling income statement and balance sheet at the end of fiscal year. The financial information is then reported in the corporate tax return as starting point of the estimation of taxable income and income tax liability. The comercial net income will be adjusted to obtain taxable income by accounting for differences in treatment and timing of accruing income and expenses between firms' accounting practices and the income tax law (book-tax adjustments).

1.2.2 The 2013 Turnover Tax Reform

In 2013, Indonesian government enacted a turnover tax scheme for taxpayers with previous year turnover of up to 4.8 billion IDR.[4] Under this scheme, eligible taxpayers are taxed at a final rate of 1 percent on the turnover in lieu of 25 percent on firms' profit. The level of previous annual turnover would dictate the type of regime that firms should follow for the current year. If a firm earned more than 4.8 billion in the current year, it is required to pay monthly income tax installments tax starting January next year. And vice versa, if a firm earned less than the threshold, it is required to pay monthly turnover taxes starting January next year. Moreover, some firms in certain industries, such as construction and real estate, specifically regulated by other special tax regimes are not eligible for the turnover tax scheme. Thus, I exclude construction and real estate firms in the estimation of behavioral responses

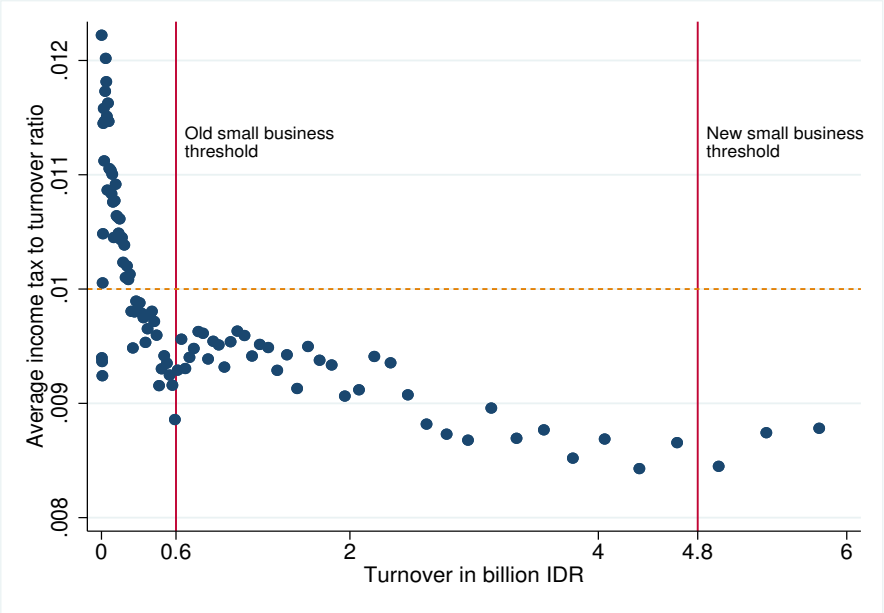
get the taxable income and eventually the income tax liability.

[3]Article 28 of Law number 6 year 1983 as already amended several times and the latest by Law number 28 year 2007 regarding General Provision and Procedures of Taxation.

[4]Government Regulation Number 46 year 2013 regarding taxation on business income of certain individual and corporate taxpayer.

because they may not affected by the turnover tax reform.

Figure 1.1: Average Corporate Income Tax in Indonesia, 2007-2012



Notes: The figure shows the scatter plot of average corporate income tax to turnover ratio in 100 equally sized bins before (2007-2012) the turnover tax reform. The left vertical line represents the old (2003) VAT registration and small firms threshold at 0.6 billion IDR and the right vertical line represents the new (2013) small firms threshold and the new (2014) VAT registration threshold. The horizontal-dashed line denotes the turnover tax rate of 1 percent applicable for taxpayer with turnover of up to 4.8 billion IDR.

Figure 1.1 shows that the average corporate income tax to turnover ratio prior (2007-2017) to the reform is less than the mandated turnover tax rate of around 1 percent. The average tax ratio between the old and new small firms thresholds is around 0.85 percent to 0.9 percent. In other words, the reform raises the average effective tax burden for small firms. Thus, all else equal, small firms might prefer income tax regime relative to turnover tax regime.

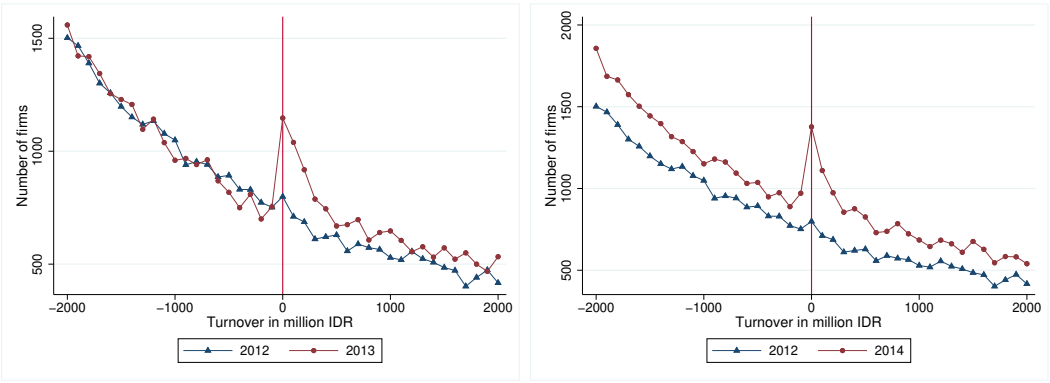
The reform simplifies tax regime for small firms yet does not remove the main costs of complying with income tax laws, e.g., book keeping practice and financial information reporting. The income tax compliance costs in Indonesia is substantial. Susila and Pope (2012) find that the cost of complying to income tax regime for Indonesian firms, on average, is around 28 percent of total compliance costs or approximately 3.14 percent of turnover. Thus, I expect that change in tax incentive would solely drive the firms' behavioral responses to the turnover tax eligibility threshold.

1.2.3 The 2014 Value Added Tax Reform

Following the turnover tax reform, in 2014, the government further simplifies taxation for small firms by increasing the VAT registration threshold from 0.6 billion

IDR to 4.8 billion IDR, corresponding to the turnover tax eligibility threshold. Firms with turnover below the VAT threshold are freed from VAT compliance costs of about 3 percent of turnover for firms with turnover above 3 billion IDR and around 11.2 percent of turnover for firms with turnover of up to 3 billion IDR (Susila and Pope, 2012). However, firms with turnover under the threshold are not allowed to claim input VAT. Thus, I expect that changes in both tax as well as non-tax (e.g., compliance costs and benefits) incentives would stimulate the firms' responses to the expanded VAT registration threshold.

Figure 1.2: Excess Mass: Single vs Multiple Thresholds



Notes: The figure shows the observed annual turnover distribution before (2012) and after (2013) the turnover tax reform as well as after (2014) the VAT reform. Panel A compares the 2012 turnover distribution (solid-triangle line) and the 2013 turnover distribution (solid-dotted line). Panel B compares the 2012 turnover distribution (solid-triangle line) with the 2014 turnover distribution (solid-dotted line).

Firms responses to the two reforms are well captured by Figure 1.2. Panel A shows that the turnover tax reform induces taxpayers to bunch just above the threshold. The 2012 distribution of turnover is a counterfactual for such responses. This type of bunching is known as bunching at a tax notch where the incentives change discontinuously. Surprisingly, Panel B shows that, after the 2014 VAT registration threshold increase, the shape of bunching changes into kink type of bunching as if the incentives change marginally. [5]This paper examine the mechanisms behind taxpayers responses to both turnover tax and VAT reforms. Specifically, the study looks at various incentives discontinuities at the threshold including tax rates as well as compliance costs and benefits.

[5]Appendix Figure A.1 shows decomposition of firms by tax regime before (2012-2013) and after (2014-2017) the expansion VAT registration threshold, indicating that firms bunch at different side of the threshold conditional on tax regime (turnover vs income taxes).

1.2.4 Data

The empirical analysis is based on the Indonesian tax administrative data set that contains population of corporate tax returns from 2007 to 2017. The data includes detailed information on revenue and expenses, fiscal adjustments, tax payments, tax credits, and, industry classification. The data contains composition of expenses which can be used to study the mechanism behind small firms responses to the tax scheme. The information on industry classification can be exploited to estimate heterogeneity of responses among the sectors. I restrict the data to cover only firms and not individuals because the number of individual taxpayers around the turnover tax threshold is smaller than that of firms and thus the distribution of the former is relatively noisier than the latter.

Table 1.1: Summary Statistics: Turnover Tax Reform

	Before reforms (2012)		After reforms (2014)	
Variables	Below threshold	Above threshold	Below threshold	Above threshold
Turnover (billion IDR)	0.485	106.08	0.426	95.591
	(0.864)	(947.919)	(0.786)	(948.196)
Direct inputs (billion IDR)	0.319	78.679	0.276	70.65
	(0.745)	(722.932)	(0.848)	(696.442)
Net income (billion IDR)	0.098	10.457	0.091	9.062
	(10.927)	(249.355)	(11.123)	(250.406)
Net fiscal adjustments (billion IDR)	0.025	3.181	0.104	3.774
	(7.028)	(70.078)	(5.403)	(91.926)
Income tax liabilities (million IDR)	6.297	1,879.215	2.865	1,607.941
	(256.032)	(38,344.33)	(193.892)	(53,560.04)
Turnover tax liabilities (million IDR)	n/a	n/a	1.926	3.237
	(n/a)	(n/a)	(5.879)	(16.814)
Number of firms				
Turnover > 0	242,279	66,278	268,829	84,571
Turnover $= 0$	148,846	-	193,225	-
Direct input to turnover ratio				
All firms	0.363	0.739	0.334	0.729
	(4.181)	(0.334)	(7.216)	(0.35)
Firms with non-zero turnover	0.587	0.739	0.575	0.729
	(5.301)	(0.334)	(9.453)	(0.35)
Fiscal adjustments to turnover ratio				
All firms	0.0566	0.0544	0.188	0.087
	(3.325)	(1.356)	(5.177)	(0.773)
Firms with non-zero turnover	0.0913	0.0544	0.324	0.087
	(4.226)	(1.356)	(6.78)	(0.773)

Notes: Statistics reported are means with standard deviations in parentheses in the year before (2012) and after (2014) the turnover tax and VAT reforms. All monetary variables are measured in constant 2010 IDR.

Table 1.1 displays the summary statistics of the variables before (2012) and after (2014) the turnover tax and VAT reforms. It can be seen that firms below the threshold have considerably smaller average annual turnover, input, profit, fiscal adjustments and income tax liabilities relative to those above the threshold both before and after the reforms. Moreover, except fiscal adjustments, all monetary variables

are lower in 2014 than in 2012. Firms below threshold have considerably larger increase in average fiscal adjustments (319 percent) relative to that of firm above the threshold (19 percent). This meaningful change might be caused by misreporting of income subject to final tax as well as fiscal adjustments by firms eligible for turnover tax. The discussion of this misreporting is discussed in Appendix C. The appendix indicates that different misinterpretation of the definition in income subject to final tax can be the driver of the misreporting. The discusion indicates that around 50 percent of firms report gross income as income subject to final tax and the rest of firms reports net income as income subject to final tax. The appendix concludes that the misreporting is not performed strategically and thus excluding it from the dataset would not much effect the analysis.

The table also shows that firms with no turnover account more than one third of firms below the threshold in 2012 and 2014. This makes the averages for firms below threshold look much smaller relative to those of firms above the threshold where they all have non-zero turnover. The financial ratios, namely direct input and fiscal adjustments to turnover tax ratios are presented into two categories, such as all firms and firms with non-zero turnover. The results demonstrate that the size of firms with zero turnover affects the averages of financial ratios.[6]

1.3 Theoretical Framework

1.3.1 Framework Set Up

I set up the framework based off the model developed by Kleven and Waseem (2013). I also consider VAT compliance costs as one of the drivers of bunching responses as in Harju et al. (2019). However, my framework handles multiple notches (downward and upward) that occur at the same threshold. This feature is absent from the contexts and models developed in the previous bunching studies.

The turnover tax and VAT thresholds cause several discontinuous increases in average costs of taxation such as tax rates (income tax and VAT) and compliance costs (income tax and VAT reporting requirements). Thus, the thresholds produce a notch in firms' budget set. Previous studies suggest that this notch can affect behavior which can be observed as an excess mass of firms located in the tax preferred side near the threshold in the turnover distribution.

Assume that a group of many firms producing a homogeneous good and selling their products to consumers. Consider perfectly elastic demand and the good's price is normalized to one. A firm is type a, capturing its productivity. Production of value added, $v = (1 - \alpha)y, 0 \leq \alpha < 1$, needs intermediate goods as inputs. Let α be the amount of inputs to produce one unit of revenue y. Consider firm's disutility from

[6]The tax payments as well as financial ratio for firms inside the window of bunching analysis which is -2,000 milion IDR to the left and 2,000 million IDR to the right of the threshold are provided by Appendix Table A.1 and A.2. These tables provide yearly summary of firms' characteristics examined in the bunching analysis.

producing output

$$\phi(y) = \frac{a}{1+1/e}\left(\frac{(1-\alpha)y}{a}\right)^{1+1/e} \tag{1.1}$$

where e is the elasticity of tax base with respect to the net-of-tax rate.

The firm maximizes quasi-linear utility $u(y) = c - \phi(y)$, where $c = (1-\alpha)y - \tau(y,\alpha) - t(y,\alpha) - \theta(y,\alpha)$, $\tau(y,\alpha)$ represents accrued VAT payment, $t(y,\alpha)$ denotes accrued income tax payments, and $\theta(y,\alpha)$ denotes VAT net compliance costs. The quasi-linear, isoelastic utility function before the implementation of turnover tax is as follow

$$\begin{aligned} u(y) &= \left(\frac{1}{1+\tau} - \alpha\right)y - ty - \theta(1-\alpha)y - \phi(y) \\ &= \left(1 - \frac{\tau}{(1+\tau)(1-\alpha)} - \frac{t}{(1-\alpha)} - \theta\right)(1-\alpha)y - \phi(y) \end{aligned} \tag{1.2}$$

The framework is designed to analyze tax and non-tax incentives produced by a turnover tax and VAT registration thresholds commonly imposed to small firms. The expansion of VAT threshold from 600 million IDR to 4.8 billion IDR is relatively large and thus firms near the new threshold may have different characteristics and respond differently to the policy.[7] However, the dataset indicates that firms around the old VAT threshold are similar to those near the new VAT. For example, both of them have inputs to turnover ratio and wages to turnover ratio of around 0.65 and 0.16 respectively. In addition, the Indonesian government defines large firms as those with annual turnover of above 50 billion IDR. Therefore, the utility maximization framework is practical in this analysis. Moreover, Liu and Lockwood (2016) suggest that the utility maximization framework is equivalent to the profit maximization framework under the assumption that production function is fixed-coefficients. [8]

I further assume that the firm is unable to pass VAT burden to consumers by increasing the price. This assumption is build on both theoratical literature (Keen and Mintz, 2004; Kanbur and Keen, 2014) and empirical evidence (Carbonnier, 2007; Benedek et al., 2015; Kosonen, 2015; Benzarti et al., 2017; Harju et al., 2018) studying the incidence of VAT. Likewise, I assume that the firm cannot pass the compliance costs and benefits to consumers through price increase. However, I implement various degree of tax incidence in the estimation of elasticity of taxable base to check for consistency.

1.3.2 Single Threshold

I start with the model coresponds to the 2013 turnover tax notch and extend it to include VAT notch starting in 2014. In 2013, a firm pays turnover tax instead of

[7] Appendix D shows that behavioral responses to the previous VAT threshold are relatively similar to those of the new threshold discussed in Section 1.5.

[8] Appendix Table A.1 shows that frms in the window of bunching analysis have relatively similar direct inputs to turnover ratio before (2012-2013) the VAT registration threshold expansion, suggesting a fixed-coefficient production function. Moreover, Appendix E provides a brief discussion on the comparability between utility and profit maximization frameworks in bunching analysis.

income tax when its annual turnover less than the threshold. In 2014, a firm eligible for turnover tax regime is exempted from the VAT system. Thus, I will abstract the VAT system from the analysis for 2013 (single threshold case) and incorporate it to the analysis for 2014-2017 (multiple threshold case).

I also exclude income tax compliance costs θ from the first part of the study because the costs do not change at the turnover tax threshold in 2013. The firm below the turnover tax threshold is still required to report turnover, expenses, profit, fiscal adjustments, and submit the corporate tax return as well as remitting VAT and reporting VAT monthly tax returns. I assume the disutility from producing output is $\phi(y) = \frac{a}{1+1/e}\left(\frac{y}{a}\right)^{1+1/e}$, instead of expression in Equation (1.1) because the tax base is turnover y and not value added $(1-\alpha)y$. The utility of a firm under and above the turnover tax threshold in 2013 is

$$u(y) = \begin{cases} (1-T)y - \phi(y) & \text{if} \quad y \leq y^* \\ (1-t)y - \phi(y) & \text{if} \quad y > y^* \end{cases} \tag{1.3}$$

where T is the turnover tax rate when $T > t$ (based on the statutory value of T and the observed value of t).

Solving maximization problem in Equation (1.3) for firms below y^* yields $y = a(1-T)^e$. Consider a smooth cumulative distribution of firms with productivity levels $F(a)$ and a related density function $f(a)$. The implications of this are $F(y) = F\left(\frac{y}{(1-T)^e}\right)$ and $f(y) = f\left(\frac{y}{(1-T)^e)}\right)\left(\frac{1}{(1-T)^e}\right)$. Therefore, absent any discontinuity at y^* a smooth turnover distribution exists.

Using the first-order condition $y = (a^* - \Delta a^*)(1-T)^e$, the utility for lowest-productivity firm (type L) as the marginal buncher at $y^* - \Delta y^*$ is [9]

$$u^L = (a^* - \Delta a^*)(1-T)^{e+1}\left(1 - \frac{e}{e+1}\right)$$

The utility for the highest-productivity firm (type H) at the notch point y^* is

$$u^H = (1-t)y^* - \frac{a^* - \Delta a^*}{1+1/e}\left(\frac{y^*}{a^* - \Delta a^*}\right)^{1+1/e}$$

Given $u^L = u^H$ and $a^* - \Delta a^* = \frac{y^* - \Delta y^*}{(1-t)^e}$, the following expression can be derived

$$(a^* - \Delta a^*)(1-T)^{e+1}\left(1 - \frac{e}{e+1}\right) = (1-t)y^* - \frac{a^* - \Delta a^*}{1+1/e}\left(\frac{y^*}{a^* - \Delta a^*}\right)^{1+1/e} \tag{1.4}$$

The indifference condition in Equation (1.4) can be rearranged as

$$\left(1 - \frac{\Delta y^*}{y^*}\right) + e\left(1 - \frac{\Delta y^*}{y^*}\right)^{-1/e} - (e+1)\left(\frac{1-t}{1-T}\right) = 0 \tag{1.5}$$

[9] Under a downward notch, the best interior location y^I corresponds to $y^* - \Delta y^*$ because the marginal buncher's budget set does not change (Kleven, 2016).

This formula provides a relationship between tax elasticity, the behavioral response of the marginal buncher relative to the threshold $\frac{\Delta y^*}{y^*}$, and the effective tax rates below (T) and above (t) the threshold. The above expression is the formula for bunching at a downward notch where average tax rate discretely falls at the threshold.

1.3.3 Multiple Thresholds

In 2014, Indonesian government increased the VAT registration threshold from 600 million to 4.8 billion IDR, equalizing the turnover tax threshold. Therefore, there are three notches at the same level of turnover, namely VAT rate, turnover tax rate, and VAT compliance costs. In this combined tax notches regime, the firm's utility is

$$u(y) = \begin{cases} (1 - \frac{\tau\alpha}{1-\alpha} - \frac{T}{1-\alpha})(1-\alpha)y - \phi(y) & \text{if} \quad y \leq y^* \\ \big(1 - \frac{\tau}{(1+\tau)(1-\alpha)} - \frac{t}{1-\alpha} - \theta\big)(1-\alpha)y - \phi(y) & \text{if} \quad y > y^* \end{cases} \tag{1.6}$$

Rearranging the previous equation, I get the following expression

$$u(y) = \begin{cases} (1 - \gamma^B)(1-\alpha)y - \phi(y) & \text{if} \quad y \leq y^* \\ (1 - \gamma^A - \theta)(1-\alpha)y - \phi(y) & \text{if} \quad y > y^* \end{cases} \tag{1.7}$$

where $\gamma^B = \big(\frac{\tau\alpha}{1-\alpha} + \frac{T}{1-\alpha}\big)$ and $\gamma^A = \big(\frac{\tau}{(1+\tau)(1-\alpha)} + \frac{t}{1-\alpha}\big)$ denote the effective tax rates below and above the threshold, $\gamma_B < \gamma_A$ when $0 \leq \alpha \leq 1$.

The selection criteria for tax regime is the following

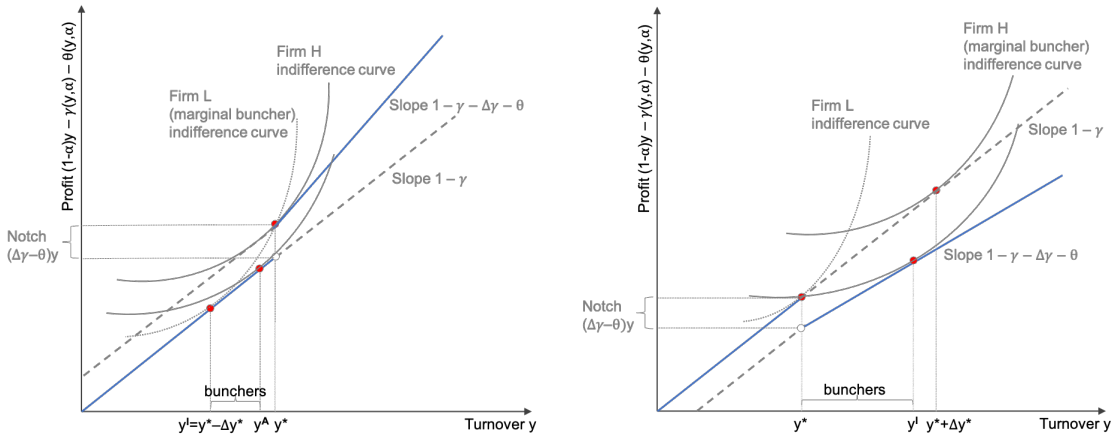
$$y = \begin{cases} y \leq y^* & \text{if} \quad \gamma^B < \gamma^A - \theta \\ y > y^* & \text{if} \quad \gamma^B > \gamma^A - \theta \end{cases} \tag{1.8}$$

The above selection equation describes the relationship between tax regimes, tax rates above and below the threshold, and compliance costs (benefits).

Budget sets in Figure 1.3 illustrate bunching at multiple (turnover tax and VAT) thresholds. $\Delta\gamma$ represents the discontinuous change in average effective total tax burden when the turnover tax and VAT thresholds are surpassed. Panel A displays a condition when average costs of taxation falls at the threshold or known as an downward notch. In this panel, Firm L represents the marginal buncher with turnover $y^* - \Delta y$ in the absence of the threshold with ability $a^* - \Delta a^*$. This firm is indifferent between locating at y^* or $y^* - \Delta y$. Thus, there will be bunching at the threshold for firms with abilities within the range $[a^* - \Delta a^*]$. Panel B illustrates a situation when average costs of taxation jumps at the threshold or known as a upward notch. In this panel, Firm H represents the marginal buncher with turnover $y^* + \Delta y$ in the absence of the thresholds with ability $a^* + \Delta a^*$. This firm is indifferent between locating at y^* or y^I. Thus, there will be bunching at the threshold for firms with abilities within the range $[a^* + \Delta a^*]$.

Figure 1.3: Behavioral Responses to Tax Notches

Panel A: Budget Set Diagram: Downward Notch Panel B: Budget Set Diagram: Upward Notch



Notes: The figure shows behavioral responses to an average tax costs fall (downward notch) and to an average tax costs jump (upward notch) in two budget set diagrams. Panel A illustrates behavioral responses to falls in total average costs of taxation such as tax rates, and compliance costs (benefits). Panel B illustrates behavioral responses to jumps in total average costs of taxation. In Panel A, firms in the intervals $[y^I, y^A]$ and $[y^A, y^*]$ will bunch at as well as move strictly above the threshold, respectively. In Panel B, firms in the interval $[y^*, y^I]$ will bunch at the threshold.

1.3.3.1 Downward tax notch: taxpayers in the income tax regime

Similar to the downward notch in turnover tax regime, I can state $u_D^L = u_D^H$ where D refers to the downward tax notch analysis. Using the first-order condition $y(1-\alpha) = (a^* - \Delta a^*)(1 - \gamma^B - \theta^B)^e$, the utility for lowest-productivity firm (type L) as the marginal buncher at the best interior location y^I or $y^* - \Delta y^*$ is

$$u_D^L = (a^* - \Delta a^*)(1-\gamma^B)^{e+1}\left(1 - \frac{e}{e+1}\right)$$

The utility for the highest-productivity firm (type H) at the notch point y^* is

$$u_D^H = (1 - \gamma^A - \theta)(1-\alpha)y^* - \frac{a^* - \Delta a^*}{1 + 1/e}\left(\frac{(1-\alpha)y^*}{a^* - \Delta a^*}\right)^{1+1/e}$$

From the condition $u_D^L = u_D^H$ and the relationship $a^* - \Delta a^* = \frac{y^* - \Delta y^*}{(1-\gamma^B)^e}$, the following expression can be derived

$$(a^* - \Delta a^*)(1-\gamma^B)^{e+1}\left(1 - \frac{e}{e+1}\right) = (1 - \gamma^A - \theta)(1-\alpha)y^* - \frac{a^* - \Delta a^*}{1 + 1/e}\left(\frac{(1-\alpha)y^*}{a^* - \Delta a^*}\right)^{1+1/e} \tag{1.9}$$

The indifference condition in Equation (1.9) can be rearranged as

$$\left(1 - \frac{\Delta y^*}{y^*}\right) + e\left(1 - \frac{\Delta y^*}{y^*}\right)^{-1/e} - (e+1)\left(\frac{1 - \gamma^A - \theta}{1 - \gamma^B}\right) = 0 \tag{1.10}$$

This expression explains the relationship between tax elasticity, the response of the marginal buncher, the tax rates above and below the threshold, and VAT compliance costs (benefits) in the context of downward tax notch analysis.

1.3.3.2 Upward tax notch: taxpayers in the turnover tax regime

The utilities of marginal buncher H and the firms with lowest-productivity L locating at y^* are indifference, suggesting that $u_U^L = u_U^H$ where U denotes the upward tax notch analysis. For a type-L firm, the utility is the following

$$u_U^L = y^*(1-\alpha)(1-\gamma^B) - \frac{a^* + \Delta a^*}{1+1/e}\left(\frac{y^*(1-\alpha)}{a^* + \Delta a^*}\right)^{1+1/e} \tag{1.11}$$

For a type-H firm, based on the maximization of utility above y^* in Equation (1.3), i.e. $y^*(1-\alpha) = (a^* + \Delta a^*)(1-\gamma^A-\theta)^e$, the utility is the following

$$u_U^H = (a^* + \Delta a^*)(1-\gamma^A-\theta)^{e+1}\left(1 - \frac{e}{e+1}\right) \tag{1.12}$$

From the condition $u_U^L = u_U^H$ and using the relationship $(y^* + \Delta y^*)(1-\alpha) = (a^* + \Delta a^*)(1-\gamma^B)^e$, the following expression can be derived

$$\begin{aligned} &y^*(1-\alpha)(1-\gamma^B) - \frac{a^* + \Delta a^*}{1+1/e}\left(\frac{y^*(1-\alpha)}{a^* + \Delta a^*}\right)^{1+1/e} \\ &= (a^* + \Delta a^*)(1-\gamma^A-\theta)^{e+1}\left(1 - \frac{e}{e+1}\right) \end{aligned} \tag{1.13}$$

The indifference condition in Equation (1.13) can be rewritten as

$$\frac{1}{1+\frac{\Delta y^*}{y^*}} - \frac{e}{e+1}\left(\frac{1}{1+\frac{\Delta y^*}{y^*}}\right)^{1+1/e} - \frac{1}{e+1}\left(\frac{1-\gamma^A-\theta}{1-\gamma^B}\right)^{e+1} = 0 \tag{1.14}$$

This expression explains the relationship between tax elasticity, the response of the marginal buncher, the tax rates above and below the threshold, and VAT compliance costs in the context of upward tax notch analysis.

1.4 Empirical Strategy

1.4.1 Bunching Estimation

In general, bunching estimator can be defined as an estimation of the excess mass of taxpayers at the threshold by comparing the density of taxpayers bunching at the threshold with the density of taxpayers at the same turnover level in the absence of the threshold. The key procedure is to remove the influence of the threshold from the observed turnover distribution to obtain a counterfactual distribution. Thus, the

identifying assumption of the causal interpretation is that the distribution of turnover would have been smooth if there were no discontinuity in average costs of taxation, in this case tax burden and net compliance costs.

The eligibility turnover and VAT registration threshold set by the reforms at the turnover value y^* persuade excess mass at the threshold for firms that fail to optimize the turnover tax or VAT registration. The bunching is motivated by the productivity parameter a. It will create an excess mass by firms that would have reported a turnover between y^* and $y^* + \triangle y^*$ in the absence of the threshold as the following integration equation:

$$B(y^*) = \int_{y^*}^{y^*+\triangle y^*} g(y)d(y) \simeq g(y) \triangle y^* \tag{1.15}$$

where $B(y^*)$ is the excess mass and $g(y)$ is the counterfactual density of the turnover distribution absent the threshold.

I estimate the bunching responses caused by the turnover tax and VAT thresholds by comparing the observed excess mass in the turnover distribution above (below) the threshold to the counterfactual density that would occur in the absence of the discontinuity at the thresholds. This bunching estimate consists of average tax rate and net compliance costs. Following Chetty et al. (2011), Kleven and Waseem (2013), to estimate the counterfactual density, I fit a flexible polynomial function to the observed turnover distribution, excluding a range around the threshold.

I group firms into turnover bins of 100 million IDR and estimate a counterfactual density by regressing the following equation and excluding the region around the threshold $[y_B, y_A]$ from the regression

$$c_j = \sum_{l=0}^{q} \beta_i (y_j)^l + \sum_{i=y_B}^{y_A} \theta_i \mathbf{1}(y_j = i) + \varepsilon_j \tag{1.16}$$

where c_j is the count of firms in turnover bin j, y_j is the level of turnover in bin j, q is the order of the polynomial, and θ_i is dummy for the excluded region. The range (y_B, y_A) specifies turnover bins near the threshold where bunching exists and thus excluded from the regression. The excess bunching mass start from lower bound of the excluded turnover region, y_B, to the upper bound of the excluded region y_A. ε_j is the error term of the turnover density equation.

The counterfactual distribution estimate is the predicted bin counts $\hat{c_j}$ from Equation (1.16) excluding the dummies in the omitted region $[y_B, y_A]$. The excess bunching is defined as the difference between the observed and the predicted bin counts over the region near the turnover and VAT thresholds. I estimate y_A iteratively so that the region below counterfactual density (B) is equal to the region above the observed density (A) such as the following:

$$\hat{B} = \sum_{i=y_B}^{y^*} (\hat{c_j} - c_j) \quad \text{and} \quad \hat{A} = \sum_{i=y^*}^{y_A} (c_j - \hat{c_j}) \tag{1.17}$$

I raise repeatedly the value of y_A until the excess mass (A) equals the missing mass (B). I then estimate the relative excess bunching $\hat{b}$ by dividing the excess mass from the excluded region by the average excess mass in the same region

$$\hat{b}(y^*) = \frac{\sum_{i=y_B}^{y^*}(\hat{c_j} - c_j)}{\sum_{i=y_B}^{y^*} \frac{\hat{c_j}}{N_k}} \quad \text{or} \quad \hat{b}(y^*) = \frac{\sum_{y^*}^{i=y_A}(c_j - \hat{c_j})}{\sum_{y^*}^{i=y_A} \frac{\hat{c_j}}{N_j}} \tag{1.18}$$

where N_k is the number of bins within $[y_B,\, y^*]$ and N_j is the number of bins within $[y^*,\, y_A]$.[10]

1.4.2 Discontinuity Estimation

To estimate discontinuities in tax outcomes, e.g., turnover, direct input, and income tax liabilities at the threshold, I use a regression discontinuity estimator discussed in Calonico et al. (2014). The key identifying assumption of the estimator is that the assignment variable, i.e. turnover can not be manipulated and thus observed bunching at the threshold would be undesirable. Under no manipulation of the running variable, the discontinuity can be interpreted as the causal effect of the policy. However, this paper do not attempt to estimate the causal effect of the turnover tax on firms' outcomes but study the nature of manipulation around the threshold (e.g., turnover scalling down vs turnover misreporting). Therefore, the key identifying assumption of the estimator will be relaxed in this analysis.

This paper uses estimates in discontinuity around the threshold from the years prior to the reforms as counterfactuals, assuming that but for the reform, the running variable just above and below the threshold would be similar and not manipulated by firms. The manipulation of running variable would be suggested by the presence of bunching at the threshold. Figure 1.2 shows that there is no observable bunching at the threshold before (2012) the implementation of turnover tax. Therefore, firms' manipulation on turnover as well as other outcomes (e.g., direct inputs, income tax payments) near the threshold after 2012 can be solely attributed to the reform.

1.5 Results

1.5.1 Bunching at Single Threshold

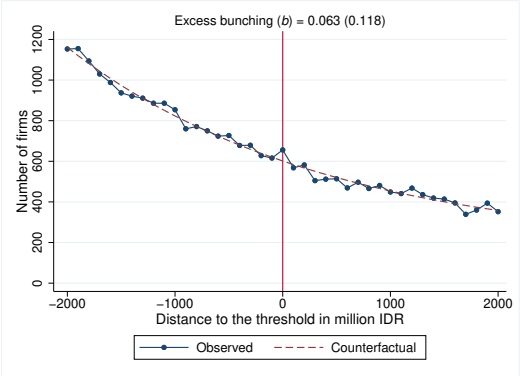
Figure 1.4 displays the turnover distributions for all firms around the turnover tax threshold before (2012) and after (2013) the implementation of turnover tax scheme. Panel A shows that there is no observable bunching at the threshold in 2012, suggesting that any behavioral response to the threshold after the implementation of the turnover tax can be solely attributed to the reform. Moreover, Panel B shows that excess bunching at the threshold emerges and is statistically significant (1.173

[10] In initial bunching papers, e.g., Chetty et al. (2011), the $\hat{b}$ estimator is defined as the ratio of excess mass over the height of the counterfactual density at the threshold.

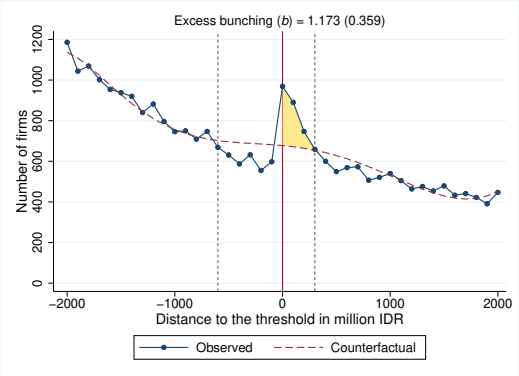
(0.359)). This excess bunching indicates a type of bunching at downward notch where average tax rate discretely falls at the threshold.[11]

Figure 1.4: Behavioral Responses to Single Threshold

Panel A: All Firms in 2012



Panel B: All Firms in 2013



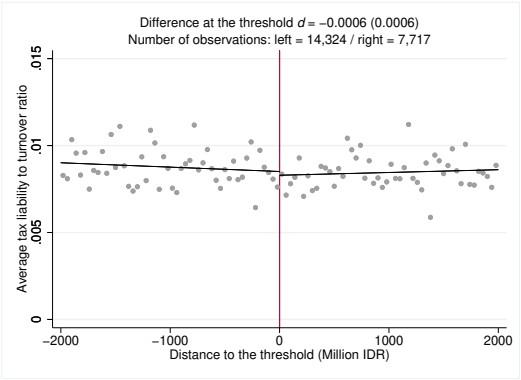
Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

This bunching responses are driven by the jump in tax incentives where the 1 percent turnover tax rate imposed by the government is relatively higher than the average income tax to turnover ratio around the threshold which is around 0.85 percent (See Figure 1.1). Panel A and B of Figure 1.5 shows that the conditional expectation function estimates at the threshold is around 0.85 percent. Panel C further shows that firms around the notch with previous year turnover of above the threshold and thus ineligible to the turnover tax regime also have tax liability to turnover tax ratio of around 0.85 percent. On the other hand, the conditional expectation of average tax liability to turnover tax ratio for firms eligible to the turnover tax threshold are around 0.95 percent to 1 percent.

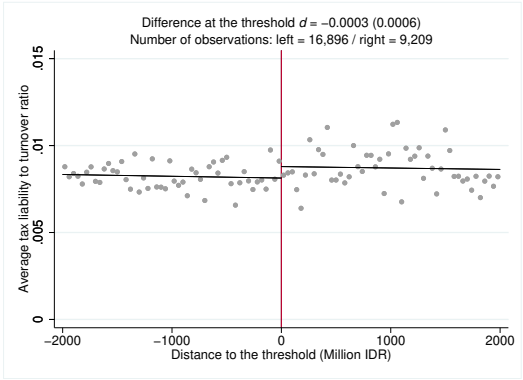
[11] Appendix Table B.1 shows that the excess bunching estimates are relatively similar under seveth-order polynomial counterfactual but overestimated when third-order polynomial is used to construct counterfactual distribution.

Figure 1.5: Tax Liability to Turnover Ratio (2011-2013)

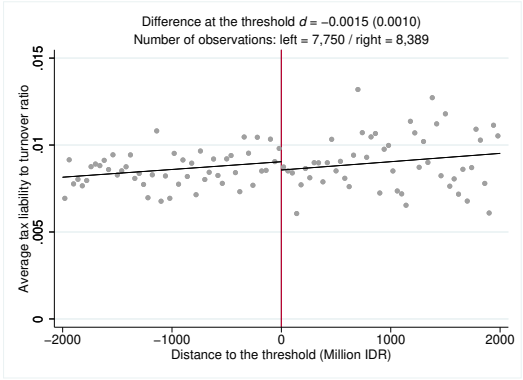
Panel A: All Firms (2011)



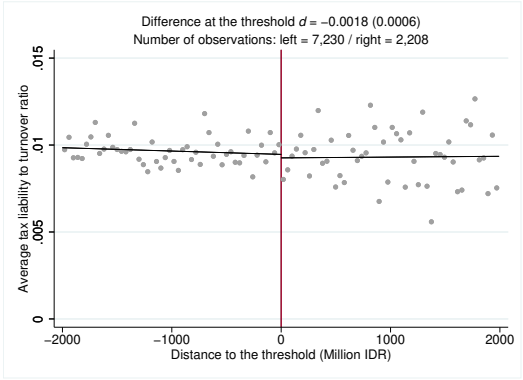
Panel B: All Firms (2012)



Panel C: Ineligible Firms (2013)



Panel D: Eligible Firms (2013)



Notes: The figure plots the average tax liability to turnover ratio near the threshold before (2011-2012) and after (2013) the turnover tax reform. Panel A and B depicts the ratio for all firms. Panel C and D depicts the ratio for firms with previous year turnover above (ineligible) and below (eligible) the turnover tax eligibility threshold respectively. The tax liability in panel A, B, and C includes only income tax liability. The tax liability in panel D includes both income tax and turnover tax liabilities because the turnover tax ragime was implemented in July 2013. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

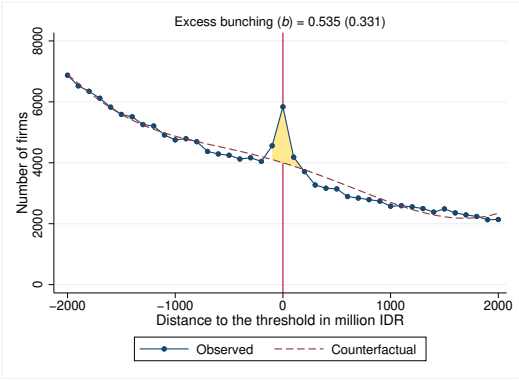
1.5.2 Bunching at Multiple Thresholds

Figure 1.6 presents bunching around the threshold after (2014-2017) the expansion of VAT registration threshold. Despite the discontinuity in tax rates and compliance costs at the threshold, panel A shows that the threshold induces a kink pattern instead of a notch pattern. However, the turnover tax and VAT threshold expansion introduce no marginal change in both tax incentives or compliance costs around the threshold. In fact, when taxpayers are grouped by tax regimes (e.g., income tax and turnover tax), the kink regime would disappear and two notches appear as demonstrated in

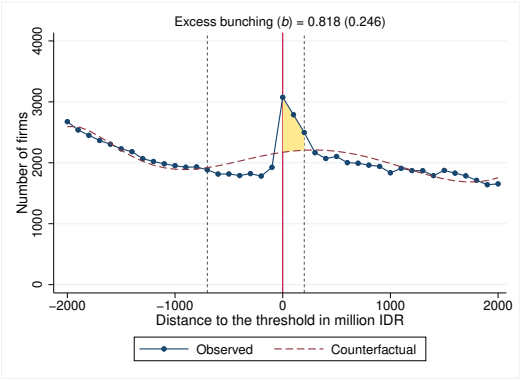
panel B and C.[12]

Figure 1.6: Behavioral Reponses to Multiple Thresholds (2014-2017)

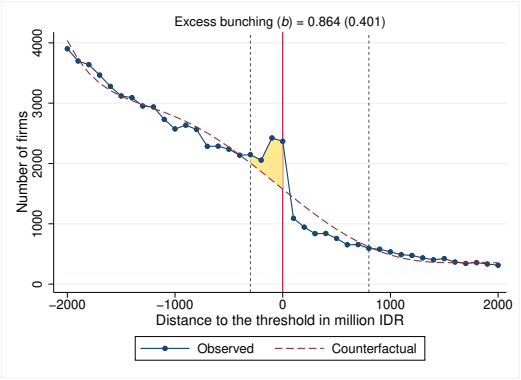
Panel A: All Firms



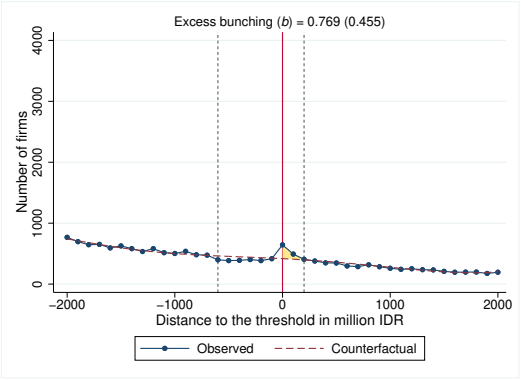
Panel B: Firms in the Income Tax Regime



Panel C: Firms in the Turnover Tax Regime



Panel D: Firms in the Mixed Regime



Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover after the turnover tax reform and VAT threshold expansion in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

Panel B shows the distribution of turnover for firms with previous year turnover more than the threshold and thus subject to income tax regime. It presents a clear evidence of a downward tax notch for firms subject to income tax regime. This notch occurred in 2013 and was induced by the turnover tax reform (see Figure 1.2 and 1.4) and continue to exist even after the VAT registration threshold was increased to

[12]Appendix Figure B.2, B.3, B.4, B.6, and B.7 present observed bunching by year, tax regime, industry, and type of firm. The figures suggest that bunching responses to both turnover as well as VAT registration thresholds are relatively observable in all major industries, particularly trade and manufacturing. The figures also shows that responses from partneships are slightly larger than corporations.

the same level of turnover tax threshold. The number of firms bunching near the tax notch is around 1,787 and the excess mass is meaningful and statistically significant (0.818 (0.246)).[13]

Panel C present the distribution of turnover for firms with previous turnover of up to 4.8 billion IDR and thus are required to be in the turnover tax regime. It shows an evidence of an upward tax notch for firms subject to turnover tax regime. The notch occurred after the government increase the VAT registration threshold in 2014. The firms in the bunching area are those with last year turnover less than or equal to the threshold. The number of buncher near the tax notch is around 1,824 and the excess bunching is around 0.864.

1.5.3 Mechanism: Real vs Evasion Responses

This section discusses whether the mechanism of bunching responses to the threshold is real economic responses (e.g., change in real output) or evasion responses (e.g., manipulation of turnover). Studying the mechanism of responses sheds light on whether the estimated elasticities of taxable base represents long-run or short-run effects of tax reforms. Real responses produce lasting impacts relative to behavioral responses and thus the differentiation is essential for welfare analysis (Seim, 2017). Slemrod (1995) indicates that evasion and avoidance responses, as opposed to real responses, to tax reforms would emerge when circumstances (e.g., enforcement, tax loopholes) are favorable.

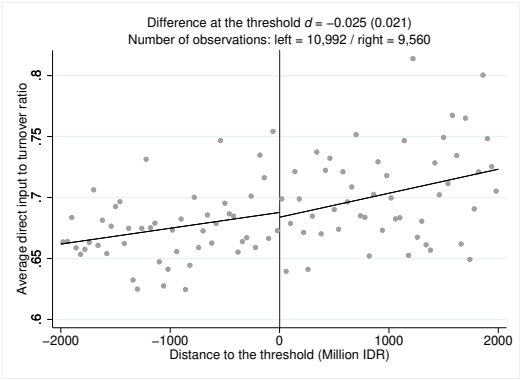
Liu and Lockwood (2016) find evidence on evasion responses in the form of misreporting turnover to avoid VAT threshold. The study detects the misreporting by observing that firms just below the threshold have higher direct input to cost ratio relative to those just above the threshold. On the other hand, Harju et al. (2019) find real responses to the threshold indicated by a jump in direct input at the threshold. The jump implies that firms just below the threshold have higher value added and thus profit margin relative to those just above the threshold.

Before discussing the responses to the VAT threshold, I provide suggestive evidence on the mechanism behind the bunching responses to the turnover tax regime in 2013. Panel A of Figure 1.7 demonstrates that no discontinuity in direct input to turnover ratio after the implementation of turnover tax in 2013. Panel C further shows that there is no statistically significant discontinuity in commercial net income in 2013. The results suggest that firms that bunch just above the threshold increase proportionally their turnover and direct input to avoid falling into the turnover tax regime. In other words, the results provide evidence on real economic responses to the turnover tax regime.

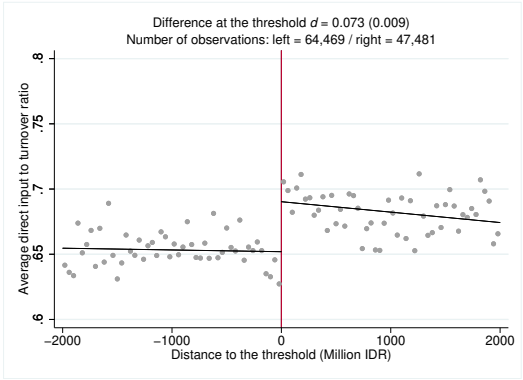
[13] Appendix Figure B.1 plots estimates for excess bunching after the reforms for each tax regime. The figures demonstrates that excess bunching estimates in the income tax regime has been slightly decreasing while those of the turnover tax regime has been consistently increasing.

Figure 1.7: Direct Input and Commercial Net Income

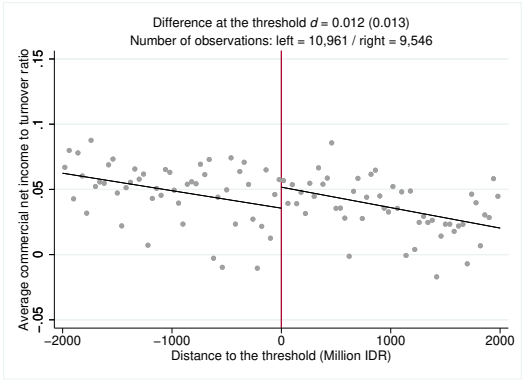
Panel A: Direct Input (2013)



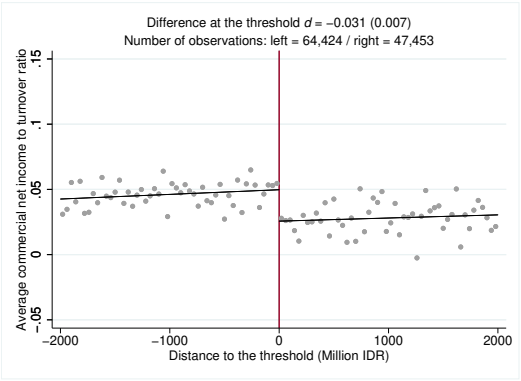
Panel B: Direct Input (2014-2017)



Panel C: Commercial Net Income (2013)



Panel D: Commercial Net Income (2014-2017)



Notes: The figure plots the average direct input to turnover ratio (panel A and B) and the average commercial net income to turnover ratio (panel C and D) around the threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Moreover, panel B of Figure 1.7 demonstrates that direct input to turnover ratio jumps around 7.3 percentage point at the notch after the expansion of VAT regristration threshold in 2014, leading to a fall in the commercial net income to turnover tax ratio of about 3.1 percentage point as shown in panel D. The results suggest that firms disproportionately reduce direct input as they reduce output in order to avoid the registration threshold. Thus, the discontinuity in direct input to turnover ratio can be thought as a suggestive evidence for evasion responses to the VAT threshold.

1.5.4 Estimates for Compliance Costs and Tax Elasticity

I estimate the VAT compliance costs and tax elasticity using models outlined in Section 1.3 and behavioral responses estimated in Section 1.5. I independently solve

Equation (1.5) in the case of single threshold and simultaneously solve Equations (1.10) and (1.14) in the case of multiple thresholds to recover the estimates using observed value of α, γ^A, γ^B, and the estimates of the percentage sales response $\frac{\Delta y^*}{y^*}$. I also consider the VAT compliance costs estimate from Susila and Pope (2012) as part of the total compliance costs estimated in the multiple notch setting.

Table 1.2 presents the estimates for compliance costs and tax elasticity with respect to reported value added. The table shows that the tax elasticity in the single notch in 2013 is around 0.727. I assume no discontinuity in compliance costs since the bookkeeping regulations have not been repealed. The results suggest that tax incentive was the single motivation for firms around the notch under the single threshold condition to bunch above the notch and avoid the turnover tax regime in 2013.

Table 1.2: Elasticity of Tax Base and Compliance Costs

	Compliance costs (θ)	Tax elasticity (e)	
		$\theta > 0$	$\theta = 0$
Single tax notch (2013)	-	-	0.727
			(0.000)
Multiple tax notches (2014-2017)	-0.157	1.020	1.290
	(0.000)	(0.000)	(0.000)

Notes: the table presents the estimates for elasticity of tax base and compliance costs. To obtain the estimates, I solve conditions in Equations (1.5), (1.10), and (1.14) by using values for α, γ^A, γ^B, and $\frac{\Delta y^*}{y^*}$.

I also find that the compliance costs are about -15.7 percent of the value added, suggesting that moving from income tax and VAT to turnover tax forgoes non-tax incentives around 4.7 percent of the turnover. Given that the average VAT compliance costs for firms with turnover from 3 billion to 10 billion IDR are about 3 percent of turnover Susila and Pope (2012), the results suggest that the compliance benefits of being in the income tax regime for firms above the threshold are around 1.7 percent of the turnover.[14]

Moreover, I find the tax elasticity under multiple thresholds is about 1.020 and is larger than that of the single threshold. It may suggest that firms are more responsive to the VAT system relative to the income tax. Finally, the tax elasticity increases to 1.290 if the non-tax incentives are absent in the estimation. The results suggest that firms respond not only to change in tax incentives but also to change in non-tax incentives.

[14]The compliance benefits estimate is likely to be an upper bound because VAT compliance costs for firms with turnover of 4.8 billion is potentially larger than the average VAT compliance costs of around 3 percent. The regressiveness of VAT compliance costs suggests that firms with turnover of 3 billion IDR would pay compliance costs of more than 3 percent while those with turnover of 10 billion IDR would pay compliance costs of less than 3 percent. Thus, this regressivity indicates that the VAT compliance costs estimate for firms at the threshold is larger than the average VAT compliance costs of 3 percent.

1.6 Conclusion

Governments often impose a presumptive tax regime to and exclude small firms from VAT system in order to reduce compliance costs that are regressive as well as cut monitoring costs. These policies require a certain eligibility threshold to keep firms with sufficient administrative capacity stay in the preferable yet more complex tax systems (e.g., income tax and value added tax). Previous studies show that threshold creates discontinuity in tax incentives as well as compliance costs and drives firms to bunch just below or above it. However, few works have been conducted on multiple thresholds where turnover tax elibility and VAT registration threshold are the same.

This paper studies the behavioral responses to the implementation of turnover tax system in 2013 as well as the expansion of VAT registration threshold in 2014. I find that firms bunch just above the threshold in 2013 to avoid the turnover tax regime which imposes relatively higher tax burden relative to income tax regime. In 2014, firms in the turnover tax regime bunch just below the threshold to avoid the VAT registration threshold. Despite the emergence of the upward notch for firms in the turnover tax regime in 2014, the upward notch for firms in the income tax regime persist but slightly moderated through 2017 due to net compliance benefits.

I also document some suggestive evidence on mechanism of bunching responses to the turnover tax eligibility and VAT registration threshold. In 2013, firms proportionately increase direct input as they increase output to avoid falling into the turnover tax regime, suggesting that the bunching responses can be considered as real economic responses. However, in 2014, firms in the turnover tax regime disproportionately decrease direct input and thus get higher profit margin as they reduce output to avoid the VAT system, implying that the bunching responses can be seen as tax evasion responses.

The findings suggest that firms can respond differently to a tax notch particularly when it involves multiple tax regimes and heterogeneity in profit margin. Moreover, the findings consistent with the previous works studying a single tax threshold (e.g., VAT, turnover tax, profit tax) which document that tax incentives as well as non-tax incentives such as compliance costs and benefits are the main drivers to bunching responses to a tax notch. Finally, the findings imply that governments should decompose the behavioral responses to a threshold if it involves multiple tax regimes.

Chapter 2

Tax Evasion and Forgiveness: Evidence from the Indonesian Tax Amnesty Program

2.1 Introduction

One of the key factors in tax revenue collection is governments capacity to verify the accuracy of self-reported tax base and enforce compliance (Slemrod and Gillitzer, 2013). A growing literature suggests that third-party reporting, paper trails, and whistle-blowers provide information on tax base such as income and value added that can be used by governments to improve the reporting accuracy and bolster the enforcement capacity.[1] In other words, the enforcement capacity would be seriously compromised when governments have limited accesible information on tax base. The variation in availability of information on tax base can explain the stark differences in tax revenue to GDP ratio between developed and developing countries (Gordon and Li, 2009; Besley and Persson, 2014; Kleven et al., 2016).

The vital role of information in taxation can also explain the fact that governments in developing countries often rely on the value added tax (VAT) as well as the presumptive taxes instead of the income taxes. The VAT is generally known for its self-enforcing mechanism due to invoice trail on transactions between parties (Bird et al., 2007; Keen and Lockwood, 2010). Empirical evidence shows that the self-enforcing property of VAT invoice plays important role in increasing governments enforcement capacity (Pomeranz, 2015; Naritomi, 2019). Moreover, developing countries often implement presumptive taxes instead of income taxes presumed tax bases such as turnover and assets are easier to observe and verify relative to income (Tanzi and De Jantscher, 1987). Empirical evidence indicates that presumptive taxes such as turnover tax reduce tax evasion (Best et al., 2015). Despite the empirical works on tax evasion in the context of VAT and presumptive taxes, few works have been conducted to study tax evasion in the context of income tax system, particularly in developing countries.

This paper uses quasi-experimental variation from the Indonesian tax amnesty that provides incentive for tax evaders to confess their evasion and the population of tax administrative data to study the determinants of income tax evasion and the

[1] An expanding literature on tax compliance highlights that third-party information on tax base can be used by governments to verify the accuracy of self-reported tax base. Kleven et al. (2011) finds a significant evasion in a group of taxpayers with less third-party data while almost no evasion in a control group subject to withholding tax. Pomeranz (2015) and Naritomi (2019) find that taxpayers with more transactions backed by VAT invoices have less evasion than those with less transactions involving VAT invoices. Slemrod (2019) provides a nice survey on tax compliance, emphasizing that external factors such as third-party data, audit rate, and penalty motivate compliance rather than internal factors such as tax morale, etc.

compliance effects of forgiving tax evaders. The program offers an opportunity for tax evaders to declare their unreported net assets, as equivalent of unreported income, be taxed a set of lower tax rates ranging from 2 to 10 percent conditional on location of assets and timing of declaration instead of regular income tax rates which has top marginal tax rates of 30 to 35 percent and freed from all penalties.

The program was designed to collect additional tax revenue from past unreported income to finance a major fiscal deficit in 2016 as well as to improve future compliance. Many governments in both developed and developing countries have implemented tax amnesties to generate short-term revenue (Le Borgne and Baer, 2008; Mikesell et al., 2012). A laboratory experiment shows that tax amnesty can also increase long-term revenue stream when accompanied by stricter enforcement (Alm et al., 1990). The Indonesian tax amnesty was introduced shortly after the massive leak from offshore financial institutions known as the "Panama Paper" published by the International Consortium of Investigative Journalists (ICIJ) on April 2016 containing the names and adresses of the owner of shell companies. (Alstadsæter et al., 2018) indicate that Indonesian wealthy individuals have the highest propensity to own offshore wealth relative to wealthy individuals in other countries. Recent studies reveal that providing amnesty to offshore tax evaders increases long-term revenue when bundled with higher probability of detection due to novel third-party information such as information exchange with tax haven countries and whistle-blowers (Johannesen et al., 2018; Alstadsæter et al., 2019). Moreover, tax amnesty can be a reasonable policy to recover some of the evaded taxes when administrative costs to enforce tax evaders are significant (Langenmayr, 2017).

I divide my analysis into two parts. First, I study the determinants of tax evasion by exploiting variation in the participation of taxpayers in the Indonesian amnesty program. I use logit specification to assess various factors such as withholding tax, level of income, and types of employment, that may affect the probability of participation which highly correlates with past tax evasion. I estimate that self-employed individuals in the top income distribution (i.e. decile 10) with no withholding tax have and with fully tax-withheld income have the probability of conducting tax evasion and participating in the amnesty of around 80 percent and 55 percent respectively. On the other hand, the probability of participation of wage earners in the top income decile with no withholding tax as well as with fully tax-withheld income are about 45 percent and 20 percent respectively.

Second, I study the impacts of tax amnesty on taxpayer compliance. I exploit the variation in the intensity to withholding tax mechanism as well as the level of income to analyze the change in reported net income. Specifically, I use quantile generalized difference-in-differences to compare reported net income changes in taxpayers that face insignificant withholding tax mechanism (self-empoyed) versus taxpayers that face intensive withholding mechanism (wage earner) by income percentile. I find that reported net income do not change except in percentile 100 by about 6.1 percent on average as a result of the amnesty program.

This paper contributes to the broad literature on tax compliance (Andreoni et al., 1998; Slemrod and Yitzhaki, 2002; Alm, 2019; Slemrod, 2019) by providing evidence on various factors that motivate taxpayers' decision to evade taxes. Specifically, this

paper reinforces an argument that third-party information has a vital role in nurturing compliance (Kleven et al., 2011; Pomeranz, 2015; Naritomi, 2019). This paper also contributes to the literature which argues that the variation in the level of income greatly influences how taxpayers respond to changes in tax administration (Slemrod et al., 2001).

Furthermore, the this paper contributes to the literature on the impacts of tax amnesty (Le Borgne and Baer, 2008; Mikesell et al., 2012). Many tax jurisdictions implemented tax amnesty to generate short-term revenue as well as to revitilize longer-term revenue collection. This paper provides new causal evidence on compliance impacts of tax amnesty program using quasi-experimental variation strategy. The results reinforce previous findings from laboratory experiment which suggests that tax amnesty can improve longer-term compliance if post-amnesty enforcement is strengthen (Alm et al., 1990).

2.2 Institutional Background and Data

This section presents institutional background on the Indonesian tax amnesty and the details of the policy that are essential for the empirical analysis. First, I describe the relevant features of the Indonesian tax system and the amnesty program. I then describe the dataset used to estimate the parameter of interests.

2.2.1 Tax Regimes

Indonesia is the fourth most populous country in the world with population of 270 million people in 2019 . The country's GDP is around 1,119 billion US Dollars in 2019 which placed it as the sixteenth biggest economy in the world. Its economic growth for the past two decades is hovering at about 5 percent. Despite the robust economic performance, Indonesia's total tax to GDP ratio has not been gone up from around 12 percent in the last decade. This ratio is below the OECD average (34.2 percent), African countries (18.2 percent) and Latin American countries (22.8 percent). In addition, Indonesia' tax ratio is relatively smaller relative to its neighbor such as Thailand (17.6 percent), Philippines (17.5 percent), Singapore (14.1 percent) and Malaysia (13.6 percent). Its poor tax revenue collection has been creating large growing fiscal deficit in the state budget and expanding government debts.

The Indonesian tax system was first modernized in 1983 to mitigate a potential shortfall from the oil and gas revenue by the introduction of the value added and luxury tax and the progressive income tax, replacing the 1951 sales taxes and the former Dutch colonial income tax. The reforms attempted to raise sufficient revenue, promote economic efficiency, and improve income distribution by implementation of broad based and simple tax system with tax rates lower than other developing or developed countries (Gillis, 1985). Over the period of 2011 to 2015, Indonesia relies heavily on the VAT and corporate income taxes which account for around 40 percent and 20 percent of total tax revenue respectively. Moreover, the contribution of personal income tax to total tax revenue is around 10 percent where the majority

(more than 95 percent) of it is raised through a withholding tax mechanism (DJP, 2016).

Indonesia implements three regimes for taxing individuals income, namely the personal income tax, deemed-profit method, and turnover tax. The personal income tax was introduced in 1983 and has several tax brackets with marginal tax rates of 5 percent, 15 percent, 25 percent, and 30 percent. In addition, the income tax also provides a special treatment for self-employed workers and individuals performing independent services such as medical doctors, lawyers, and accountants with annual turnover of up to the VAT registration threshold (600 million IDR) to maintain record keeping and estimate their net income using deemed-profit method estimated by the government instead of maintain book keeping and calculate their net income using accounting rules. This special scheme is designed to simplify taxation for small taxpayers and reduce costs of compying with tax laws. In 2013, the government enacted a new presumptive tax (e.g. turnover tax regime) that stipulates self-employed individuals, except those performing independent services, with previous year turnover of up to 4.8 billion IDR to be taxed with a 1 percent final tax on the turnover in lieu of progressive tax rates on net income/profit.[2]

The income tax system is equiped with a set of withholding tax provisions with respect to various types of income such as wage income, self-employed income, and capital gain. The majority of withholding tax revenue are collected through article 21, 23 and 4 paragraph 2 of the income tax law. The article 21 mandates employers to withhold income tax from employees monthly wage income. The article 23 prescribes withholding mechanims for income from tachnical, management, construction, and consulting services as well as rent from non-property assets. The article 4 paragraph 2 covers withholding rules for dividend, property and land rent, interest, capital gain from selling assets such as property and securities. Unlike the article 21 and 23, the article 4 paragraph 2 is a final withholding tax mechanism where the income and taxes withheld are excluded from the estimation of taxable income and income tax liabilities in the end of fiscal year. These withholding taxes must be remitted and reported to the tax authority on monthly basis.

Both wage earners and self-employed are required to file income tax return by the end of the third months of the next fiscal year. Wage earners typically receive their net-of-taxes income from their employers. Whereas self-employed individuals have to maintain book keeping to record their income and expenses as well as estimate their income tax liabilities. Individual taxpayers have to report not only income and tax payments but also wealth and liabilities in the tax return including their types, date of acquisitons and acquisition values. However, wage earners with annual income of up to 60 million IDR are allowed to report only the total wealth and liabilities. This feature allows the tax authority to match retained income and additional net wealth each year in order to check for a potential evasion. Individuals with a gap between retained income and additional net wealth are required to amend their tax returns.

[2]In 2013, the exchange rate for 1 IDR is around 10,000 USD. Thus, 4.8 billion IDR is around 480,000 USD.

2.2.2 Tax Administration

Indonesian taxation is administered by the Directorate General of Taxes (DGT) of the Ministry of Finance. In 2001, the government of Indonesia initiated tax administration reform stipulating that taxpayers are administered based on the size of their businesses and tax payments to reinforce fiscal capacity after the Asian financial crisis hit the country's economy in 1998. The 2001 reform includes the creation of two Large Taxpayers Offices (LTOs) which administer several hundreds largest taxpaying firms. The LTOs have more strictier monitoring due to higher staff-to-taxpayer ratio, better employee remuneration than ordinary tax offices. The administration in ordinary tax offices are structured with respect to types of taxes such as personal income tax, corporate income tax, value added tax, and withholding taxes. The LTOs administration departs from tax-types to all-taxes approach where all taxpayers' obligations are integratedly monitored.

In 2007, the government gradually expanded the tax administration reform by creating Medium Taxpayers Offices (MTOs) and Small Taxpayers Offices (STO), replacing all ordinary tax offices in the country. MTOs administer largest taxpayers, particularly corporations, in regional level. Several MTOs also administer foreign firms, publicly traded firms, oil and gas firms, as well as expatriates. The ratio of tax official and taxpayer is smaller in LTOs and MTOs relative to that of STOs. A group of high wealth individuals are selected to be administered and monitored within an LTO unit called High Wealth Individuals (HWI) Office and the rest of individual taxpayers are administered within STOs. In STOs, a size-based taxpayer administration is also implemented. A group of 100 or 200 largest taxpayers in each STO are selected and scrutinized more thoroughly relative to the rest of taxpayers. The size-based administration reflected in the new organizational structure as well as the taxpayers monitoring activities increases the probability of detection of larger taxpayers to relative to smaller taxpayers.

2.2.3 Tax Amnesty

The Indonesian tax amnesty program was implemented by the Indonesian government in 2016 in response to a large potential fiscal deficit in the state budget. Under this program, taxpayers are given an opportunity to declare unreported net assets (i.e., unreported asset minus liabilities), as an equivalent of unreported income, and provided with a set of lower tax rates ranging from 2 percent to 10 percent as well as freed from penalty. The unreported assets and liabilities eligible for the program are those that should have been reported for the fiscal years of up to 2015. Therefore, the 2016 tax returns would theoretically reflect the true assets and liabilities.

The program consists of three periods where each period offers different tax rates conditioned on the types of asset declared, i.e. foreign assets or domestic assets. Foreign assets declaration is taxed higher than domestic assets declaration, except when the foreign assets are repatriated to Indonesia. In the first period (July-September 2016), the tax rates are 2 percent for domestic assets declaration and foreign assets declaration and repatriation as well as 4 percent for foreign assets declaration. In

the second period (October-December 2016), the tax rates are 3 percent for domestic assets declaration and foreign assets declaration and repatriation as well as 6 percent for foreign assets declaration. And, in the third period (January-March 2017), the tax rates are 5 percent for domestic assets declaration and foreign assets declaration and repatriation as well as 10 percent for foreign assets declaration. The potential impact of amnesty is expected to occur in 2016 because the 2016 tax return must be filled by the end of March 2017 after the first and the second periods of the program have ended as well as parallel with the third period of amnesty which also ended in March 2017.[3]

From the program, the Indonesian tax authority collected significant amount of tax revenues, i.e., 0.92 percent of GDP. To date, this yield has been the highest amnesty yield in the world, exceeding those of 2015 Chilean amnesty (0.62 percent of GDP), 1997 Indian amnesty (0.58 percent of GDP) and 2009 Italian amnesty (0.2 percent of GDP). Moreover, the assets declared in the program is around 39.3 percent of GDP, while those of Chilean, Indian, and Italian are 8.3 percent, 2.1 percent, and 5.2 percent respectively (DJP, 2017).

2.2.4 Post-Amnesty Compliance Monitoring

In 2017, the Indonesian tax authority issued a circular letter regarding post-amnesty compliance monitoring. [4] The letter mandates tax offices and officials to examine the accuracy of assets and liabilities reported during the amnesty program. The letter also orders examination of the reporting accuracy of taxpayers that do not participate in the program. In conducting the examination, the tax authority utilizes third-party data on assets as well as liabilities supplied by government and private institutions.[5] Taxpayers will be notified by the tax authority if any discrepancies in assets, liabilities, and income were found during the examination.

Moreover, in 2017, the government of Indonesia requires financial service institutions (i.e., institutions that operate in the area of banking, capital market, and insurance) to supply financial information to the tax authority for taxation purpose.[6] This policy relaxes bank secrecy in Indonesia and strengthen the capacity of the tax authority to enforce tax compliance during post-amnesty period.

[3]Law of the Republic of Indonesia Number 11 Year 2016 Regarding Tax Amnesty enacted on July 1, 2016.

[4]Circular Letter of Director General of Taxes Number SE–20/PJ/2017 as last amnended by Circular Letter of Director General of Taxes Number SE–14/PJ/2018 Regarding Post-Amnesty Taxpayers Monitoring

[5]In 2012, the government of Indonesia enacted Government Regulation Number 31 Year 2012 Regarding Provision and Collection of Data and Information Related to Taxation. This regulation allows the tax authority to receive various third-party data on assets, liabilities, income, etc. from local and central government institutions as well as private associations.

[6]Government Regulation in lieu of Law Number 1 Year 2017 Regarding Access to Financial Information for Taxation Purpose

2.2.5 Data

To estimate the compliance effect of the amnesty, I use Indonesian tax administrative data at individual level. I study the population of individual income tax returns from year 2010 to year 2017 containing around 30 million individual taxpayers. I focus on Individual taxpayers because they account for 70 percent of the tax amnesty participants and 95 percent of the amnesty yield whereas corporate taxpayers' share of participants is around 30 percent which account only 5 percent of the amnesty yield.

Table 2.1: Summary Statistics: Tax Amnesty

	Wage Earner				Self-employed			
	10^{th} Decile		$1^{st} - 9^{th}$ Decile		10^{th} Decile		$1^{st} - 9^{th}$ Decile	
Variables	TA	Non TA	TA	Non TA	TA	Non TA	TA	Non TA
Net income	500.53	395.2	32.7	26.25	724.25	438.76	77.95	63.73
in million IDR	(1,005.99)	(440.84)	(28.92)	(22.21)	(2,698.73)	(11.956.59)	(37.51)	(27.68)
Taxable income	690.61	404.08	45.45	31.55	471.11	363.18	7.1	3.14
in million IDR	(2,703.55)	(11,920.58)	(36.62)	(27.58)	(1,081.24)	(445.59)	(85.45)	(14.75)
Income taxes	167.14	76.22	6.91	2.46	106.79	72.01	0.73	0.29
in million IDR	(562.32)	(571.84)	(169.33)	(18.49)	(408.47)	(127.44)	(5.52)	(2.88)
Withholding taxes	152.65	72.94	5.88	2.48	71.18	61.86	0.29	0.19
in million IDR	(497.81)	(558.81)	(114.57)	(33.33)	(263.03)	(114.99)	(2.85)	(2.21)
N in thousand of observations	66.74	390.29	106.75	3,375.84	25.22	8.59	418.75	516.32

Notes: Statistics reported are means with standard deviations in parentheses in the year before (2015) the amnesty program implementation. All monetary variables are measured in constant 2010 IDR.

Table 2.1 presents the means and the standard errors of the data for each participation group in each subgroup. The table shows some differences among these participation groups. First, in each subgroup, the means of reported net income, taxable income, income taxes and withholding taxes of the amnesty participants are higher than those of nonparticipants. These differences could be interpreted that taxpayers facing higher marginal income tax rates are more likely to evade taxes and later reveals some of the evaded taxes when governments offer forgiveness. This is consistent with literature on tax evasion that finds marginal tax rates as one of the factors that influence tax evasion decision (Allingham and Sandmo, 1972; Kleven et al., 2011). Second, the share of withholding taxes for wage earner is higher than self-employed within all income deciles. Consequently, the share of taxpayers in self-employed group which participated in the program is larger than their counterparts in the wage-earner group. This variation has been commonly observed in many tax systems and frequently exploited as identification strategy due its randomness. Third, self-employed in the $1^{st} - 9^{th}$ deciles who participated in the program have lower share of withholding taxes than nonparticipants in the self-employed group. These variations further support the argument that withholding mechanism plays essential role in deterring tax evasion. These figures reveals some characteristics that motivate

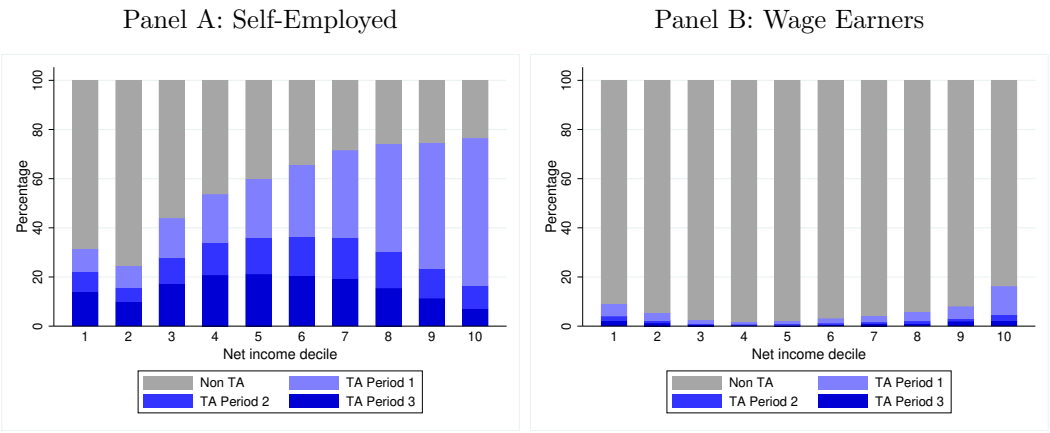
decision to evade taxes and then later participate in the amnesty program.

2.3 Determinants of Tax Evasion

2.3.1 Descriptive Evidence

Figure 2.1 provides descriptive evidence to rationalize the comparison between self-employed and wage earners in estimating the determinants of tax evasion as well as the impacts of tax amnesty. Although the tax amnesty program is offered to all taxpayers, those who have more tax evasion would get higher benefit from discounted tax rates and waived penalty and thus are more likely to particate in the program. Panel A and B of Figure 2.1 compare the percentage taxpayers who participated and did not participate in the program between self-employed and wage earners as well as between income groups. They clearly demonstrate a substantial difference in the rate of participation in the program between the two types of employment and between the ten income groups, particularly in the self-employed group. The figure suggests that self-employed individuals have higher rate of participation and thus more evasion than wage earners in all income groups. Moreover, the figure indicates that high income groups are more likely to participate and potentially have more hidden net assets than low income groups.

Figure 2.1: Amnesty Participation by Types of Employment

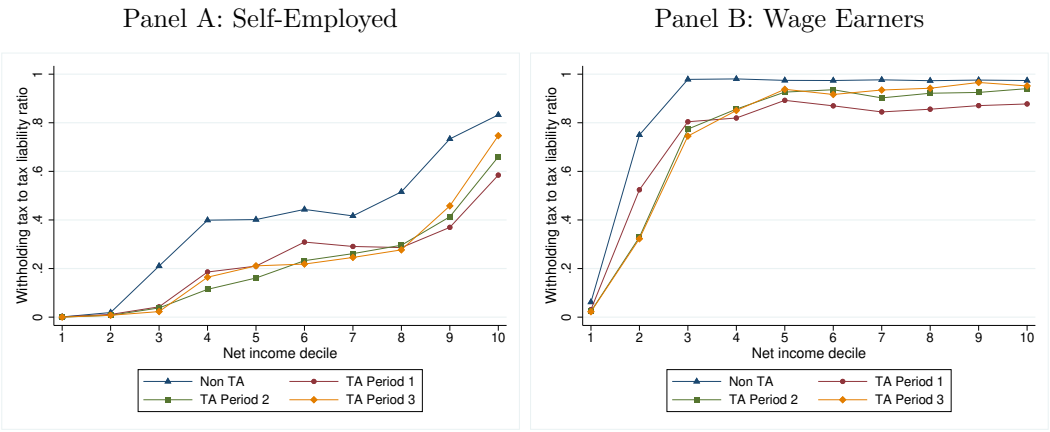


Notes: The figure shows the program participation rates in percentage by decile of net income distribution. Panel A and B show the participation rates of self-employed individuals and wage earners respectively. The participation rates in each panel are further categorized into three program periods. The dark blue bars represent the first amnesty period, the blue bars represent the second amnesty period, and the light blue bars represent the third amnesty period.

Figure 2.2 displays average withholding tax to tax liability ratio by amnesty periods, types of employment, and income groups. Panel A of Figure 2.2 shows that withholding tax ratios for self-employed participants are significantly lower than non-participants in all income deciles. Panel B of Figure 2.2 shows that wage earners participants also have lower yet insignificant withholding tax ratio relative to non-participants. Moreover, Figure 2 shows that self-employed have lower average

withholding tax ratio relative to wage earners in almost all income groups. The descriptive statistics displayed in Figure 2.1 and 2.2 are consistent with the argument that third-party information provides deterence effect on taxpayer's decision to evade taxes (Saez, 2010; Kleven et al., 2011).

Figure 2.2: Withholding Tax to Tax Liability Ratio



Notes: The figure shows the average withholding tax to tax liability ratio by income decile and amnesty period. Panel A and B show the average withholding tax ratio for self-employed and wage earners respectively.

The descriptive evidence from the tax amnesty participation indicates that withholding tax to tax liability ratio, level of income, and types of employment could be the main determinants of tax evasion. To validate this argument, I assume that types of employment are exogenous and tax evasion is not factored in the taxpayer's decision to select types of employment. Therefore, the fact that self-employed group has higher withholding tax ratio and thus more likely to evade may be uncorrelated with the selection of types of employment.

2.3.2 Empirical Analysis

To formally test whether amnesty participation correlates with the withholding tax ratio, types of employment, and level of income, I set up three regression specifications. The baseline specification is to linearly regress tax amnesty participation on withholding tax ratio and tax amnesty rates. The second specification involves logistic regression using the same dependent and independent variable. The argument for this specification is that the descrioptive evidence shows that the share of participants increases non-linearly through income groups. The third specification uses ordered-logit specification since the amnesty program is implemented in three phases where each one offers a different tax rate. To implement those specifications, I use the following equation

$$A_{isd} = \beta W_i + \eta_s + \delta_d + \gamma X_{isd} + \varepsilon_{isd} \tag{2.1}$$

where A is the tax amnesty participation dummy (1 if participate and 0 if not for the first and second specifications and 1 if participate in period 1, 2 if participate in period 2, 3 if participate in period 3, and 0 if not for the third specification) for individual i with type of employment s in decile d. W is withholding tax to tax liability ratio for each individual, η denotes type of employment fixed effects, δ is income decile or percentile dummy, and X is a vector of controls for regional tax office code and industry classification. Since the second and the third specifications are logit and ordered logit respectively, the regression outputs are transformed into probability using margins to make the interpretation easier. Based on the previous descriptive evidence, I expect strong correlations between the intensity of withholding tax and the level of income as well as the probability of participating in the tax amnesty program.

2.3.3 Results

Table 2.2 shows that, in all three specifications, withholding tax ratio is negatively and significantly correlated with amnesty participation. In other words, the probability of participating in the program increases as the withholding tax ratio goes to zero. This indicates that evaders are more likely to have lower withholding tax ratio. On the other hand, the estimated coefficients of self-employed and income deciles are positive and significant. The size of the coefficients of self-employed variables are similar to those of the withholding tax ratio, implying that types of employment is also a key determinant of tax evasion. The coefficients of income decile dummy variables increase as the deciles climb up from the bottom to the top. The results suggest that taxpayers in the higher income group that face higher marginal income tax rates are more likely to evade taxes and then participate in the amnesty program.

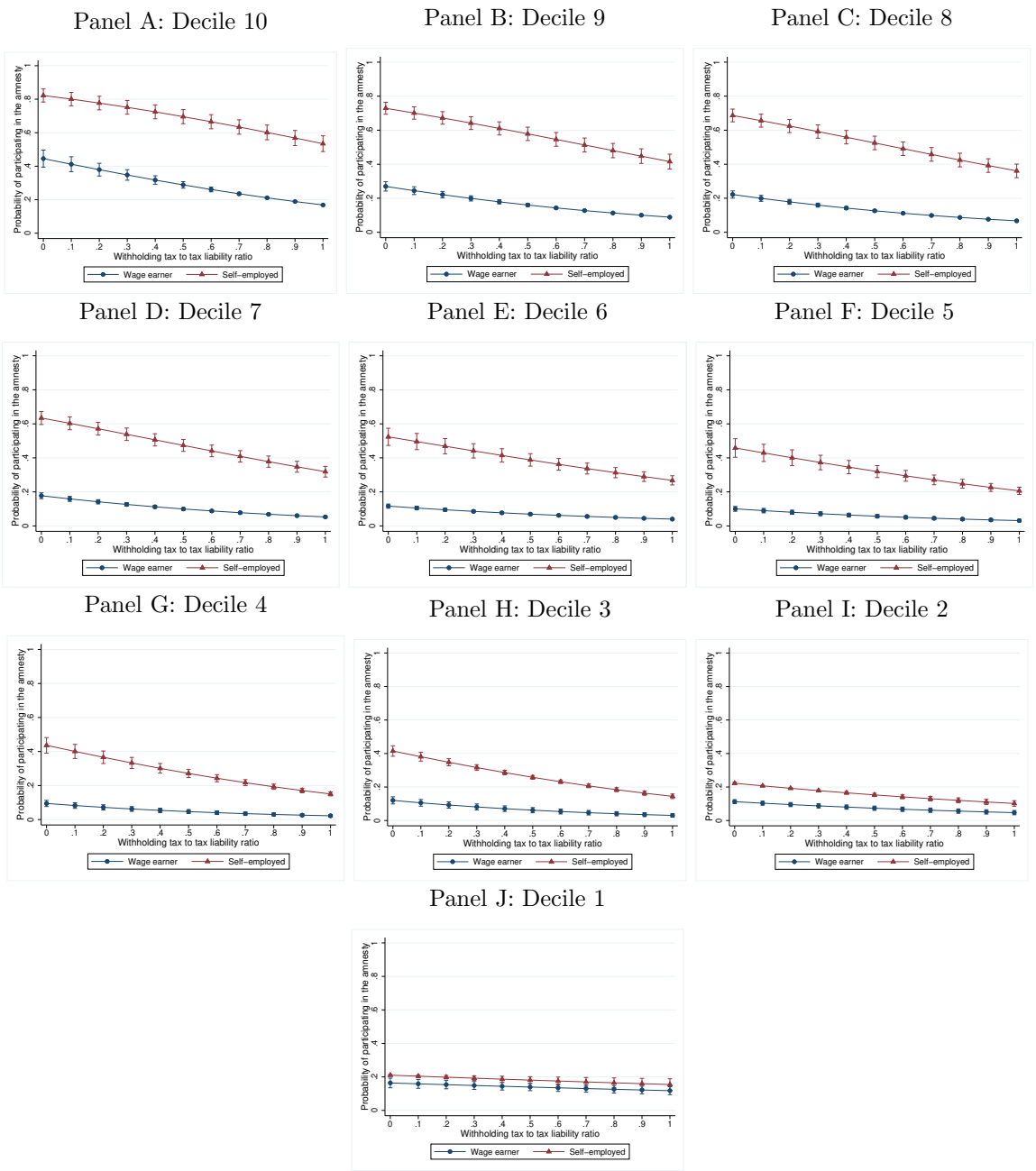
Table 2.2: Tax Amnesty Participation

	(1) OLS	(2) Logit	(3) Ordered Logit
Withholding tax to tax liability ratio	-0.187***	-1.591***	-1.416***
	(0.012)	(0.080)	(0.061)
Self-employed	0.221***	1.751***	1.516***
	(0.009)	(0.133)	(0.122)
Income decile 2	0.052***	0.036	0.041
	(0.009)	(0.043)	(0.044)
Income decile 3	0.204***	0.837***	0.811***
	(0.008)	(0.046)	(0.048)
Income decile 4	0.232***	1.126***	0.986***
	(0.009)	(0.062)	(0.058)
Income decile 5	0.245***	1.409***	1.154***
	(0.010)	(0.060)	(0.054)
Income decile 6	0.253***	1.635***	1.287***
	(0.010)	(0.076)	(0.066)
Income decile 7	0.273***	1.927***	1.487***
	(0.012)	(0.088)	(0.072)
Income decile 8	0.283***	2.150***	1.636***
	(0.013)	(0.088)	(0.071)
Income decile 9	0.301***	2.423***	1.871***
	(0.014)	(0.093)	(0.075)
Income decile 10	0.375***	3.081***	2.450***
	(0.021)	(0.082)	(0.071)
R^2	0.275		
N Obs.	13,370,910	13,370,910	13,370,910

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The reference group for self-employed is wage earners and for income deciles is income decile 1. All specifications are controlling for industry classification and regional tax office fixed effects.

Figure 2.3 shows the marginal effects of withholding tax to tax liability ratio on the probability of participating in the amnesty program for both wage earners and self-employed individuals. The figure demonstrates that the probability of participating in the amnesty program is relatively low in Decile 1 and Decile 2 for both self-employed and wage earners. However, self-employed have singificantly larger probability in Decile 3 up to Decile 10 relative to wage earner. The probability gaps between those groups are wider as the withholding tax to tax liability ratio goes to zero. The results suggest that the marginal effects increase as income decile goes higher and withholding tax to tax liability ratio decreases. Moreover, the figure shows that self-employed individuals in the top income distribution (i.e. decile 10) with no withholding tax have and with fully tax-withheld income have the probability of conducting tax evasion and participating in the amnesty of around 80 percent and 55 percent respectively. On the other hand, the probability of participation of wage earners in the top income decile with no withholding tax as well as with fully tax-withheld income are about 45 percent and 20 percent respectively. The results indicate that marginal effects for self-employed individuals are larger than those for wage earners. The results are consistent with the arguments that withholding tax mechanism reduces tax evasion (Kleven et al., 2011) and high-income earners have larger capacity to evade taxes (Alstadsæter et al., 2018).

Figure 2.3: Marginal Effects of Withholding Tax Ratio on the Probability of Participation (Logit Specification)

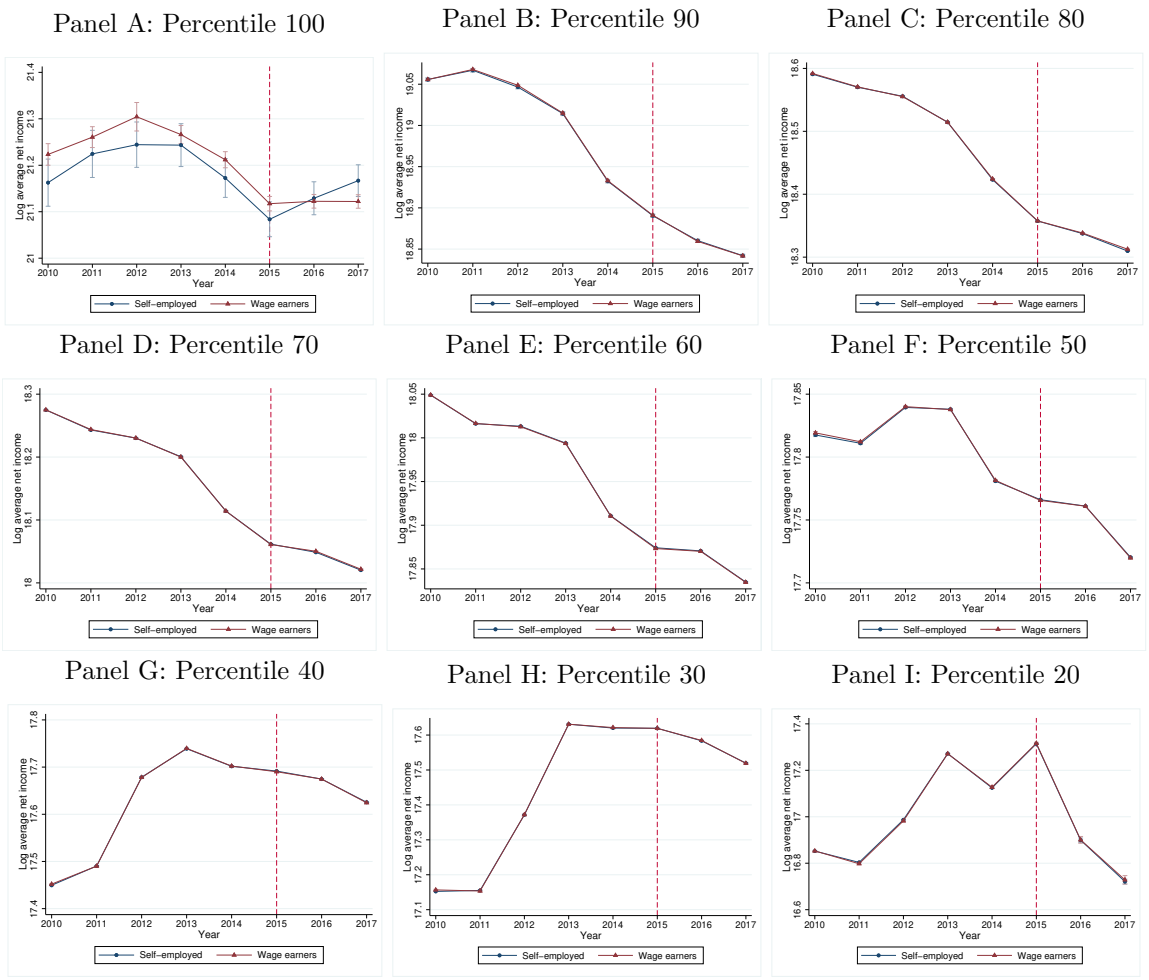


Notes: The figure shows the marginal effects of withholding tax to tax liability ratio on the probability of participating in the amnesty program for both wager earners (solid-dotted line) and self-employed individuals (solid-triangled line) by income decile obtained from logit specification with 95 percent confidence interval. The results from linear and ordered logit specifications are presented in Appendix Figure G.1 and G.2, respectively. The latter shows that the probability of participating in the first period of amnesty which offer the lowest tax rates is significantly higher than in other periods, suggesting that tax rate also affects decision to evade taxes. The implications of variation in the size of tax amnesty rates and timing of net assets declaration on the probability of participation are discussed in Appendix G.

2.4 The Effect of Tax Amnesty on Compliance

Previous literature finds that the magnitude of tax evasion grows with true income and tops at the 99 to 99.5 percentile(Johns and Slemrod, 2010). The finding is similar to the previous section results (Table 2.1 and Figure 2.3) that show that level of income determines the level of tax evasion indicated by the probability to participate in the tax amnesty. These findings imply that the distribution of tax evasion can be expected to be left-skewed, and thus mean estimator might not be well-suited to estimate the impact of amnesty on tax compliance. Therefore, I employ quantile estimation to better assess the effect of tax amnesty.[7]

Figure 2.4: Reported Net Income by Percentile: Self-Employed vs Wage Earners



Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

[7]Quantile estimation is often utilized in the literature on the impact of health policy where the eligibility for Medicaid is determined by the left-skewed distribution of income (Maynard and Qiu, 2009; Engelhardt and Gruber, 2011).

2.4.1 Descriptive Evidence

Figure 2.4 shows the reported net income of both self-employed individuals and wage earners before (2010-2015) and after (2016-2017) the amnesty program by income percentile. The figure shows that there is no meaningful gaps in the percentage change in average reported net income between self-employed and wage earners before and after the amnesty program except in percentile 100 (Panel A).[8] The result suggests that the program limitedly impacts a group of taxpayers that potentially received more intensive monitoring due to the Indonesian size-based tax administration.

2.4.2 Empirical Analysis

To test whether the tax amnesty affects compliance or not, I compare changes in reported net income between self-employed (treatment group) and wage earners (control group) before and after the program implementation. I use the reported net income as it is the variable directly impacted by the policy. The identification strategy exploits the variation in the intensity of withholding tax mechanism. Taxpayers that face trivial withholding tax mechanism (self-employed) are more likely to evade and thus more affected by the amnesty program than taxpayers with significant withholding tax (wage earners). I use the following generalized difference-in-differences framework to estimate the parameter of interest

$$Y_{st} = \alpha + \gamma_s + \delta_t + \sum_{t=2010}^{2014} \theta_t \times D_s \times 1(y = t) + \sum_{t=2016}^{2017} \pi_t \times D_s \times 1(y = t) + \beta X_{st} + \varepsilon_{st} \tag{2.2}$$

In this equation, Y is the log real reported net income in type of employment s in year $t = 2010, ..., 2017$, γ denotes types of employment fixed effects, δ is a set of year fixed effects that represent changes common to types of employment, D_s equals 1 if type of employment is self-employed, and ε_{st} is clustered by regional tax office. The year dummy prior the amnesty implementation, $1(y = 2015)$, is ommited, normalizing the estimates for θ and π to 0 in 2015. The vector of covariates (X) includes industry classification and regional tax office code. The coefficients π_{2016} to π_{2017} capture the impact of the amnesty program on individuals' reported net income. The framework is applied independently to each of the income percentile to reflect the shape of probability distribution of tax evasion and thus better assess the impacts of tax amnesty.

The amnesty impact, averaged across all post-amnesty periods, can be estimated using a standard difference-in-differences (DD) specification,

$$Y_{st} = \alpha + \gamma_s + \delta_t + \pi Treat_s.Post_t + \beta X_{st} + \varepsilon_{st} \tag{2.3}$$

[8]The comparisons of log average reported net income between self-employed and wage earners for all percentiles are presented in Appendix H.

where $Treat$ equals 1 if type of employment is self-employed and equals 0 if wage earner, $Post$ equals 1 if $y \geq 2016$ and 0 if $y \leq 2014$, and ε_{st} is clustered at the regional tax office level.

2.4.3 Results

I start the analysis by presenting the coefficients from the standard DD specification in Equation (2.3). The results suggest that the tax amnesty program produces limited effects on taxpayers' reported net income except that of taxpayers in the very top income distribution. Row 1 of Table 2.3 shows that the differences in the log reported net income between wage earners and self-employed are near zero for all representative income precentiles before the tax amnesty implementation. Row 2 of the table further shows miniscule differences in reported net income after the program except for percentile 100. In the very top percentile, the tax amnesty program increases reported net income by 6.1 percent. Appendix J provides the estimates for all percentiles and demonstrates a similar pattern on coefficients where almost no meaningful effect was found except in the top 1 percent of income distribution. This limited impact might be driven by the adoption of size-based tax administration by the Indonesian government where tax authority focuses its limited resources to taxpayers with the highest revenue risks.

Table 2.3: Tax Amnesty Impact on Reported Net Income

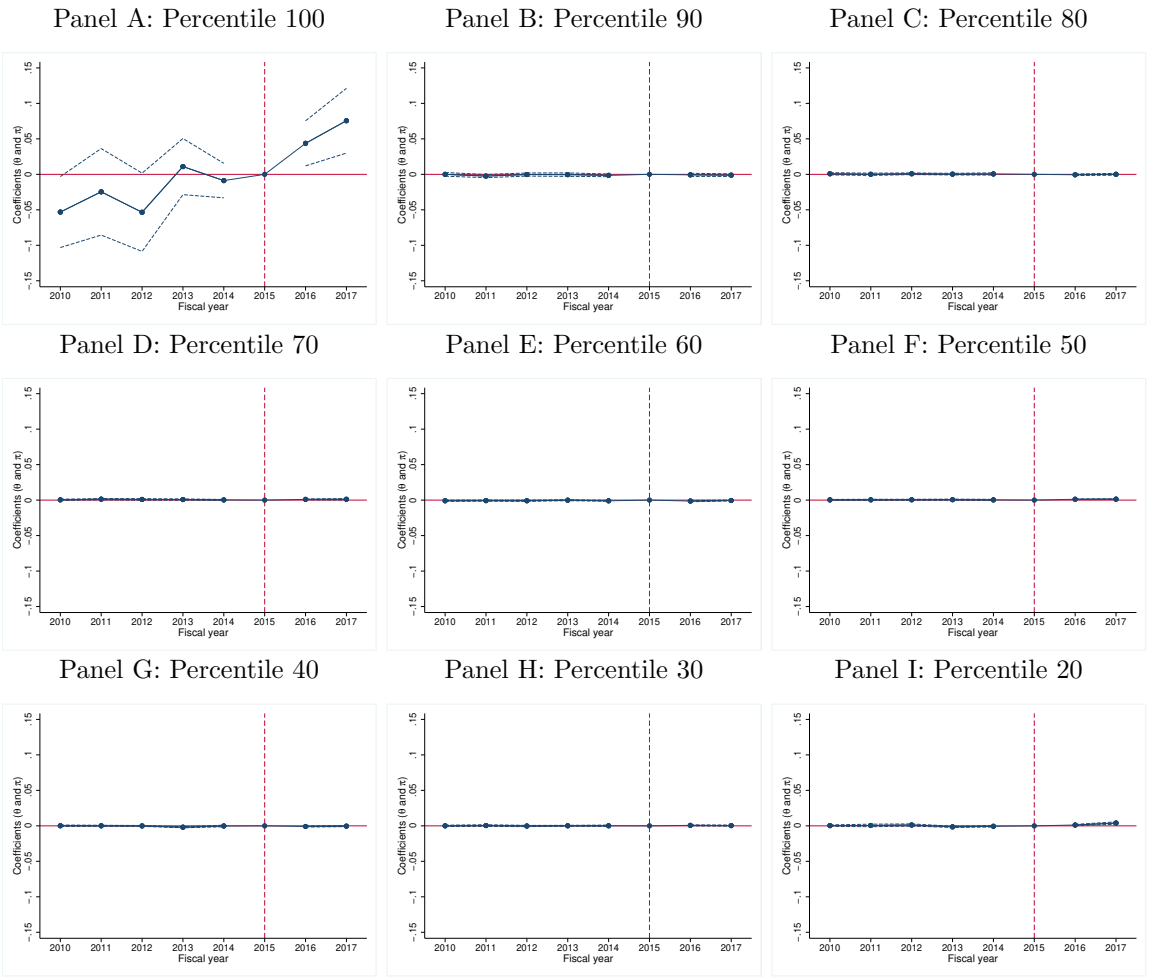
	(1) P-20	(2) P-30	(3) P-40	(4) P-50	(5) P-60	(6) P-70	(7) P-80	(8) P-90	(9) P-100
Before Amnesty									
(2010 to 2014) x	-0.000	0.000	-0.000	0.000	-0.001*	0.001**	0.001	-0.001	-0.023
Self-employed	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.017)
After Amnesty									
(2016 to 2017) x	0.003***	0.001	-0.001*	0.001***	-0.001*	0.001**	-0.000	-0.001	0.061**
Self-employed	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.018)
R^2	0.998	0.998	0.993	0.990	0.994	0.994	0.990	0.955	0.079
N Obs.	9,394	7,780	10,201	11,699	20,402	28,837	46,666	67,268	84,450

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment, industry classification, and regional tax office fixed effects. The estimates are similar to those of unbalanced panel regressions presented in Appendix Table I.1.

Figure 2.5 presents the event-study coefficients θ and π from Equation (2.2) that capture the impact of amnesty program on taxpayers' reported net income relative to the year before the program implementation. The figure shows that the coefficients to the left of the normalized year (2015) are mostly indifferent from zero. The coefficients to the right of the normalized year (2015) are also mostly indifferent from zero except for percentile 100 presented in Panel A of Figure 2.5. The coefficients π are about 5 percent in 2016 and 7 percent in 2017. The event-study coefficients for all income percentiles are presented in Appendix K. The appendix shows that coefficients θ and

π are indifferent from zero in the majority of income percentiles except in the top 1 percent of income distribution. This evidence suggests that government monitoring and enforcement activities are constrained with resources and thus largely channeled to taxpayers with high revenue risks.

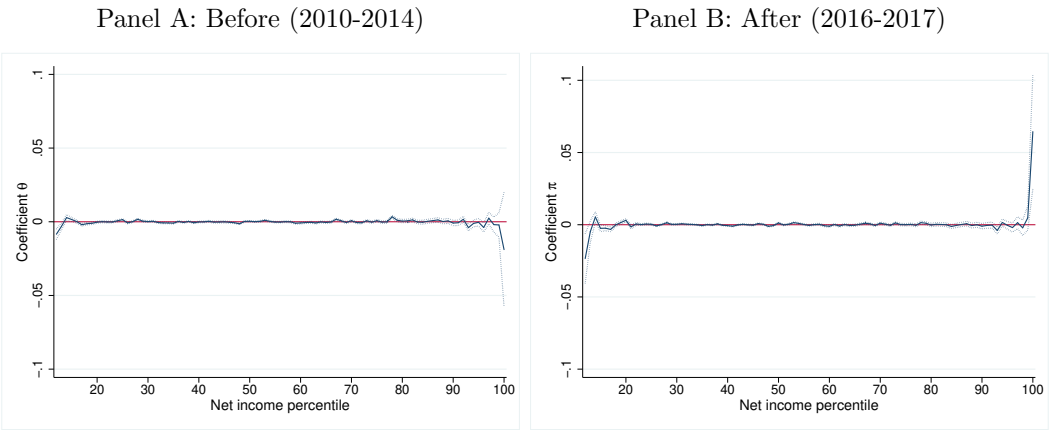
Figure 2.5: The Impact of Amnesty on Reported Income by Income Percentile



Notes: The figure shows the effects of amnesty on reported real net income for 10 representative net income percentiles. Panel A, B, C, D, E, F, G, H, and I present the coefficients θ and π of percentile 100, 90, 80, 70, 60, 50, 40, 30, and 20 respectively.

The coefficients of interest presented in Table 2.3 and Appendix J are summarized in Figure 2.6. The figure shows that the coefficients π are around zero in most of the income percentile before (2010-2014) the amnety program. The figure also shows that the coefficients π are also about zero in most of the income percentile after (2016-2017) the amnesty program except for percentile 100. These coefficients suggest that the amnesty program provides limited affect only to those with very high revenue risks and that have been highly monitored by governments.

Figure 2.6: Summary of the Tax Amnesty Effect on Reported Net Income



Notes: The figure shows the effects of amnesty on reported real net income. Panel A and B display the coefficient π of Equation (2.3). The solid line represents the coefficients of interest before (2010-2014) and after (2016-2017) the program. The solid dotted-line represents the 95 percent confidence interval.

2.5 Conclusion

I find that withholding tax, level of reported income, tax rates, and types of employment determine the decision to evade taxes. The intensity of withholding tax explains why self-employed individuals have higher amnesty participation rates and thus higher tax evasion relative to wage earners. The amnesty participation rates also vary with income groups where the highest participation rates occur in the highest income percentile. Moreover, self-employed tends to have more evasion than wage earners, all else equal. I further document that tax evaders prefers lower tax amnesty rates offered in period 1 of the program. The findings are consistent with the literature on tax compliance and enforcement (Slemrod, 2019) which shows that external factors, e.g., third-party data, level of income, tax rates, and types of employment, motivate taxpayers decision to evade taxes.

I document that the program did not improve the long-term compliance except of taxpayers at the very top of the income distribution that face stricter post-amnesty monitoring (e.g., intensification of post-amnesty compliance monitoring and the relaxation of access to financial information).The results produced by a quasi-experimental design are consistent with (Alm and Beck, 1990) which find in the laboratory experiment that stricter post-amnesty monitoring can generate positive compliance impact.

The limited effect of amnesty could be attributed to the Indonesian size-based tax administration where tax authority's resources are prioritized to monitor and enforce compliance of taxpayers with large tax base and tax payments. Moreover, individuals taxpayers commonly report smaller tax base and pay smaller taxes relative to firms. Consequently, little resources could be deployed to strengthen post-amnesty compliance of smaller-sized individual taxpayers.

From a policy perspective, the results indicate that governments in developing

countries with limited enforcement capacity can generate short-term revenue from previously evaded taxes by utilizing tax amnesty program and offering some forgiveness to tax evaders. In the environment with lack of third-party data and thus administrative costs to detect non-compliance are high, tax amnesty program can be a reasonable alternative to collect additional revenue for a revenue-maximizing government (Langenmayr, 2017).

Chapter 3

Compliance Effect of Tax Administration Reform on Wealthiest Individuals: Evidence from the Indonesian High-Wealth Individuals (HWI) Office

3.1 Introduction

High wealth individuals (HWIs) tax payments are essential to countries' tax revenue collection (Atkinson et al., 2011). Given their enormous capacity to minimize taxes through evasion and avoidance (Feldstein, 1995; Scheuer and Slemrod, 2020), it is reasonable to allocate more resources to ensure their tax compliance. Indeed, many countries have devoted a special unit (HWI Unit) to scrutinize tax compliance of wealthy individuals (OECD, 2017) and some countries have reported significant tax recoveries (Mc Laughlin and Buchanan, 2017). Nevertheless, tax evasion by HWIs seems to persist as indicated by several major tax evasion and avoidance, such as offshore-tax-havens scandals (Zucman, 2013, 2014) and migration of the rich (Agrawal and Foremny, 2019; Kleven et al., 2020).

The persistence of tax evasion and avoidance by wealthy individuals raises question regarding the effectiveness of a HWI unit, which is an essential consideration for governments in deciding an optimal tax policy. For instance, governments may examine a question of whether they are going to improve tax administration or to increase tax rates in order to maximize revenue collection from wealthy individuals. Basri et al. (2019) find that reforming tax administration is more efficient in collecting additional revenue than increasing tax rates in the context of corporate taxation. Nevertheless, few papers have studied the impacts of tax administration reform in terms of organizational restructuring in the context of individual taxation, particularly high wealth individuals.

To fill this gap, I use Indonesian administrative data on individual taxpayers and exploit quasi-experimental variation from the establishment of the Indonesian HWI office in 2009 to study the impact of tax administration reform on HWIs compliance. The reform assigned individuals who reside in the Indonesian capital city Jakarta, with assets of more than 100 billion IDR, and have significant control over corporations.[1] The reform increased the intensity in tax administration for HWI in terms of higher staff to taxpayers ratio, better-skilled staffs, and tailor-made compliance monitoring approach for HWIs.

This tax administration reform was designed to improve HWIs tax compliance as well as tax payments. Under an Indonesian ordinary tax office or Small Taxpayers

[1]Wealth has been commonly used by government as a tax base to increase progressivity of a tax system. The literature on wealth tax suggests that wealth tax affects wealth accumulation, mobility, and evasion (Seim, 2017; Jakobsen et al., 2020; Brülhart et al., 2019; Agrawal et al., 2020). (Scheuer and Slemrod, 2021) provide a nice survey on taxing wealth, discussing the behavioral responses to a wealth tax as well as optimal wealth tax theory.

Office (STO), the compliance monitoring activities are prioritized to taxpayers with high income and tax payments including HWIs. However, HWI's tax strategy is often complex and involving some controlled corporations which are not administered by the office where a HWI is administered, and thus creating hurdles for tax officials to collect information on controlled corporations from other tax offices, map the HWI tax strategy and detect tax fraud. The HWI office provides a unique compliance framework that gathers and analyzes relevant information from various sources as well as employs well-skilled staffs to accurately evaluate HWIs and controlled corporations behavior toward tax system and effectively detect non-compliance. The special office aims to affect the likelihood that income is reported accurately and taxes are paid accordingly by the HWIs.

In order to empirically examine the extent to which intensification of tax administration can affect HWI compliance, I compare tax outcomes of wealthy individuals who are administered by the HWI unit to those of wealthy individuals who would have been qualified for HWI office (e.g., individuals with assets above the HWI office assignment threshold of 100 billion IDR and have significant control over corporations) administered by ordinary tax offices (in Jakarta and other cities) before (2007) and after (2009-2014) the creation of HWI office. I restrict the sample to include only top 5 percent of high-income earners because around 80 percent of individuals administered by the HWI office are in that category. I separate my study into three parts. First, I study the compliance impact of the tax administration reform by comparing reported net income between the control and comparison groups. I find that the policy reduced income reported by wealthy individuals at the HWI office by around 44.2 percent over six years compared to their counterparts administered by STOs in Jakarta. Similarly, I document that the estimated effect is around negative 43.9 percent during the 2009-2014 when the comparison group is HWIs administered by STOs in other cities. However, the negative effects are slightly smaller by around 4 percentage point when the sample is reduced to top 1 percent of income earners. This difference are potentially driven by the top marginal tax cut which also occured in 2009.

Second, I investigate whether the change in top marginal tax rates from 35 percent to 30 percent for individuals with taxable income above 500 million IDR affects the estimated effects on the tax administration reform. I decompose the analysis into two groups. The first group is wealthy individuals with taxable income below 500 mllion IDR and not affected by the tax cut and the second group is wealthy individuals with taxable income above 500 million IDR and likely affected by the tax cut. I find that the estimated effects for the first and second groups are around -19.1 percent and -21.2 percent when the comparison group is HWIs in Jakarta as well as -22.3 percent and -13.1 percent when the comparison group is HWIs in other cities. However, the impacts increase to around negative 40 percent over six years or similar to those of baseline results when the taxpayers with taxable income of around 4,500 million IDR higher than the 500-million cut off are pooled with the first group (i.e., taxpayers with taxable income of up to 500 million IDR). On the other hand, the estimated effects are around for those with taxable income above 5,000 million IDR are around -19.7 percent when the comparison group is HWIs in Jakarta and around -12.2 percent

but not statistically significant when the control group is HWIs in other cities. The results suggest that top marginal tax cut largely affects taxpayers with considerably high taxable income (i.e., above 5,000 million IDR) and thus errodes the estimated impact of tax administration reform when the sample is restricted to these particular taxpayers.

Third, I analyze the revenue implication of the creation of HWI office by comparing the income tax liabilities of HWIs administered by the HWI unit to HWIs administered by STOs for both wealthy individuals affected (e.g., HWIs with taxable income below 500 million IDR) and not affected (e.g., HWIs with taxable income above 500 million IDR) by the top marginal tax cut. I find that the administration reform reduced income taxes paid by wealthy individuals not affected by the tax cut at the HWI office by around 33.2 percent over six years compared to their counterparts administered by STOs in Jakarta. I also document that the estimated effect is around negative 40.5 percent during the 2009-2014 when the comparison group is HWIs not affected by the tax cut administered by STOs in other cities. On the other hand, I find smaller negative effects for those affected by the tax cut of around -21.3 percent and -12 percent when the comparison groups are HWIs in Jakarta and other cities, respectively. The results indicate that the income tax payment is affected in the similar way by the reform as the reported net revenue.

This paper contributes to several strands of literature. The first contribution is to a literature studying tax enforcement on high-income earners. Slemrod et al. (2001) find that high-income earners obtaining an audit threat declare lower reported income because they consider an audit as a negotiation which does not necessarily results in the estimation and enforcement of all tax evasion. This paper support this view by documenting that high-income earners with control over corporations also respond negatively to the intensification of tax examination.

Secondly, this paper contributes to the literature studying the impact of tax administration reform that documents various administrative programs that can effectively improve tax compliance such as wistle-blower system (Naritomi, 2019), electronic VAT invoices (Fan et al., 2018), pay for perfomance (Khan et al., 2016), and sized-based tax office (Basri et al., 2019). Specifically, this paper finds that tax administration reform can also deteriorate tax compliance when it increases the probability of audit and examination but fails to improve the probability of detection.

Finally, the paper contributes to the literature on taxation in developing countries that argue that the lack of capacity to enfoce compliance in developing countries affect the selection of tax regime (Gordon and Li, 2009; Best et al., 2015; Waseem, 2018). Revenue collection in developing countries are highly dependent on value-added tax (VAT) and presumptive taxes which are well known with their capacity to better handle non-compliance. This paper provides evidence on how compliance in the income tax system is difficult to be enforced and thus potentially prevents governments from collecting larger revenue from this source.

3.2 Theoretical Framework

In this section, I constrast two tax compliance models that yield different predictions of the effects of the intensification of tax administration on compliance and earnings. I start with the Allingham and Sadmo's (1972) standard tax compliance model. Because of the empirical results cannot be easily rationalized with this model, I use the extended model discused in Slemrod et al. (2001) that can account for the empirical findings.

3.2.1 Standard Compliance Model

When the true tax base is not easily observable to the tax authority yet known to the taxpayer, the latter may be attracted to underreport the tax base. Under the standard compliance model (Allingham and Sandmo, 1972), the underreporting will be detered by a probability of detection of (p) and a penalty (θ) on unreported tax base.

Suppose that the true taxable income (y) held fixed and the taxpayer decides to report taxable income (x) where $x < y$, and so an amount of evasion is $y - x$ in order to maximize

$$EU = (1-p)U(v + t(y-x) + pU(v - \theta(y-x) \tag{3.1}$$

where v represents true after-tax income, $y(1-t)$, and t denotes the proportional income tax rate. The first-order condition of equation (1) gives me an optimal interior solution of x

$$\frac{U'(y_E)}{U'(y_U)} = \frac{(1-p)t}{p\theta} \tag{3.2}$$

where y_E and y_U are income in the examined and unexamined state, respectively. The model predicts that increases in p will decrease evasion. In other words, when p equals one, any rational taxpayer will report his or her true income.

3.2.2 Extended Compliance Model

As the paper will show, the empirical findings are not consistent with the prediction of the standard compliance model. Therefore, I consider an alternative model which extends the standard model and that can rationalize the findings. In the extended compliance model (Slemrod et al., 2001), the probability of detection is assumed to be an increasing function of the unreported income, and thus the model's predictions depend on the relationship between p and evasion. The model further assumes that the expected income upon examination is not a monotonically increasing function of x but reaches a maximum at some positive level of evasion, where $x < y$.

However, I replace the term probability of detection (p) in the original model with probabilty of audit or examination (P) because in the context of governments with limited enforcement capacity the former is practically different from the latter. In other words, 100 percent probability of audit does not necessarily translate into 100

percent probability of detection because of several conditions, such as lack of third-party data as well as lack of technological capacity to analyze taxpayers data. Under 100 percent probability of audit, taxpayers may still get less than 100 percent probability of detection when tax authority does not have all the information regarding taxpayers unreported income or have all the relevant information but do not have capacity to analyze it. This condition may occur in a country where banking and financial information is difficult to obtain or where some of taxpayers have offshore shell companies in tax havens. In this situation, taxpayer has more information than tax authority and thus perceive the probability of detection is less than the probability of audit.

The extended model starts with the optimal solution when the taxpayer is risk neutral. Yitzhaki (1987) eliminate the corner solution in the standard model's prediction facing risk-neutral taxpayer by assuming that the probability of audit is an increasing function of the amount of evasion. Under this assumption, the risk-neutral taxpayer's problem is to maximize

$$E(Y) = (1 - P[x])(v + t(y - x)) + P[x](v - \theta(y - x)) \tag{3.3}$$

where y is the expected income.

If $P' \equiv \partial p/\partial x$ is zero, then the taxpayers underreport an unlimited amount as long as it has positive expected utility, i.e. when $(1 - P)t - P\theta > 0$. However, if p' is negative and thus the probability of audit decreases with a decreased evasion, the first-order condition would be $(1 - P)t - p\theta = -P'(\theta + t)(y - x)$. In this case, the evasion will be constrained by the fact that the increase of P would increases expected utility.

The extended model further assumes that the expected income upon examination is not a monotonically increasing function of x but reaches a maximum at some positive level of evasion, where $x < y$. In other words, unlike the standard compliance model, the true tax liability is uncertain and the outcome of an audit depends on the taxpayer's initial reported income. Under the second assumption, the risk-neutral taxpayer's problem becomes

$$E(Y) = (1 - P[x])(v + t(y - x)) + P[x](g[x, d]) \tag{3.4}$$

where g is the expected income upon examination which a function of reported income x and availability of third-party data d. Thus, the first order-conditon for a maximum becomes

$$(1 - P)t - Pg' = -P'(v + t(y - x) - g). \tag{3.5}$$

Under the situation where probability of audit is 100 percent, $P = 1$, and is the increasing function of evasion $P' = 0$, the optimum of Equation 3.5 is $g' = 0$. However under the situation where probability of audit is less than 100 percent, $P < 1$, and is the decreasing function of evasion $P' < 0$, the optimum of Equation 3.5 is

$$g' = \frac{1 - P}{P}t + \frac{P'}{P}(v + t(y - x) - g), \tag{3.6}$$

indicating that in this case the $g' < 0$. This result is caused by the facts that the first and the second terms of the right-hand side are positive and negative, respectively.

Therefore, given the shape of g, the optimal value of x for taxpayer in the second situation ($g' < 0$) is greater than the optimal value of x for taxpayer in the first situation ($g' = 0$). The intuition is that, under a certain examination (e.g. all HWIs at the HWI office have 100 percent chance of being scrutinized by tax officials enabled by higher tax official-to-taxpayer ratio, well-skilled officials, and tailor-made compliance framework), taxpayer does not have to report more income in order to reduce the probability of detection. Moreover, the extended model illustrates that $g(x)$ may reach a maximum at $x < y$. This theoretical predictions suggest that in the face of a certain examination the optimal strategy might involve some underreporting of income.

The main implication of the extended model is that the change in evasion upon the establishment of HWI office does not only represent the change in noncompliance, as in the standard compliance model, but also involve uncertainty in the outcome of an examination because of the absent of relevant third-party data and required technology as well as well-suited compliance framework that can be used to analyze HWIs complex tax strategies and detect any discrepancies.

Moreover, when probability of audit P is equal to probability of detection p, it might be irrational for taxpayers to slightly underreport income when he/she face a certain audit probability. In this case, the probability of detection is not only an increasing function of the unreported income but also the availability of third-party data, d. Therefore, the expected income upon examination g is increasingly function of x and reaches a maximum where $x < y$ if there is lack of available third-party data. Otherwise, when all information on taxpayer's income is available to the tax authority, then $g[x, d]$ is equal to $v - \theta(y - x)$. Thus, the uncertainty in audit outcome would be eliminated because the tax authority also has information that the taxpayer does have.

3.3 Setting and Data

3.3.1 Income Taxation of Individuals in Indonesia

A modern personal income tax scheme was introduced in 1983 by the Indonesian government with three marginal income tax rates, e.g., 15 percent for taxable income of up to 10 million IDR, 25 percent for taxable income from 10 million to 50 million IDR, and 35 percent for taxable income above 50 million. Prior to the implementation of HWI unit (2000-2008), the marginal income tax rates were 5 percent for taxable income of up to 25 million IDR, 10 percent for taxable income from 25 million to 50 million IDR, 15 percent for taxable income from 50 million to 250 million IDR, 25 percent for taxable income from 250 million to 500 million IDR, 35 percent for taxable income above 500 million IDR. In 2009, the government reduced top marginal tax rate from 35 percent to 30 percent. This reduction might affect the reported income of individuals in the sample of this study as they generally have taxable income of more than 500 million IDR. Previous studies on elasticity of taxable income (Feld-

stein, 1995; Gruber and Saez, 2002; Saez et al., 2012) suggest that reduction of top marginal tax rate can minimize evasion and avoidance and thus improve the accuracy of reported income. Moreover, the studies indicate that the elasticity increases as the taxable income grows. Thus, this paper expects that the tax cut would positively affect the reported income.

Wealthy individuals commonly earn a considerable amount of income from capital. In Indonesia, most of the capital income is subject to final tax regime instead of regular progressive income tax scheme where the marginal tax rate in the highest bracket is around 30 percent. For example, dividend payment received by domestic taxpayer will be taxed at 10 percent, interest from bank deposits will be taxed at 20 percent, capital gains on share of listed companies are taxed at 0.5 percent and rent income is taxed at 10 percent. Prior to 2009, dividend received by domestic individual taxpayers are subject to income tax regime. In 2009, the Indonesian government changed the provision of taxing dividend from progressive income tax regime to 10 percent final withholding tax regime.[2] This policy reduced reported net income as well as income taxes paid by wealthy individuals under progressive income tax regime.

Moreover, In 2008, financial crisis emerged in Asian countries because of the US sub-prime mortgage market collapse. For Indonesia, the effects of financial crisis were depicted by the exchange rate depreciation of around 30 percent and the stock market index plummet of around 50 percent in 2008, slowing down economic growth to 5.2 percent (Basri and Siregar, 2009). With sound policy responses, Indonesia managed to recover from the crisis in 2010 and increase the economic growth to around 6.2 percent (Basri et al., 2013). The crisis may affect Indonesian HWIs in the treated and comparison groups differently conditional on the level of assets. Thus, in the empirical analysis I would check the robustness of the estimated impacts by gradually increasing the assets threshold in the sample as it would potentially exclude HWIs with lesser share of capital assets as a percentage of total assets and thus less affected by the crisis as well as the change in dividend tax policy.

3.3.2 Tax Administration Reform in Indonesia

In 2002, the government of Indonesia initiated a tax administration reform to rebuild its fiscal system after the 1997-1998 Asian financial crisis. The reform consists of several major initiatives namely organization restructuring, upgrading of employee compensation scheme, and procurement of modern and integrated IT system.

The organization restructuring transfromed tax offices structure into size-based tax administration. Several hundreds of Indonesian largest taxpayers which are mostly corporations would be administered by several Large Taxpayer Office (LTO) in Jakarta. LTOs are supervised by a Large Taxpayer Regional Office (LTRO). Similarly, several hundreds of large taxpayers in each of Indonesia's 19 tax regions would be administered by a Medium Taxpayer Office (MTO).[3] The remaining taxpayers would

[2]Government Regulation number 19 year 2008 concerning Income Tax on Dividend obtained by Domestic Individual Taxpayers.

[3]Around 15 Regional Tax Offices have no MTO under their supervision.

be administered by around 300 Small Taxpayer Office (STO). MTOs and STOs in each region are administered by a Regional Office (RO).

The organization restructuring was started by the establishment of two LTOs in 2002. The LTO initiative was considered successful by the government and international institutions such as International Monetary Fund and World Bank in terms of corruption eradication in tax offices and provision of excellent tax administration and services. In 2004-2006, the first wave of MTOs were established in 6 regions. In 2007, the second wave of MTOs were created in 13 regions and ordinary tax offices in all regions are transformed into STOs.

The internal structure of tax office was also restructured. Prior to the reform, tax offices and taxpayer services and compliance activities were structured by tax type, i.e., corporate income tax, individual income tax, value added tax, and withholding taxes. Moreover, tax audit was not only conducted by tax offices but also conducted by separate tax audit offices. The reform integrated all taxpayer services, compliance, and auditing activities into a single office.

In each tax office, day-to-day compliance monitoring and examination and provision of services is conducted by around 40 Account Representative (AR) whereas auditing is performed by around 30 tax auditors. Each AR handles a group of taxpayers where the number of taxpayers is changing based on the type of offices. In LTOs and MTOs, each AR and auditor administers around 20 to 30 taxpayers. In contrary, in STOs, each AR and auditor administers hundreds of taxpayers, in some cases, thousands of individual taxpayers. However, in each STO, the compliance monitoring and examination is typically focused on its 100 to 500 largest taxpayers.

The upgraded employee compensation scheme follows the pattern of new organizational structure. Employees in LTOs recieve slightly higher salary relative to their counterparts in MTOs and STOs. Likewise, employees in MTOs receive slightly higher salary relative to their counterparts in STOs. The salary gradation in this scheme is characterized by the skills and experience required in each type of office. In other words, more skillful and experienced employee would be recruited by LTOs or MTOs and thus receive slightly higher compensation.

3.3.3 High-Wealth Individuals Office

In 2009, the government of Indonesia established a High Wealth Individual (HWI) office in Jakarta to administer individuals who live in Indonesian capital city, Jakarta, with reported assets of above 100 billion IDR (around 10 million USD in 2009), and have control over corporations.[4] The Indonesian tax authority issued a decision letter containing a list of qualified wealthy individuals who will be administered by the HWI tax office. Starting May 2009, around 1,200 wealthy individuals are administered by the HWI tax office.[5]

[4]Appendix Table L.1 shows that the majority of taxpayers (top 5 percent income earners) administered by the HWI office have over 40 percent of their total assets in terms of stocks (not held for sale).

[5]Director General of Tax Decision number KEP-53/PJ/2009 mandated 1,203 wealthy taxpayers to be administered by the HWI office starting May 1, 2009. On August 1, 2009, around 11

The objective of the HWI office is to improve wealthy individuals' tax compliance and spur tax revenue collection. In general, under an ordinary tax office or Small Taxpayers Office (STO), the compliance monitoring activities are prioritized to taxpayers with high income and tax payments including HWIs. However, HWI's tax strategy is often complex and involving some controlled corporations which are not administered by the office where a HWI is administered, and thus creating hurdles for tax officials to collect information on controlled corporations from other tax offices, map the HWI tax strategy and detect tax fraud. The HWI office uses a special compliance monitoring approach that does not only involve wealthy individuals but also the corporations (domestic and foreign) under their control. To check the accuracy of HWIs reporting, the office also collects third-party data on assets, liabilities, and income from various sources, e.g., governments institutions, exchange of information (EOI), news media, internet, and so on. [6]. Moreover, the HWI is structured as an LTO and under supervision of the LRTO in Jakarta, and thus has higher official-to-taxpayer ratio and well-suited officials. Therefore, the key administrative differences between individuals handled by HWI office and those handled by STOs is that the former face more intensive administration than the latter due to higher tax official-to-taxpayer ratio, more skillful and experienced tax official, and better-tailored compliance strategies. The special office aims to affect the likelihood that income is reported accurately and taxes are paid accordingly by the HWIs.

Nevertheless, several challenges were faced by the HWI office during its early period of operation (DJP, 2010; Widihartanto and Braithwaite, 2016). First, there is a 6-month delay in transfering taxpayers documents including tax returns, financial statements, etc. from previous tax offices to the HWI office. During the period of analysis, the integrity and reliability of the taxpayers database is relatively low due to poor data entry processes. Thus, tax official frequently used hard-copy files in the examination in order to avoid inaccurate anlaysis. Second, the EOI provided limited information about foreign corporate ownerships, particularly in the tax haven countries. The lack of information on offshore assets create considerable obstacles in the effort to uncover offshore tax evasion.[7] Third, the banking information needed in tax audit process is often unavailable for tax auditor as the procedure of requesting bank account information can take up to eight months to complete while the tax audit must also be finished in eight months.[8] These challenges suggest that the intensification of tax administration in the HWI unit was not accompanied with sufficient third-party data.

In 2012, the government added around 972 state-owned enterprises into HWI unit's

wealthy taxpayers were added to the HWI unit by Director General of Tax Decision number KEP-80/PJ/2009.

[6]During the period of analysis (2001-2014), policies regarding relaxation of bank secrecy for tax purpose and automatic exchange of information (AEOI) have not been implemented.

[7]Alstadsæter et al. (2018) shows that Indonesian wealthy individuals have the highest propensity to own assets in tax haven countries relative to their counterparts in other countries.

[8]In 2017, the government rules that the access to banking information for tax audit purpose can be obtained no longer than 14 days since the request is placed by the tax authority to the Financial Service Authority (OJK).

administration and gave the unit a new name, i.e., Large Taxpayers Office Four (LTO 4).[9] The government also inreased the number AR to keep the tax official-to-taxpayer ratio the same. Prior to 2012, the number of AR in HWI unit is around 24 persons so each AR handles arround 50 taxpayers. Since 2012, the number of AR in LTO 4 increases to around 44 persons so each AR still handles around 50 taxpayers. Thus, the organizational restructuring may not affect the intensity of tax administration of wealthy individuals in that special tax office.

During the period of analysis, the tax authority has not amended the decisions on taxpayers assignment into HWI office and LTO 4. In other words, there has been few movements of taxpayers from other tax offices to the HWI office or vice versa. This also implies that taxpayers have no ability to manipulate the treatment status, for example by reducing their reported assets. Therefore, The creation of HWI office produces quasi-experimental variation in the intensity of tax administration conditional on the types of tax offices (HWI office and STOs) and the establishment date of HWI office (before and after 2009). Using these variations, I compare taxpayer outcomes, such as net reported income and income taxes, between HWIs administered by the HWI office and HWIs who were qualified for but not assigned to the HWI office by the government. The comparisons of means are structured into difference-in-differences type of analysis.

3.3.4 Data

I use de-identified Indonesian tax administration data from 2007 to 2015 to estimate the compliance impacts of the creation of HWI unit. Nevertheless, I only observe and use taxpayers' reported asset during the 2014-2015 period to construct the control group. In the empirical analysis, I concentrate to individuals with assets above the HWI office assignment threshold (i.e., 100 billion IDR) during 2014-2015 and who are top 5 percent of income earners (during 2007-2015) to match the key observable characteristics of individuals administered by the HWI office.[10] Moreover, I exclude foreign individuals with the same criteria that are administered by another special tax office (Foreign Firms and Individuals Tax Office) as they are likely to have different tax strategy.

Table 3.1 shows summary statistics of variables used in the study by income income groups, types of tax office, and cities. As described above, the implementation of HWI office creates variation in the intensity of tax administration among the wealthiest and potentially the highest income earners between the HWI office, STOs in Jakarta, and STOs in other cities. First, the table shows that more than 80 percent of the individuals administed by the HWI office are top 5 percent of income earners before and after the reform. Moreover, around 65 percent of the taxpayers at the HWI office

[9]Director General of Tax Decision number KEP-102/PJ/2012 mandated 972 state-owned corporations to be administered by the HWI office starting April 1, 2012. There has been no document that explains the rationale of this policy.

[10]Appendix L describes the distribution of income and assets at the HWI office used in the construction of the comparison group in this analysis.

are top 1 percent of income earners before and after the reform.[11] Second, the table shows that the reported net income at the HWI office is stable before and after the reform. On the other hand, the reported net income of individuals in Jakarta as well as other Indonesian cities increases during the 2008-2010 period. Third, the table shows that the income taxes of the top 5 percent and 1 percent income earners at the HWI office decline over the 2008-2010 period while those of their counterparts administered by Jakarta's and other cities' ordinary tax offices increase during the same period.

Table 3.1: Summary Statistics: High-Wealth Individuals

	Top 5 Percent (P95.1-100)						Top 1 Percent (P99.1-100)					
	HWI		Jakarta		Other Cities		HWI		Jakarta		Other Cities	
Variables	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Net income	3.85	3.82	0.63	0.94	0.46	0.79	4.96	5.01	1.45	2.15	1.22	2.78
in billion IDR	(8.51)	(7.54)	(1.15)	(3.68)	(3.69)	(5.61)	(9.71)	(8.51)	(1.66)	(6.95)	(5.65)	(14.69)
Income taxes	1.31	1.09	0.18	0.21	0.12	0.15	1.69	1.44	0.46	0.53	0.35	0.49
in billion IDR	(2.98)	(2.26)	(0.37)	(38)	(0.75)	(0.94)	(3.39)	(2.55)	(0.59)	(0.63)	(0.51)	(1.34)
Number of observations	804	1,017	40,620	42,363	57,550	61,805	587	743	9,657	11,393	7,455	8,815

Notes: Statistics reported are means with standard deviations in parentheses in the year before (2008) and after (2010) the establishment of HWI office. All monetary variables are measured in nominal IDR.

I use several variables to characterize HWIs, such as level of income, level of wealth, and types of tax office. The level of income is characterized by income percentile which is contructed using taxpayers' reported net income. Moreover, I use the HWI office assignment threshold, i.e. 100 billion IDR, to characterize HWIs and thus those below the threshold are excluded from the sample. I also use the tax office code to indicate the intensity of tax administration (e.g., whether the office is an HWI office or an STO).

The creation of HWI office aims to ensure that high-wealth individuals accurately report income. Consequently, reported net income is the key variable directly affected by the reform. All individual taxpayers must declare their income on a yearly basis. This variable is the primary outcome in my empirical analysis on high-wealth individuals' compliance.

All individual taxpayers must report their assets and liabilities in the annual tax return. The assets are reported in their acquisition value instead of market value. I observe the reported assets in 2014 and 2015 but not in 2009 when they are used by the government to assign individuals to the HWI office. Therefore, it is possible that the value of the 2014-2015 reported assets is larger than that of the 2009 due to selling and purchasing of assets. Panel B of Appendix Figure L.2 shows that around

[11] Appendix Figure L.1 reports the percentage distribution of reported net income at the HWI office before (Panel A) and after (Panel B) the reform. The figure suggests that during my data period the composition of income groups at the HWI unit is relatively stable.

80 percent of at the HWI office (top 5 percent of income earners) own on average more than 100 billion IDR of assets during 2014-2015.

HWIs income taxes may not be affected by the reform in the same way as the reported net income because the variable also depends on marginal tax rates, personal exemptions, and donation. In 2009, the government reduced the top marginal income tax rate for taxable income of above 500 million IDR from 35 percent to 30 percent. Thus, in the empirical analysis, I divide the estimation into two parts, e.g., individuals with taxable income of below and above 500 million IDR to localize the impact of the decrease in top marginal tax rate on income tax liabilities.

3.4 The Effect of HWI Office on HWIs Compliance

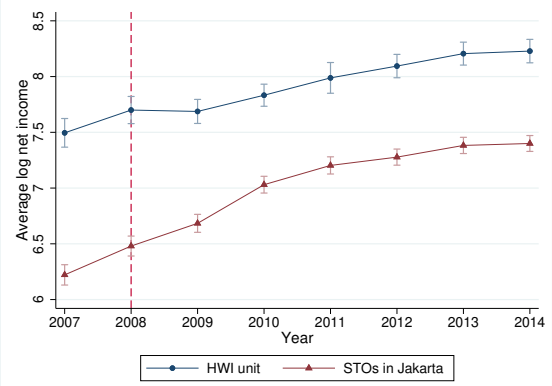
To study the extent that the intensive tax administration introduced by the establishment of a special tax unit that administer a group of wealthiest individuals can enhance compliance, I estimate the effect of the establishment of HWI office on HWIs' reported net income using a difference-in-differences research design. This paper concentrate on reported net income as it is the main outcome directly impacted by the reform. I exploit the variation in treatment from the tax administration reform on HWIs by comparing HWIs' reported income between treated tax office (the HWI office) and untreated tax offices (STOs) before and after the reform. Moreover, I decompose the untreated tax offices by region (e.g., Jakarta and other cities) as all HWIs administered by the HWI office reside in Jakarta.

3.4.1 Descriptive Evidence

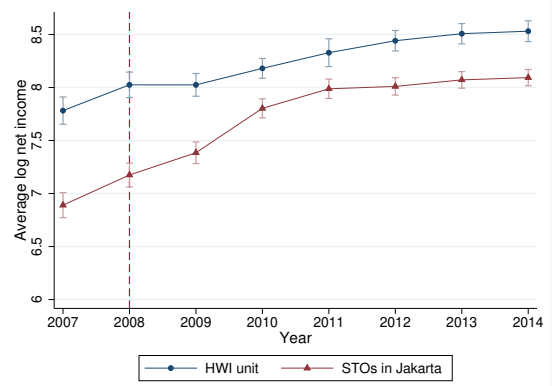
Figure 3.1 shows the average log reported net income for wealthiest individuals (e.g., those with assets above HWI office assignment threshold of around 100 billion IDR) by types tax office (e.g., HWI and STOs), region (e.g., Jakarta and other cities), and income level (e.g., top 5 percent and 1 percent income earners) before (2007-2008) and after (2009-2014) the tax administration reform. Panel A and B show that reported net income in HWI office and Jakarta STOs evolve uniformly until the creation of HWI office in 2009. However, the reported net income in HWI office started to diverge from that of Jakarta STOs in 2009 and 2010. Panel C and D also show paralel trend in the reported net income between HWI office and STOs in other cities before the reform. Nevertheless, the reported net income in the HWI office changes differently from that of STOs in other cities after 2009. The figure suggests that individuals at the HWI office on average report similar net income in 2009 as in 2008. Individuals at the HWI office on average report larger net income in 2010 but not as large as that of their counterparts in Jakarta as well as other cities.

Figure 3.1: The Evolution of Reported Net Income

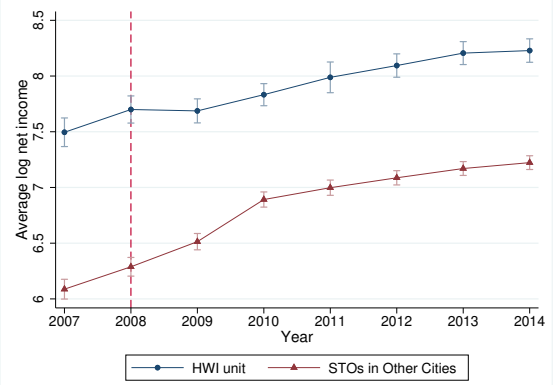
Panel A: HWI vs Jakarta (Top 5% Earners)



Panel B: HWI vs Jakarta (Top 1% Earners)



Panel C: HWI vs Other Cities (Top 5% Earners)



Panel D: HWI vs Other Cities (Top 1% Earners)

Notes: The figure shows the evolution of average log reported net income as well as standard deviation for high-wealth individuals administered by HWI unit (solid-dotted line) and STOs (solid-triangled line) before (2007-2008) and after (2009-2014) the establishment of HWI unit. The vertical solid-dashed lines represent the fiscal year when the unit was started. Panel A and B show the comparison between HWI unit and STOs in Jakarta. Panel C and D show the comparison between HWI unit and STOs in other cities. The results are similar to those of balanced panel presented in Appendix Figure M.1.

3.4.2 Empirical Analysis

To estimate the effect of the implementation of HWI office across time, I use the following generalized difference-in-differences framework,

$$Y_{it} = \alpha + \gamma_t + \delta_i + \sum_{t=2007} \theta_t \times D_i \times 1(y = t) + \sum_{t=2009}^{2014} \pi_t \times D_i \times 1(y = t) + \beta X_{it} + \varepsilon_{it} \quad (3.7)$$

In this equation, Y is the log tax outcomes such as reported net income and income taxes for high-wealth individuals i in year $t = 2007, ..., 2014$, γ is a set of year fixed effects that represents changes common to all high-wealth individuals, δ is a set of individual fixed effects that represent time-invariant individual level differences, D_i equals 1 if an individual was administered by the HWI office and 0 if administered by an STO, and y denotes a one-year window from 2007 to 2014. The year dummy prior the HWI office operation, $1(t = 2008)$, is ommited, normalizing the estimates for θ and π to 0 in 2008. The coefficients π_{2009} to π_{2014} capture the impact of the establishment of HWI unit on income taxes of wealthy individuals.

The effect of the HWI office, averaged across all post-reform periods, can be estimated using a standard difference-in-differences (DD) specification,

$$Y_{it} = \alpha + \gamma_t + \delta_i + \pi Treat_i.Post_t + \varepsilon_{it} \tag{3.8}$$

where $Treat$ equals 1 if individual was administered by the HWI office and equals 0 if administered by an STO, $Post$ equals 1 if $t \geq 2009$ and 0 if $t = 2007$, and ε_{it} is clustered at the tax office level.

3.4.3 Results

I start the analysis by presenting the coefficients from the standard DD specification in Equation (3.8). Table 3.2 shows about 44 percent decrease in the reported net income for wealthiest individuals who are top 5 percent income earners at the HWI office relative to their counterparts at the STOs (Jakarta and other cities). The table also shows that the post-reform increases in reported net income for top 1 percent of income earners at the HWI office are slightly lower, e.g., 40.9 percent and 40.6 percent, compared to their counterparts in Jakarta STOs and other cities STOs, respectively.[12]

[12] Appendix Table M.4 shows that the coefficients from standard DD specification in Equation (3.8) using taxable income as an outcome are similar to the results from the specification that uses reported net income as the outcome. The results also robust in both balanced and unbalanced panels. Appendix Figure M.3 and M.4 show the event study graphs for the specification that uses taxable income as the outcome.

Table 3.2: The Effect of HWI Office on Reported Net Income

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	Top 5 Percent	Top 1 Percent	Top 5 Percent	Top 1 Percent
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.054	0.053	0.007	-0.018
	(0.061)	(0.035)	(0.025)	(0.043)
After Reform				
(2009 to 2014) x HWI Unit	-0.442***	-0.409***	-0.439***	-0.406***
	(0.038)	(0.041)	(0.035)	(0.062)
R^2	0.852	0.806	0.860	0.807
N Obs.	9,517	6,007	11,009	6,307

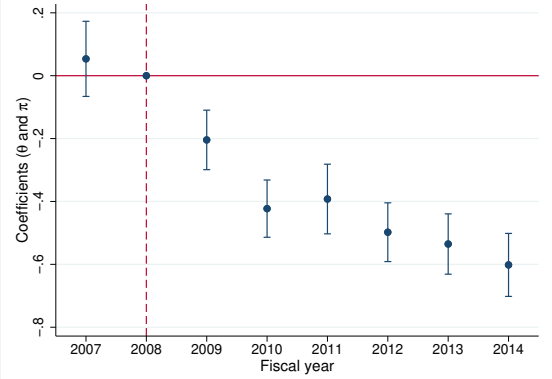
Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

Figure 3.2 plots the coefficients and the 95 percent confidence intervals estimated with Equation (3.7). The difference between the treated and control groups is around zero before the reform. By the time the HWI office is fully operated the difference in log reported net income between the two groups starts to increase. Panel A and B demonstrate that the decreases in reported income for top 5 percent and 1 percent income earners in Jakarta are relatively similar of about 20 percent in 2009. Moreover, the panels shows that in 2010 the decrease for top 1 percent is slightly larger by almost 8 percentage points. Similarly, Panel C and D show that the reported income at the HWI office decrease about 20 percent relative to other cities STOs in 2009 for top 5 percent income earners and about 40 percent in 2010. The panels also show that relative to other cities STOs, the impact on top 1 percent income earners at the HWI office is moderately larger (Panel D) than that of top 5 percent income earners (Panel C).

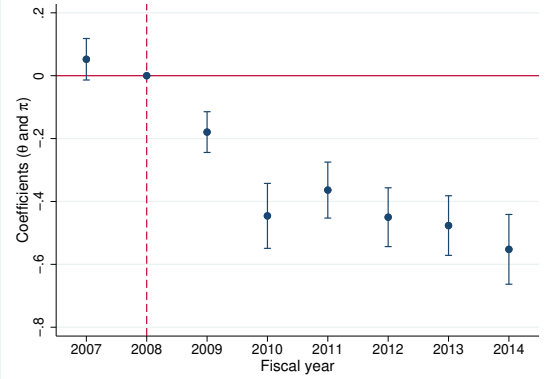
The results are consistent with (Slemrod et al., 2001) which find that increasing audit probability for high-income earners to 100 percent leads to reductions in tax liabilities of about 34.8 percent for self-employed and 16.8 percent for wage earners. They argue that high-income earners are privileged for having dependable tax consultants and thus view that the final outcome of audit can be more manipulated as well as more contigent on their reported income relative to other individuals. Moreover, the belief that the audit outcome is manipulable in this paper is likely to be more stronger because the operation of HWI office during the period of analysis have been challenged by the lack of relevant third-party data such as banking information and offshore assets.

Figure 3.2: The Effect of HWI Office on Reported Net Income by Income Group

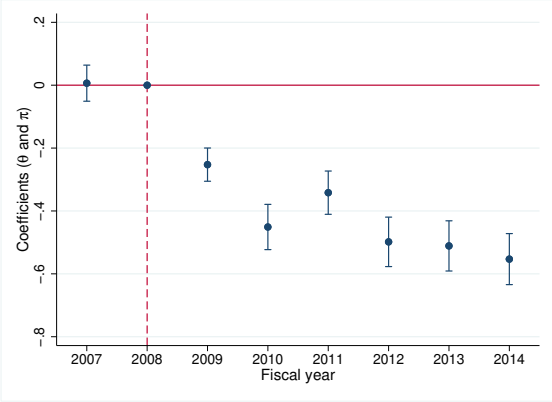
Panel A: HWI vs Jakarta (Top 5% Earners)



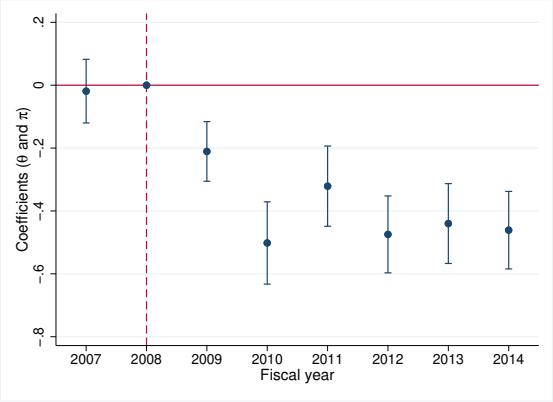
Panel B: HWI vs Jakarta (Top 1% Earners)



Panel C: HWI vs Other Cities (Top 5% Earners)



Panel D: HWI vs Other Cities (Top 1% Earners)



Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the effect of HWI office on reported net income between 2007 and 2014. Standard errors are clustered clustered at the tax office level. The results are similar to those of balanced panel regressions presented in Appendix Figure M.2.

However, the results are likely to be confounded by the change in dividend tax policy in 2009 and the 2008 Asian financial crisis because individuals admnistered by the HWI office have larger capital and thus are potentially more responsive to change in capital tax and economic shocks. Appendix Table L.1 shows that HWIs at the HWI office have slightly larger share of stock held not for sale as percentage of total assets and potentially receive more dividend income relative to their counterparts administered by STOs. Therefore, HWIs at the HWI office potentially also have larger reduction in reported income due to the change in dividend tax policy which imposes a lower final tax rate of around 10 percent on dividend and excludes the dividend income from the reported income taxed at a progressive income tax schedule. In order to check whether the change in dividend policy confuse the estimation of HWI office impact, I increase the assest threshold in the sample so that the share of stock not

held for sale of the control and comparison groups are relatively similar. Appendix Table M.1, M.2, and M.3 show that the estimates presented in Table 3.2 are similar when the sample is restricted to those with reported assets above 150 billion IDR, 200 billion, and 500 billion IDR, respectively. The results suggest that dividend tax policy have affected both control and comparison groups similarly, and thus can be thought as irrelevant to this study.

3.4.4 Heterogeneity

This subsection studies the heterogeneity of HWI office impact on compliance by localizing the individuals who are potentially treated by the 2009 top marginal tax cut. The literature studying the elasticity of taxable income (Feldstein, 1995; Gruber and Saez, 2002; Saez et al., 2012) finds that the individual's responsiveness to change in marginal tax rates increases as taxable income goes up. This finding implies that the Indonesian top marginal tax cut would be responded differently by affected taxpayers. For instance, taxpayers just above the top tax bracket cut off would respond mildly while taxpayers further above the cut off would respond intensively to the tax cut. Therefore, I expect that the variation in the responsiveness to tax cut produces heterogeneity in the estimated compliance impact of HWI office. In other words, the results presented in Table 3.2 and Figure 3.2 may be affected by the tax cut because many HWIs in the sample have taxable income over 500 million IDR.

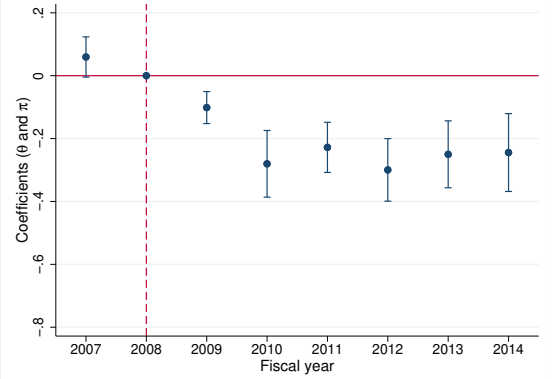
In order to study the heterogenous impact of HWI office, I decompose the sample into two parts, e.g., HWIs with taxable income of up to 500 million IDR and not affected by the tax cut as well as HWIs with taxable income above 500 million IDR and affected by the tax cut. Figure 3.3 shows that the estimated effects of HWI office are slighlty lower than the previous results. Appendix Table M.5 shows that the DD coefficients for Panel A and B of Figure 3.3 are around -19.1 percent and -21.2 percent when the comparison group is HWIs in Jakarta as well as -22.3 percent and -13.1 percent when the comparison group is HWIs in other cities. Moreover, the reduction of the estimated impacts is also observed when the comparison group is HWIs in other cities as shown in Panel C and D.

The depletion of the estimated impacts demonstrated in Figure 3.3 which occurs when the sample is decomposed into affected and unaffected groups by the cut off of top tax bracket (i.e., 500 million IDR) may be driven by the variation in the intensity of responses to tax cut, e.g. , taxpayers just above the cut off are not much affected by the cut relative to those with taxable income significantly further above the tax cut. In other words, the latter are potentially greatly treated by the tax cut and reported larger net income relative to the former.

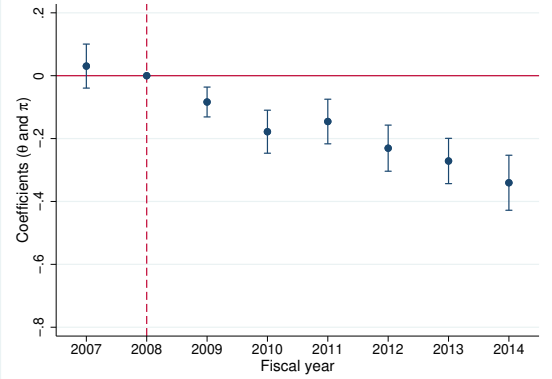
In addition, Table 3.1 suggests that individuals at the HWI office have higher average reported net income and thus higher average taxable income relative to other individuals in the sample. This income gap indicates that few individuals with the highest taxable income are administered by the HWI unit. These individuals potentially receive larger positive treatment from the tax cut and increase their reported income by higher percentage than other individuals which eventually reduces the estimated impacts for the affected sample presented in Panel B and D of Figure 3.3.

Figure 3.3: The Impact of HWI Office on Reported Net Income by Tax Bracket

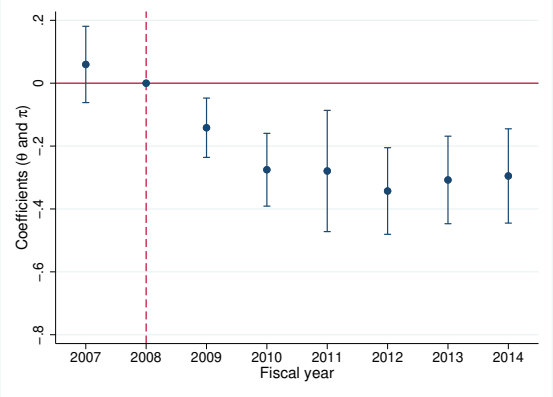
Panel A: HWI vs Jakarta (TI $\leq$ 500 M IDR)



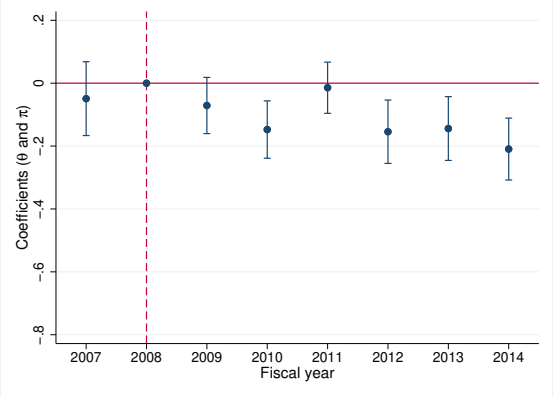
Panel B: HWI vs Jakarta (TI $>$ 500 M IDR)



Panel C: HWI vs Other Cities (TI $\leq$ 500 M IDR)



Panel D: HWI vs Other Cities (TI $>$ 500 M IDR)



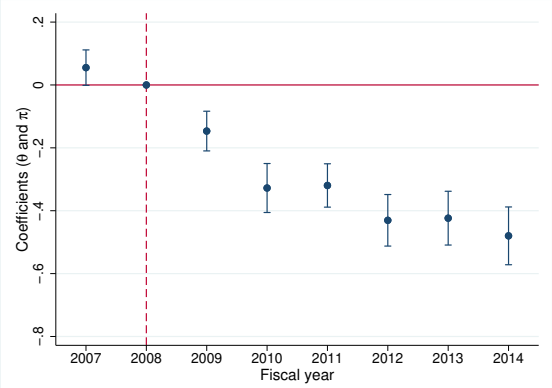
Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on reported income between 2007 and 2014. Standard errors are clustered clustered at the tax office level. The coefficients from the standard DD specification in Equation (3.8) are presented in Appendix Table M.5. The graphical evidence comparing the evolution of log average reported net income between the groups is presented in Appendix Figure M.5.

Figure 3.4 depicts that the magnitude of the estimated impacts approaches the baseline results presented in Figure 3.2 when the taxpayers with taxable income of around 500 million IDR above the cut off are combined with those with taxable income below the cut off. The estimated impacts from the standard DD specification for Panel A and B of Figure 3.4 are -30.2 percent and -21.3 percent (see Appendix Table M.6). The estimated impacts are similar to the baseline estimates when the taxpayers with taxable income of around 1,500 million and 4,500 million IDR from the cut off are pooled with those below the cut off (see Appendix Figures M.6 and M.7) The DD coefficients when the samples are taxpayers with taxable income below 2,000 million and 5,000 million are around -0.331 and -0.395 when the comparison group is HWIs in Jakarta as well as about -0.363 and -0.415 when the control group

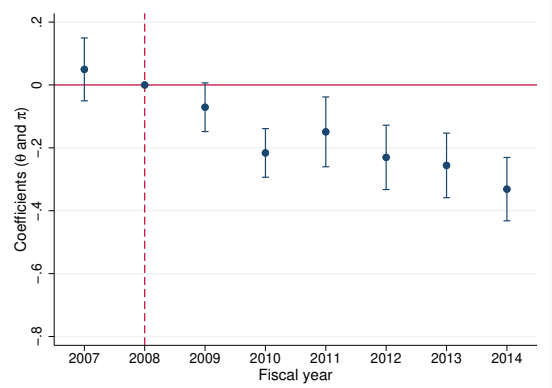
is HWIs in other cities. On the other hand, the DD coefficients for the samples which include HWIs with taxable income above 2000 million and 5000 million IDR are around -0.176 and -0.197 when the comparison group is HWIs in Jakarta as well as around -0.116 and -0.122 but not statistically significant when the control group is HWIs in other cities (see Appendix Tables M.7 and M.8). The results suggest that top marginal tax cut largely affects taxpayers with considerably high taxable income and thus errodes the estimated impact of tax administration reform for this group.

Figure 3.4: The Impact of HWI Office on Reported Net Income by Tax Bracket

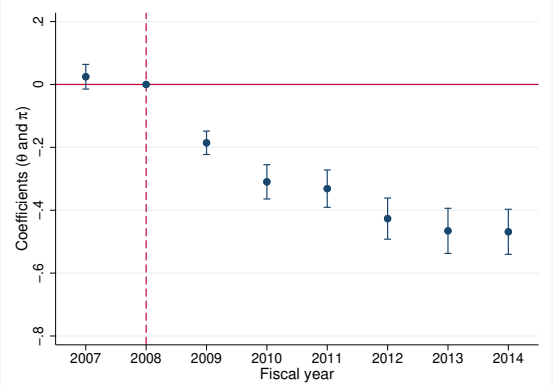
Panel A: HWI vs Jakarta (TI $\leq$ 1000 M IDR)



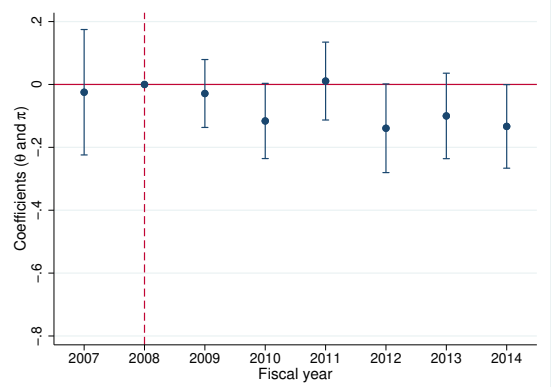
Panel B: HWI vs Jakarta (TI > 1000 M IDR)



Panel C: HWI vs Other Cities (TI $\leq$ 1000 M IDR)



Panel D: HWI vs Other Cities (TI > 1000 M IDR)



Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on reported income between 2007 and 2014. Standard errors are clustered clustered at the tax office level. The coefficients from the standard DD specification in Equation (3.8) are presented in Appendix Table M.6.

Moreover, the results show that wealthy individuals respond differently to the intensification of tax administration conditional on their reported income. Specifically, wealthy individuals with higher reported income at the HWI office demonstrate larger reduction in reported income relative to their counterparts at the HWI office. This heterogeneity indicates that the belief in manipulable examination outcome among

HWIs that face a certain probability of examination strengthen as the reported income grows. It is reasonable that the HWIs with larger reported income to have that belief because they are more likely to have more complex tax strategies which make the effort to detect non-compliance harder, particularly when the relevant third-party data was not available.

3.4.5 Tax Revenue Implication

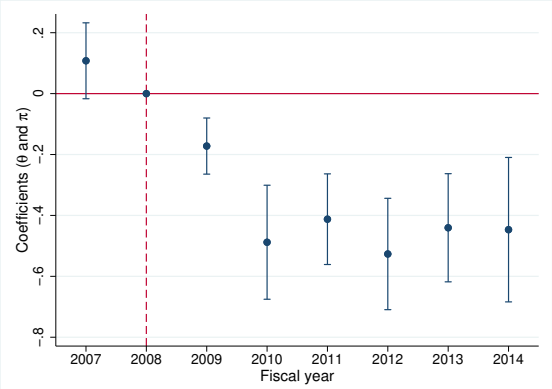
The impact of HWI office operation on the income taxes may not be in the same manner as on the reported income because the former is also affected by personal exemption, marginal tax rates, as well as donation. Nevertheless, the size of personal exemptions as well as donation for HWIs are considerably small relative to their reported income and so potentially would not facilitate behavioral responses to the implementation of HWI office. Moreover, the revenue impact could be smaller particularly to individuals with taxable income of more than 500 million IDR as the government cut the top marginal tax rate by 5 percentage points. The revenue impact could also be similar to the compliance impact particularly when HWIs with significantly large taxable income (e.g., above 5,000 million IDR) are excluded from the estimation. To investigate the impact of the policy on tax revenue, I study the policy effects on income taxes for individuals with taxable income below and above the top tax bracket cut off, i.e., 500 million IDR. I also gradually increase the cut off to find possible heterogenity in the revenue impact. Likewise, I use Equation (3.7) with log of income taxes as an outcome.

Figure 3.5 shows the revenue effect of the operation of HWI office. Panel A and C show that the revenue impacts for HWIs with taxable income below 500 million IDR (not affected by the tax cut) are similar to the previous net income effects of around -20 percent in 2009 and -40 percent since 2010. The DD coefficients are about -33.2 percent for Panel A and -40.5 percent for Panel C over six years (see Appendix Table N.1). Moreover, Panel B shows a smaller positive revenue change relative to HWIs affected by the tax cut in Jakarta with the average effects of around - 21.3 percent. Panel D also shows a smaller revenue effects compared to HWIs affected by the tax cut in other cities with average treatment effect of about -12 percent over six years.

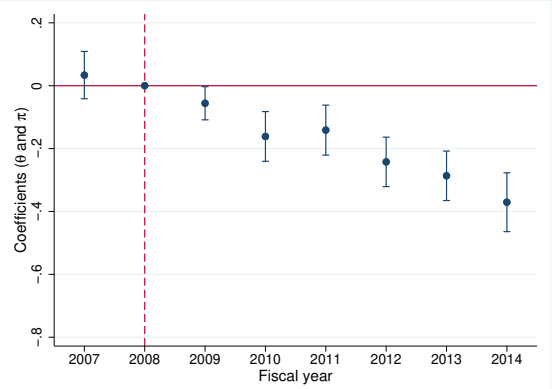
The revenue effects are increasingly larger when the cut off is increased to 1 billion, 2 billion, and 5 billion IDR as presented in Appendix N. For instance, the average treatment effect increases from -45.8 percent to -53.8 percent as the cut off expanded from 1 billion to 5 billion IDR for the specification that uses HWIs administered by STOs in Jakarta as a comparison group. With similar expansion, the average treatment effect increases from -49.6 percent to -58.2 percent when the comparison group is HWIs in other cities. On the other hand, the average impacts for taxpayers above the cut offs are similar to the baseline result for affected sample (HWIs with taxable income over 500 billion IDR) of around -20 percent and -12 percent when the comparison groups are HWIs administered by STOs in Jakarta and other cities, respectively. The results suggest that the effects of HWI office on the income taxes are slightly larger than on the reported income, except for taxpayers with considerably large taxable income, e.g., above 5 billion IDR.

Figure 3.5: The Impact of HWI Office on Income Taxes

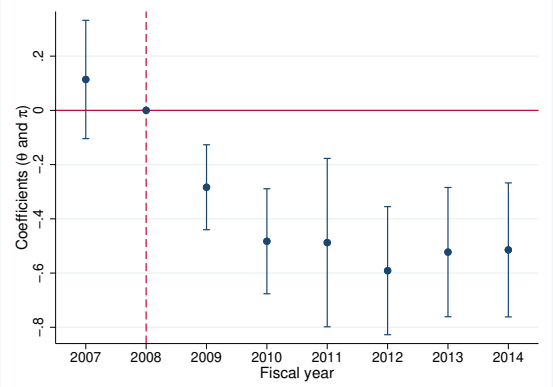
Panel A: HWI vs Jakarta (TI $\leq$ 500 M IDR)



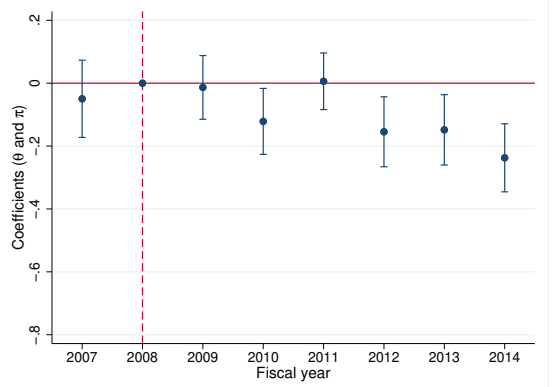
Panel B: HWI vs Jakarta (TI $>$ 500 M IDR)



Panel C: HWI vs Other Cities (TI $\leq$ 500 M IDR)



Panel D: HWI vs Other Cities (TI $>$ 500 M IDR)



Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on income taxes between 2007 and 2014. Standard errors are clustered clustered at the tax office level. The coefficients from the standard DD specification in Equation (3.8) are presented in Appendix Table N.1. The graphical evidence comparing the evolution of log average income taxes between the groups is presented in Appendix Figure N.1.

3.5 Conclusion

Given the enormous capability of high-wealth individuals to evade taxes, collecting tax revenue from and maintaining compliance of those individuals are difficult tasks for some countries. Hence, a special unit to administer HWIs tax matters is considered reasonable by tax authorities. However, the trend of HWIs' evasion seems to persist, raising a question whether the implementation of HWI unit is effective or not. This paper studies the compliance effects of tax administration reform on wealthiest individuals by utilizing the creation of Indonesian HWI unit in 2009 and Indonesian tax administration data. I use difference-in-differences estimator to

estimate the parameter of interest, exploiting quasi-experimental variation in the intensity of tax administration created by the policy conditional on the timing of policy implementation and types of tax office.

I find that the policy reduced income reported by wealthy individuals at the HWI office by around 40 percent over six years compared to their counterparts administered by STOs in Jakarta. I also find that the estimated effects are similar when the comparison group is HWIs administered by STOs in other cities. Moreover, the impacts on income tax liabilities are slightly larger than the reported income, except for the sample that includes HWIs with significantly large taxable income. The results indicate that the creation of HWI unit have negative effects on the reported net income as well as income taxes of wealthiest individuals during the period of analysis (2009-2014). The findings are consistent with the argument that under a certain examination the optimal strategy for a taxpayer should involve some underreporting of income because the outcome of an examination is uncertain or manipulable Slemrod et al. (2001).

Furthermore, the negative effects are increasingly larger as the reported income expands. The finding suggests that the belief that final outcome of tax examination can be more manipulable and more contigent on reported income when HWIs are imposed with a 100 percent chance of examination become stronger as their level of reported income increases. There is a possibility that HWIs with greater income could afford better tax consultants and get more sophisticated tax strategies which effectively conceal greater tax evasion, particularly when the relevant third-party data is hardly available.

From a policy perspective, this study sheds light on how intensification of tax administration may not work with the absent of relevant third-party data that can be used to verify the accuracy of reported income, assets, and liabilities. In the context of HWIs which are widely known to have complex tax strategies including offshore tax planning, the results indicate that lack of third-party data, particularly on assets (domestic and foreign) can potentially hamper the enforcement of HWIs compliance. This policy implication is compatible with the literature on tax compliance that argues that external factors (e.g., probability of detection, tax rates, and level of income) are the main drivers of taxpayer compliance (Slemrod, 2019).

Chapter 4

Conclusion

This dissertation studies three major tax policies in Indonesia (e.g., tax simplification, tax amnesty, and establishment of a special tax unit) designed to improve compliance and increase revenue collection. These policies also represent typical tax policy adopted by governments, particularly in the developing countries where enforcement capacity is often hampered by informality, large share of small businesses, and lack of third-party data. The first chapter studies the firms' behavioral responses to tax simplification in Indonesia by exploiting the implementation of turnover tax in 2013 and the expansion of value added tax (VAT) registration threshold in 2014 as well as the fact that both turnover tax eligibility and VAT registration thresholds are at the same value. I find that firms intentionally bunch just above the threshold in order to avoid turnover tax regime. I also document that some firms started to bunch just below the threshold in order to avoid VAT registration when the VAT threshold expanded in 2014. The results indicate that firms can face different types of notch at the same threshold and thus respond differently conditional on tax incentives (e.g. tax rates) and non-tax incentives (e.g., compliance costs and benefits). From a policy perspective, the study suggests that government should consider not only tax but also non-tax incentives in formulating tax simplification.

The second chapter examines the determinants of tax evasion and the compliance impacts of forgiving tax evaders using the 2016 Indonesian tax amnesty program where the government offers a set of discounted tax rates and penalties exemption on declaration of unreported net assets as an equivalent of unreported income. I document that the intensity in withholding tax, tax rates, level of income, as well as types of employment influence the decision to evade taxes. The results are consistent with the argument that externals factors motivate tax compliance. I further compare reported income between wage earners and self-employed individuals in each income percentile before and after the amnesty and find that the program provides no meaningful compliance effect except limitedly for those in the very top of income distribution, e.g., around 6.1 percent increase in reported net income. The limited amnesty impact is potentially driven by the Indonesian size-based tax administration, which prioritized its resources to monitor compliance of taxpayers with high tax base and payments.The results implies that tax amnesty can facilitate compliance when post-amnesty compliance is increased.

The third chapter investigates the effect of intensification of tax administration on HWIs compliance using the establishment of an HWI office in 2009 which administer individuals with gross assets of more than 100 billion IDR (around 10 million USD in 2009) and who reside in Indonesian capital city Jakarta. The policy creates quasi-experimental variation in the intensity of tax administration depending on the date

of HWI office implementation (before and after the policy) and the types of tax office (HWI office and ordinary tax offices). I document that the HWIs reported income and income taxes at the HWI office decreased by about 40 percent over six years relative to those of HWIs administered by ordinary tax offices. The results support the literature that predicts that in the face of a certain examination the optimal strategy for high-income earners might involve some underreporting of income. From a policy perspective, this study sheds light on how tax administration reform may not work with the absent of relevant third-party data that can be used to check the accuracy of taxable base.

Appendices

Appendix A

Firms Financial Ratio and Tax Regime Decomposition

Table A.1: Tax Payments Ratio

	2.8-4.8 Billion IDR					4.8-6.8 Billion IDR				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Income tax ratio										
Income tax	0.00874	0.00860	0.00676	0.00649	0.00668	0.00919	0.00899	0.00835	0.00806	0.00827
regime	(0.01254)	(0.01513)	(0.01274)	(0.01862)	(0.01480)	(0.01396)	(0.01571)	(0.01726)	(0.01425)	(0.01551)
Turnover tax	-	0.00527	0.00000	0.00000	0.00000	-	0.00524	0.00000	0.00000	0.00000
regime	-	(0.00836)	(0.00000)	(0.00000)	(0.00000)	-	(0.00864)	(0.00000)	(0.00000)	(0.00000)
Withholding tax ratio										
Income tax	0.00429	0.00524	0.00443	0.00396	0.00394	0.00413	0.00426	0.00423	0.00401	0.00394
regime	(0.00847)	(0.01172)	(0.01511)	(0.01315)	(0.01133)	(0.00874)	(0.00997)	(0.01599)	(0.01349)	(0.01264)
Turnover tax	-	0.00227	0.00028	0.00024	0.00019	-	0.00251	0.00035	0.00022	0.00025
regime	-	(0.00688)	(0.00567)	(0.00234)	(0.00178)	-	(0.00738)	(0.00395)	(0.00169)	(0.00297)
Final tax ratio										
Income tax	0.00341	0.00842	0.00942	0.00914	0.00912	0.00359	0.00498	0.00474	0.00536	0.00567
regime	(0.02253)	(0.03558)	(0.02817)	(0.02833)	(0.02606)	(0.04075)	(0.07242)	(0.04751)	(0.06889)	(0.05223)
Turnover tax	-	0.00688	0.01031	0.01041	0.01030	-	0.00501	0.01029	0.01043	0.01027
regime	-	(0.03623)	(0.01632)	(0.01785)	(0.00965)	-	(0.01581)	(0.01039)	(0.01632)	(0.02196)
Turnover tax ratio										
Income tax	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
regime	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Turnover tax	-	0.00441	0.00898	0.00908	0.00917	-	0.00405	0.00848	0.00829	0.00829
regime	-	(0.00248)	(0.00272)	(0.00281)	(0.00314)	-	(0.00264)	(0.00318)	(0.00349)	(0.00329)
Number of observation										
Income tax regime	15,923	7,752	7,434	9,527	10,595	8,742	8,386	8,625	10,400	10,543
Turnover tax regime	-	7,230	10,261	13,157	16,333	-	2,208	2,436	2,929	3,449

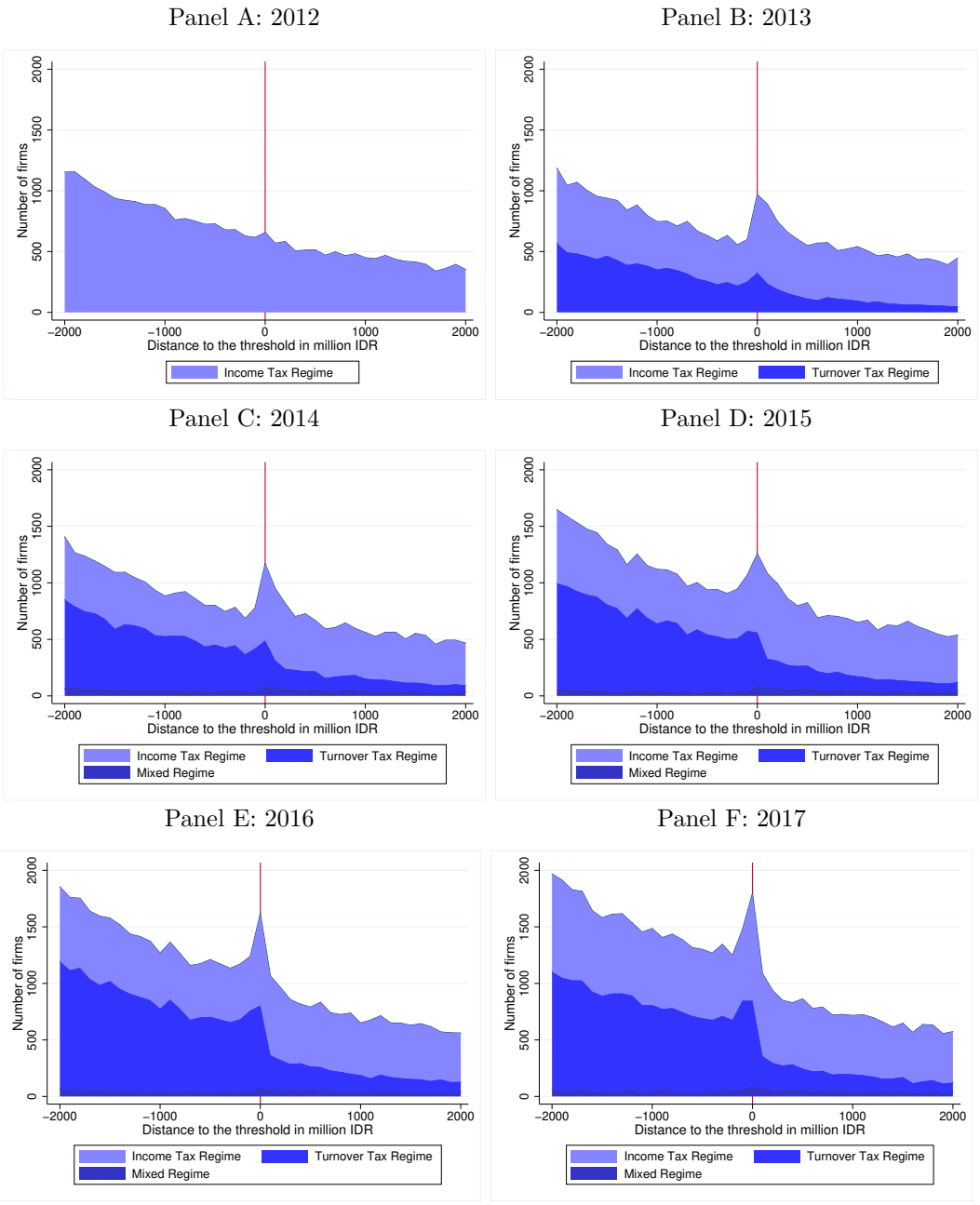
Notes: Statistics reported are means with standard deviations in parentheses. All financal ratio are calculated with respect to turnover.

Table A.2: Financial Ratio

	2.8-4.8 Billion IDR					4.8-6.8 Billion IDR				
	2012	2013	2014	2015	2016	2012	2013	2014	2015	2016
Direct input ratio										
Income tax	0.662	0.642	0.652	0.664	0.643	0.684	0.676	0.678	0.681	0.661
regime	(0.339)	(0.397)	(0.411)	(0.400)	(0.365)	(0.317)	(0.379)	(0.400)	(0.379)	(0.373)
Turnover tax	-	0.638	0.619	0.606	0.592	-	0.708	0.689	0.663	0.666
regime	-	(0.357)	(0.361)	(0.352)	(0.338)	-	(0.300)	(0.308)	(0.347)	(0.302)
Operating expenses ratio										
Income tax	0.273	0.281	0.283	0.316	0.322	0.249	0.275	0.281	0.298	0.311
regime	(0.345)	(0.429)	(0.447)	(0.519)	(0.472)	(0.311)	(0.389)	(0.392)	(0.435)	(0.401)
Turnover tax	-	0.291	0.302	0.319	0.327	-	0.225	0.249	0.291	0.281
regime	-	(0.329)	(0.320)	(0.338)	(0.342)	-	(0.278)	(0.291)	(0.407)	(0.337)
Non-operating income ratio										
Income tax	0.018	0.027	0.031	0.023	0.032	0.018	0.019	0.017	0.022	0.027
regime	(0.218)	(0.255)	(0.322)	(0.247)	(0.309)	(0.192)	(0.181)	(0.153)	(0.256)	(0.255)
Turnover tax	-	0.015	0.013	0.012	0.013	-	0.014	0.009	0.010	0.009
regime	-	(0.118)	(0.158)	(0.092)	(0.143)	-	(0.158)	(0.052)	(0.076)	(0.068)
Non-operating expenses ratio										
Income tax	0.011	0.023	0.021	0.027	0.024	0.011	0.016	0.014	0.023	0.023
regime	(0.123)	(0.264)	(0.215)	(0.255)	(0.217)	(0.123)	(0.177)	(0.134)	(0.209)	(0.208)
Turnover tax	-	0.012	0.011	0.012	0.011	-	0.013	0.013	0.013	0.012
regime	-	(0.140)	(0.090)	(0.109)	(0.083)	-	(0.099)	(0.092)	(0.098)	(0.096)
Foreign net income ratio										
Income tax	0.00008	0.00014	0.00016	0.00008	0.00011	0.00015	0.00008	0.00006	0.00011	0.00002
regime	(0.00575)	(0.00919)	(0.00567)	(0.00658)	(0.01028)	(0.01041)	(0.00353)	(0.00278)	(0.00837)	(0.00153)
Turnover tax	-	0.00004	0.00025	0.00003	0.00002	-	0.00000	0.00015	0.00000	0.00000
regime	-	(0.00337)	(0.01172)	(0.00157)	(0.00193)	-	(0.00000)	(0.00454)	(0.00000)	(0.00000)
Non-taxable income ratio										
Income tax	0.048	0.154	0.197	0.178	0.184	0.051	0.071	0.076	0.085	0.091
regime	(0.217)	(0.377)	(0.451)	(0.404)	(0.428)	(0.204)	(0.293)	(0.274)	(0.319)	(0.311)
Turnover tax	-	0.265	0.517	0.521	0.534	-	0.239	0.497	0.496	0.481
regime	-	(0.338)	(0.535)	(0.502)	(0.511)	-	(0.349)	(0.481)	(0.536)	(0.487)
Net fiscal adjustments ratio										
Income tax	0.033	0.108	0.118	0.143	0.136	0.031	0.055	0.053	0.072	0.067
regime	(0.219)	(0.430)	(0.387)	(0.466)	(0.439)	(0.225)	(0.315)	(0.279)	(0.345)	(0.324)
Turnover tax	-	0.212	0.388	0.409	0.421	-	0.195	0.406	0.418	0.403
regime	-	(0.523)	(0.497)	(0.517)	(0.511)	-	(0.335)	(0.537)	(0.504)	(0.523)
Loss carry forward ratio										
Income tax	0.00175	0.00111	0.00068	0.00078	0.00066	0.00163	0.00142	0.00091	0.00135	0.00116
regime	(0.02909)	(0.03155)	(0.02558)	(0.01718)	(0.02379)	(0.02721)	(0.01860)	(0.02555)	(0.02494)	(0.02233)
Turnover tax	-	0.00104	0.00048	0.00017	0.00018	-	0.00144	0.00059	0.00033	0.00019
regime	-	(0.02160)	(0.01482)	(0.00659)	(0.00904)	-	(0.01746)	(0.01013)	(0.00747)	(0.00632)
Taxable income ratio										
Income tax	0.068	0.065	0.053	0.047	0.049	0.063	0.061	0.056	0.054	0.054
regime	(0.085)	(0.099)	(0.096)	(0.087)	(0.091)	(0.091)	(0.091)	(0.090)	(0.087)	(0.848)
Turnover tax	-	0.000	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000
regime	-	(0.000)	(0.000)	(0.000)	(0.000)	-	(0.000)	(0.000)	(0.000)	(0.000)
Number of observation										
Income tax regime	15,923	7,752	7,434	9,527	10,595	8,742	8,386	8,625	10,400	10,543
Turnover tax regime	-	7,230	10,261	13,157	16,333	-	2,208	2,436	2,929	3,449

Notes: Statistics reported are means with standard deviations in parentheses. All financal ratio are calculated with respect to turnover.

Figure A.1: Firm Decomposition by Tax Regime (2012-2017)



Notes: The figure shows the share of firms by tax regime around the threshold. The light blue areas represent firms in the income tax regime, the blue areas represent firms in the turnover tax regime, and the dark blue areas represent firms in the mixed regime in the current year. Firms below the threshold would adopt turnover tax regime and those above the threshold would adopt income tax regime in the next year.

Appendix B

Robustness Checks and Heterogeneity on Bunching Reponses

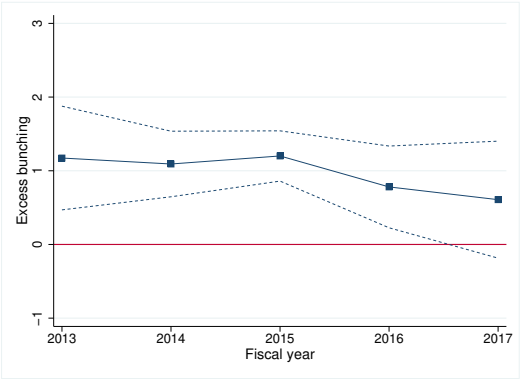
Table B.1: Robustness Checks: Excess Bunching by Counterfactual's Degree of Polynomial

	Degree of Polynomial		
	3^{rd}	5^{th}	7^{th}
A. Single threshold (2013)	1.370	1.173	1.163
	(0.354)	(0.359)	(0.356)
B. Multiple thresholds (2014-2017)			
B.1 Income tax regime			
2014	1.434	1.092	1.081
	(0.491)	(0.227)	(0.224)
2015	1.198	1.201	1.167
	(0.405)	(0.174)	(0.169)
2016	1.213	0.781	0.751
	(0.377)	(0.283)	(0.277)
2017	0.736	0.608	0.577
	(0.422)	(0.405)	(0.396)
B.2 Turnover tax regime			
2014	1.011	0.635	0.573
	(0.406)	(0.199)	(0.197)
2015	1.049	0.82	0.846
	(0.414)	(0.374)	(0.318)
2016	1.519	1.238	1.272
	(0.585)	(0.594)	(0.470)
2017	1.626	1.707	1.405
	(0.626)	(0.616)	(0.583)

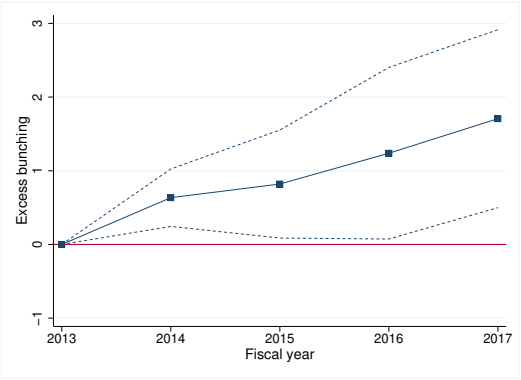
Notes: The table displays the average excess mass $b(y^*)$ as well as standard errors estimated in Equation (1.18) by counterfactual's degree of polynomial in each fiscal year after the reforms. In general, the estimates shrink as the degree of polynomials go up, yet converge at the 7^{th} degree polynomial.

Figure B.1: Summary of Excess Bunching

Panel A: Downward Notch



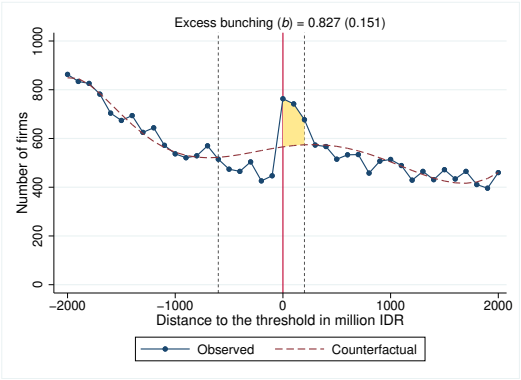
Panel B: Upward Notch



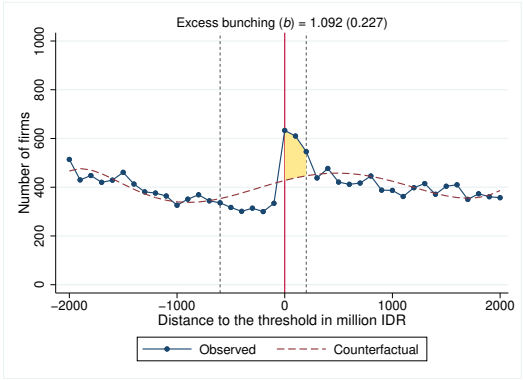
Notes: The figure displays the yearly excess bunching with 95 percent confidence intervals from 2013 to 2017. Panel A shows that the excess bunching in the upward notch due to turnover tax threshold was stable from 2013 to 2015 but has been trending down afterward. Panel B shows that the excess bunching in the upward notch due to VAT threshold has been increasing since 2014.

Figure B.2: Bunching in the Income Tax Regime by Year

Panel A: 2013

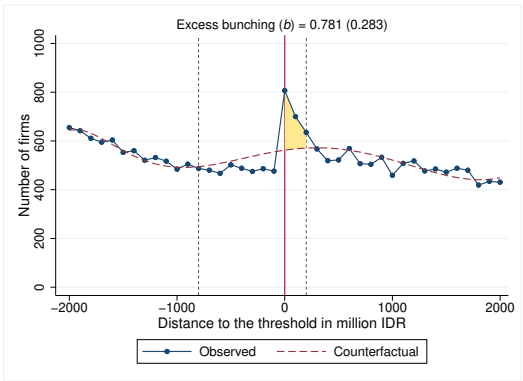


Panel B: 2014

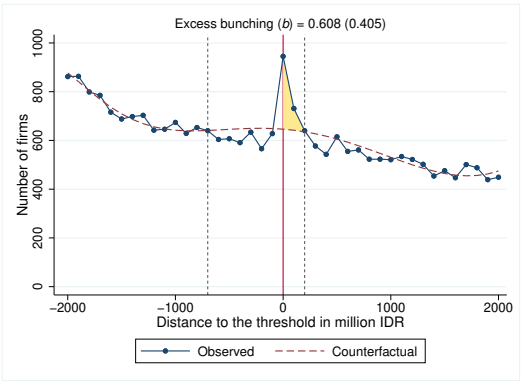


Panel C: 2015

Panel D: 2016



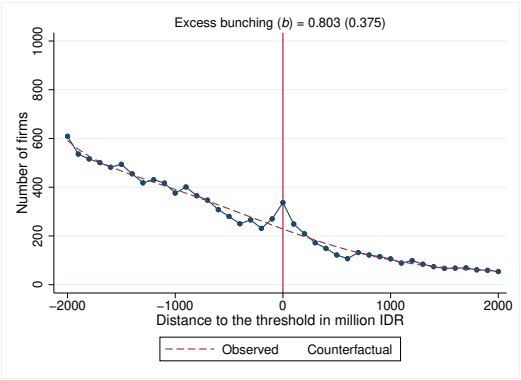
Panel E: 2017



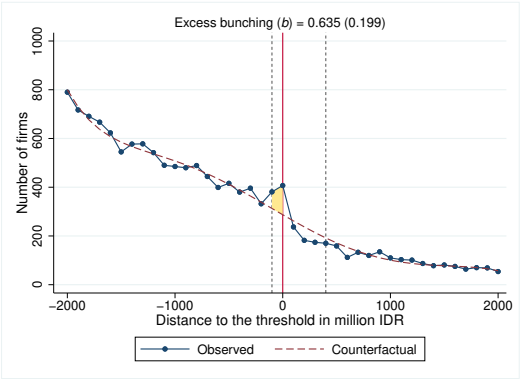
Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover after the turnover tax reform (2013-2017) in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

Figure B.3: Bunching in the Turnover Tax Regime by Year

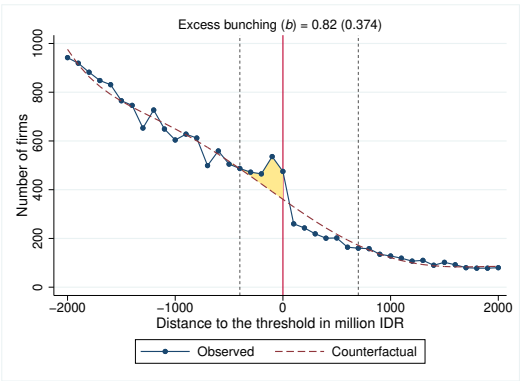
Panel A: 2013



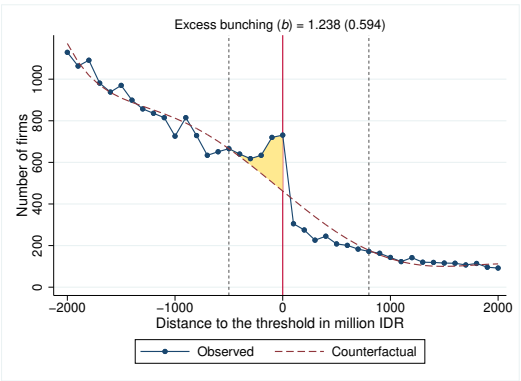
Panel B: 2014



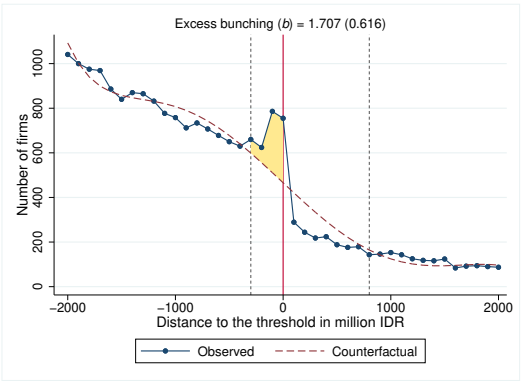
Panel C: 2015



Panel D: 2016



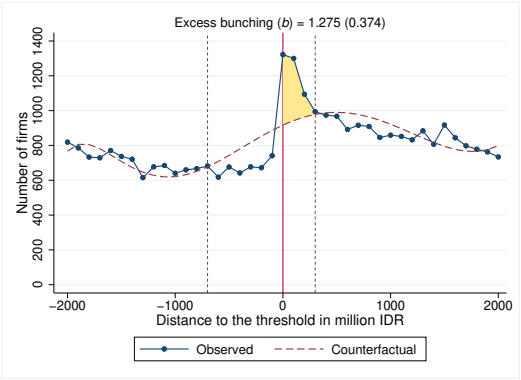
Panel E: 2017



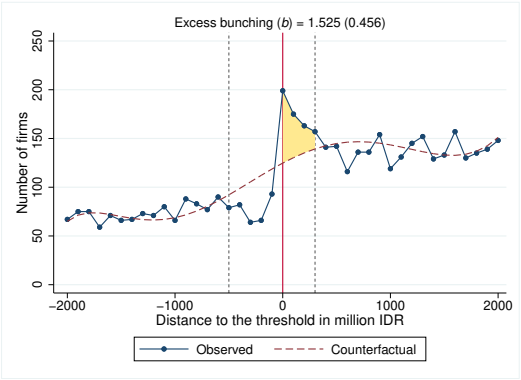
Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover after the VAT registration threshold expansion (2014-2017) in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

Figure B.4: Bunching in the Income Tax Regime by Industry

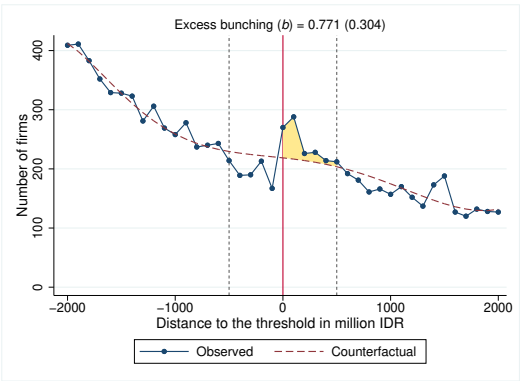
Panel A: Retail and Wholesale Trade



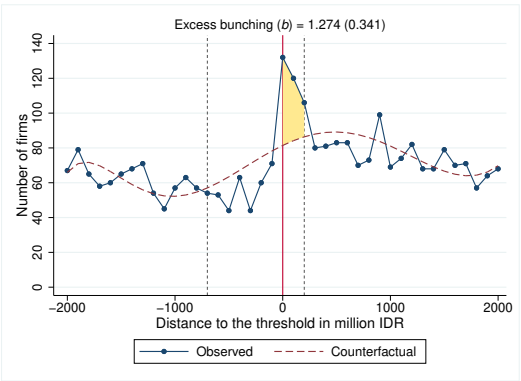
Panel B: Manufacturing



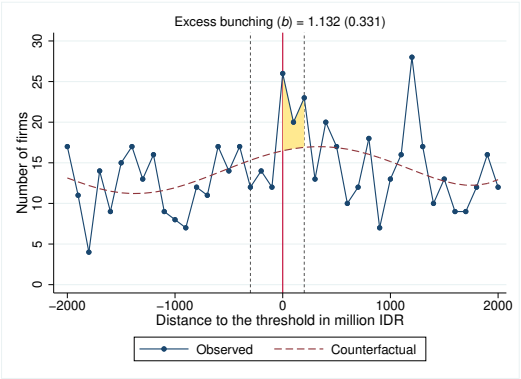
Panel C: Construction



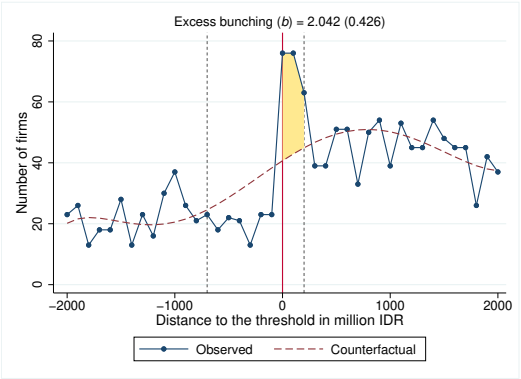
Panel D: Transportation



Panel E: Agriculture, Forestry, and Fishery



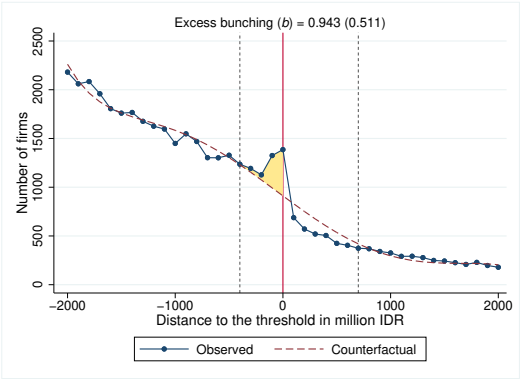
Panel F: Accommodation and Food Services



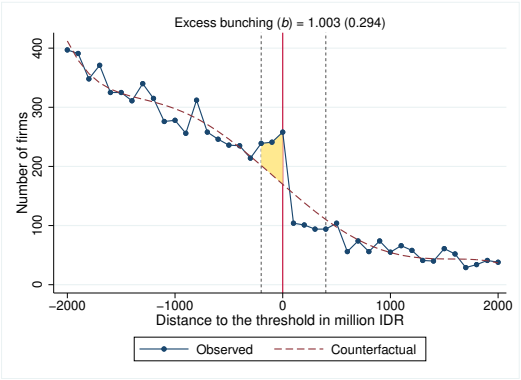
Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover after the turnover tax reform and VAT registration threshold expansion (2014-2017) in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

Figure B.5: Bunching in the Turnover Tax Regime by Industry

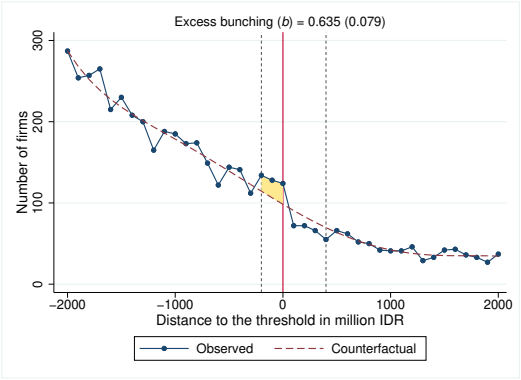
Panel A: Retail and Wholesale Trade



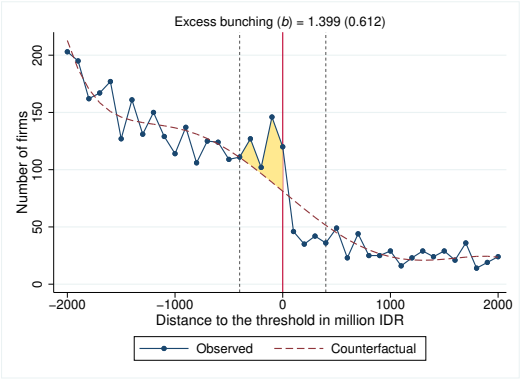
Panel B: Manufacturing



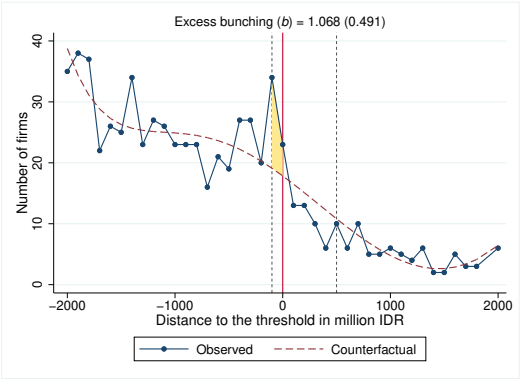
Panel C: Construction



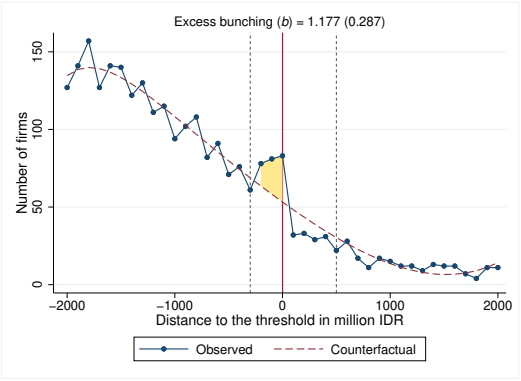
Panel D: Transportation



Panel E: Agriculture, Forestry, and Fishery



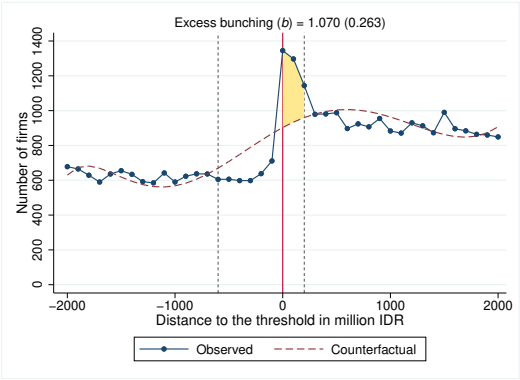
Panel F: Accommodation and Food Services



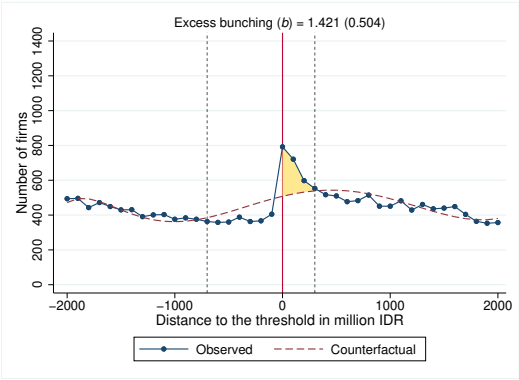
Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover after the turnover tax reform and VAT registration threshold expansion (2014-2017) in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

Figure B.6: Bunching in the Income Tax Regime by Type of Firm

Panel A: Corporation



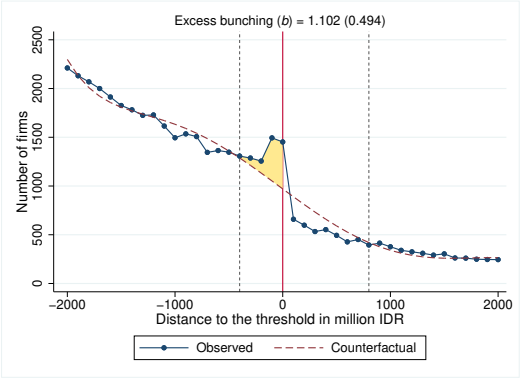
Panel B: Partnership



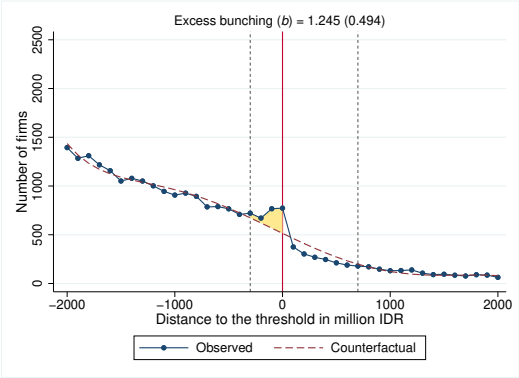
Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover after the turnover tax reform and VAT registration threshold expansion (2014-2017) in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

Figure B.7: Bunching in the Turnover Tax Regime by Types of Firm

Panel A: Corporation



Panel B: Partnership



Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover after the turnover tax reform and VAT registration threshold expansion (2014-2017) in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

Appendix C

Misreporting of Income Subject to Final Tax

This appendix discusses the possible misreporting of income subject to final tax by a group of firms in the turnover tax regime. This misreporting is possibly due to a different interpretation of income in line 4 on the attachment I of the Indonesian corporate tax return (form 1771-I) as well as its consequences to the bunching analysis. I find that around 50 percent of firms in the turnover tax regime report gross income or turnover as income subject to final tax while the rest of firms reports commercial net income as income subject to final tax. As a consequence, the former reports massive positive fiscal adjustments in order to obtain zero fiscal net income whereas the latter has no change in fiscal adjustments.

The Indonesian income tax law mandates firms to calculate and report taxable income regardless whether they are in the income tax or the turnover tax regimes. In order to get an estimate of taxable income, the Indonesian corporate income tax return suggests that firms have to adopt the following formulas[1]

$$CNI = TO - DI - OE + NOI - NOE + FCNI \tag{C.1}$$

$$FNI = CNI - IFT + NFA \tag{C.2}$$

$$TI = FNI - LCF \tag{C.3}$$

where CNI, FNI, TI, TO, DI, OE, NOI, NOE, $FCNI$, IFT, NFA, and LCF represent commercial net income, fiscal net income, taxable income, turnover (gross income), direct inputs (cost of good sold), operating expenses, non-operating income, non-operating expenses, foreign commercial income, income subject to final tax and non-taxable income, net fiscal adjustments, and loss carry forward. The net fiscal adjustment equals positive fiscal adjustments minus negative fiscal adjustments. The commercial income reflects firms' profit (loss) reported in the financial statements to their stakeholders. The fiscal net income reflects firms' net of book-tax-adjustments income used in the calculation of income tax liability if no loss carry forward is claimed.

Theoretically, firms in the turnover tax regime have no fiscal net income as well as taxable income because they are taxed at a final rate of 1 percent on gross income instead of a flat income tax rate of 25 percent on profit (net income). Given the reporting regulation, these firms have to both report and then cancel commercial net income to eventually get zero fiscal net income and taxable income. Equation (C.1)

[1]Figure C.1 and C.2 depict the main page of the Indonesian corporate income tax return used to calculate taxable income and income tax liabilities in English and Bahasa Indonesia respectively. Figure C.3 and C.4 depict the attachement I of the return used to calculate fiscal net income. The item that is frequently misreported by half of the firms is red circled in these figures.

indicates that firms in the turnover tax regime may simply report commercial net income as income subject to final tax and no net fiscal adjustments to get fiscal net income equals zero.[2]

Figure C.5 shows relatively identical shapes of distribution of commercial net income between firms in the income tax regime and those in the turnover tax regime over 2013-2017 period. The resemblance implies that the distribution of income subject to final tax would have similar to the distribution of commercial net income if all firms impute commercial net income as income subject to final tax in line 4 of the attachment I.

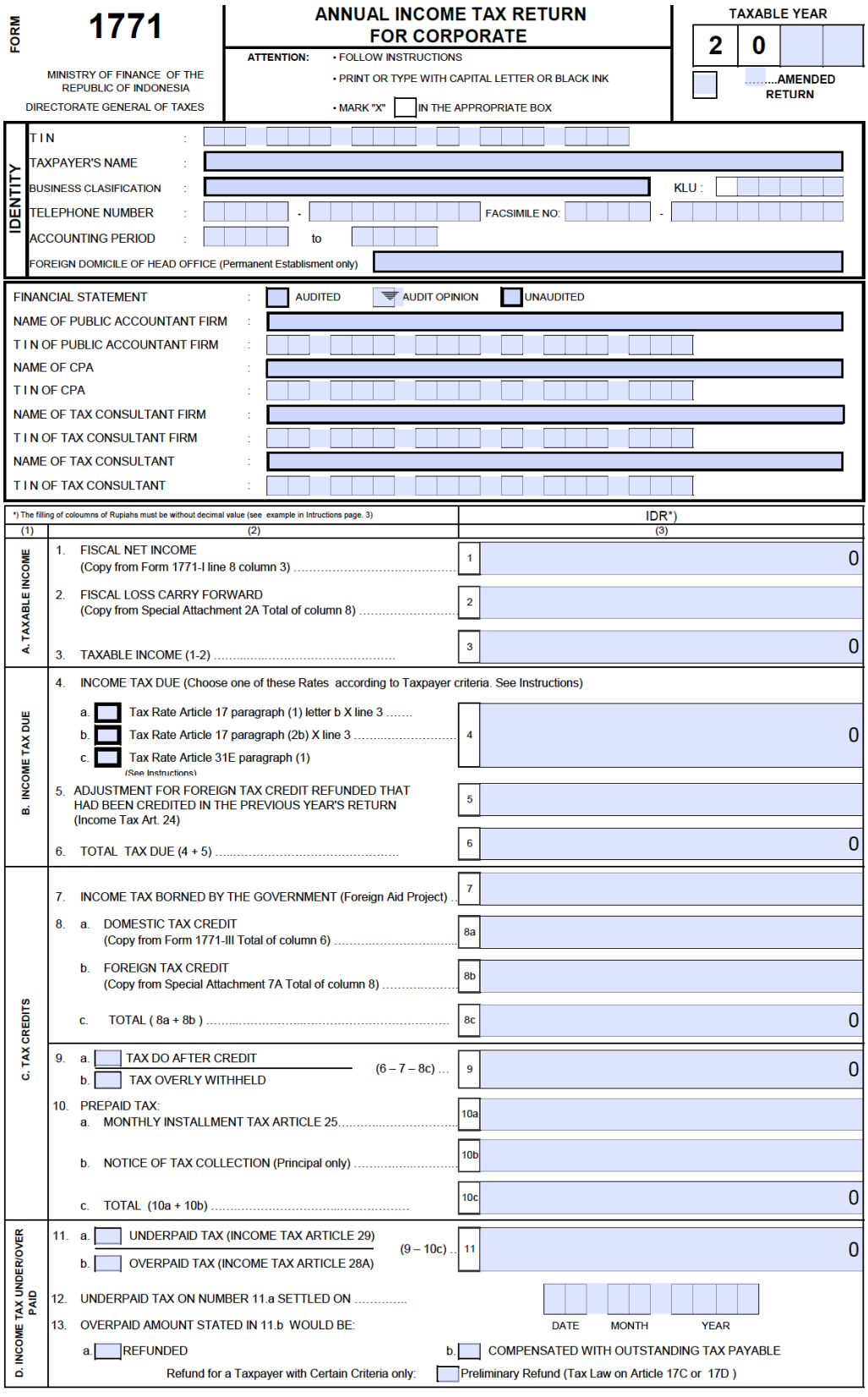
However, Figure C.6 depicts that around 50 percent firms report gross income as income subject to final tax after the implementation of turnover tax in 2013. This behavior was observed for both corporation and partnership and thus was not correlated with firms' administrative structure. Consequently, these firms have to cancel out the error by reporting large fiscal adjustments as demonstrated in Figure C.8 to obtain zero fiscal net income shown in Figure C.9. On the contrary, firms that correctly report income subject to final tax would have zero fiscal net income and report around zero fiscal adjustments.

The behavior produces an uncommonly large discontinuity in fiscal adjustment ratio at the threshold after the turnover tax was implementation in 2013 and thus provide misleading evidence on the mechanism behind the bunching responses. Figure C.11 shows that the discontinuities in net fiscal adjustments ratio (panel E) correspond to the discontinuity in income subject to final tax ratio (panel D) when the sample includes firms with incorrect misreporting. However, Figure C.12 shows that the discontinuities in net fiscal adjustments ratio disappear and the discontinuities in income subject to final tax ratio diminish. Therefore, I exclude the misreporting behavior in the discussion of mechanism of bunching responses by dropping firms that misreport income subject to final tax from the sample.

The exclusion may not affect the credibility of analysis because the remaining sample can produce similar bunching responses at the threshold. Figure C.13 shows that excess masses just below the threshold still emerge in the corrected sample though with relatively smaller magnitude relative to those of the incorrect sample depicted in figure C.14. The weaker bunching responses suggests that the corrected sample provides lower bound estimate of discontinuity at the threshold which relates to the type of mechanims (e.g., real economic or behavioral responses).

[2]The Indonesian tax authority on April 16, 2020 uploaded a tutorial video on filling corporate tax return that suggests an imputation of commercial net income as income subject to final tax for firms in the income tax regime. The video can be accessed on https://www.youtube.com/watch?v=dwBRBhjyURs.

Figure C.1: Main Page of the Indonesian Corporate Income Tax Return (English)



FORM **1771**

MINISTRY OF FINANCE OF THE REPUBLIC OF INDONESIA
DIRECTORATE GENERAL OF TAXES

ANNUAL INCOME TAX RETURN FOR CORPORATE

ATTENTION: • FOLLOW INSTRUCTIONS
• PRINT OR TYPE WITH CAPITAL LETTER OR BLACK INK
• MARK "X" ☐ IN THE APPROPRIATE BOX

TAXABLE YEAR 2 0 ☐☐

☐ .....AMENDED RETURN

IDENTITY

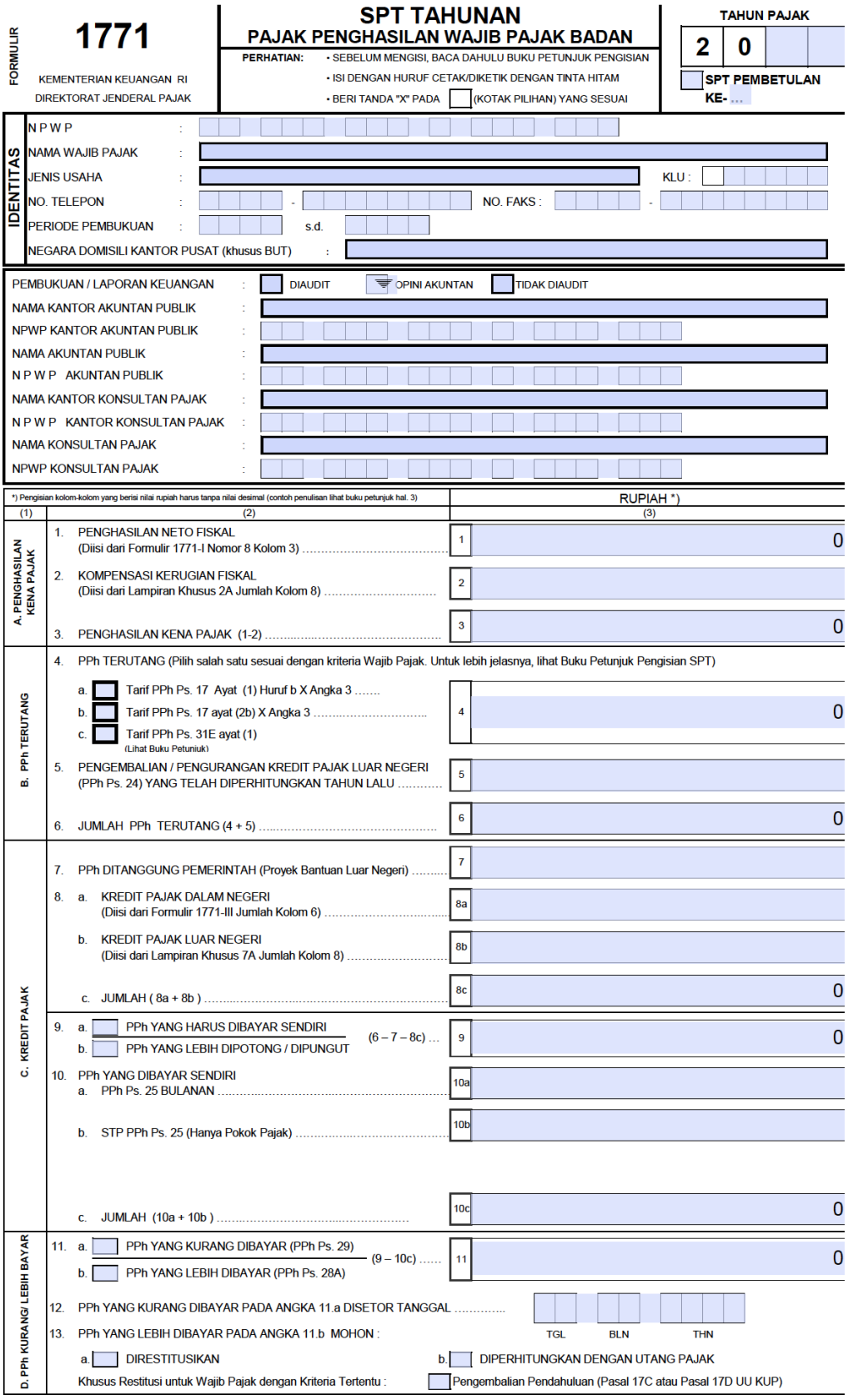
T I N :
TAXPAYER'S NAME :
BUSINESS CLASIFICATION : KLU :
TELEPHONE NUMBER : - FACSIMILE NO: -
ACCOUNTING PERIOD : to
FOREIGN DOMICILE OF HEAD OFFICE (Permanent Establisment only)

FINANCIAL STATEMENT : ☐ AUDITED ☐ AUDIT OPINION ☐ UNAUDITED
NAME OF PUBLIC ACCOUNTANT FIRM :
T I N OF PUBLIC ACCOUNTANT FIRM :
NAME OF CPA :
T I N OF CPA :
NAME OF TAX CONSULTANT FIRM :
T I N OF TAX CONSULTANT FIRM :
NAME OF TAX CONSULTANT :
T I N OF TAX CONSULTANT :

*) The filling of coloumns of Rupiahs must be without decimal value (see example in Intructions page. 3)

(1)	(2)	IDR*) (3)
A. TAXABLE INCOME	1. FISCAL NET INCOME (Copy from Form 1771-I line 8 column 3)	1 — 0
	2. FISCAL LOSS CARRY FORWARD (Copy from Special Attachment 2A Total of column 8)	2
	3. TAXABLE INCOME (1-2)	3 — 0
B. INCOME TAX DUE	4. INCOME TAX DUE (Choose one of these Rates according to Taxpayer criteria. See Instructions) a. ☐ Tax Rate Article 17 paragraph (1) letter b X line 3 b. ☐ Tax Rate Article 17 paragraph (2b) X line 3 c. ☐ Tax Rate Article 31E paragraph (1) (See Instructions)	4 — 0
	5. ADJUSTMENT FOR FOREIGN TAX CREDIT REFUNDED THAT HAD BEEN CREDITED IN THE PREVIOUS YEAR'S RETURN (Income Tax Art. 24)	5
	6. TOTAL TAX DUE (4 + 5)	6 — 0
C. TAX CREDITS	7. INCOME TAX BORNED BY THE GOVERNMENT (Foreign Aid Project)	7
	8. a. DOMESTIC TAX CREDIT (Copy from Form 1771-III Total of column 6)	8a
	b. FOREIGN TAX CREDIT (Copy from Special Attachment 7A Total of column 8)	8b
	c. TOTAL (8a + 8b)	8c — 0
	9. a. ☐ TAX DO AFTER CREDIT b. ☐ TAX OVERLY WITHHELD (6 – 7 – 8c)	9 — 0
	10. PREPAID TAX: a. MONTHLY INSTALLMENT TAX ARTICLE 25	10a
	b. NOTICE OF TAX COLLECTION (Principal only)	10b
	c. TOTAL (10a + 10b)	10c — 0
D. INCOME TAX UNDER/OVER PAID	11. a. ☐ UNDERPAID TAX (INCOME TAX ARTICLE 29) b. ☐ OVERPAID TAX (INCOME TAX ARTICLE 28A) (9 – 10c)	11 — 0
	12. UNDERPAID TAX ON NUMBER 11.a SETTLED ON ☐☐ ☐☐ ☐☐☐☐ (DATE MONTH YEAR)	
	13. OVERPAID AMOUNT STATED IN 11.b WOULD BE: a. ☐ REFUNDED b. ☐ COMPENSATED WITH OUTSTANDING TAX PAYABLE	
	Refund for a Taxpayer with Certain Criteria only: ☐ Preliminary Refund (Tax Law on Article 17C or 17D)	

Figure C.2: Main Page of the Indonesian Corporate Income Tax Return (Bahasa Indonesia)



FORMULIR **1771**

KEMENTERIAN KEUANGAN RI
DIREKTORAT JENDERAL PAJAK

SPT TAHUNAN
PAJAK PENGHASILAN WAJIB PAJAK BADAN

PERHATIAN: • SEBELUM MENGISI, BACA DAHULU BUKU PETUNJUK PENGISIAN
• ISI DENGAN HURUF CETAK/DIKETIK DENGAN TINTA HITAM
• BERI TANDA "X" PADA ☐ (KOTAK PILIHAN) YANG SESUAI

TAHUN PAJAK 2 0 ☐ ☐
☐ SPT PEMBETULAN KE- ...

IDENTITAS

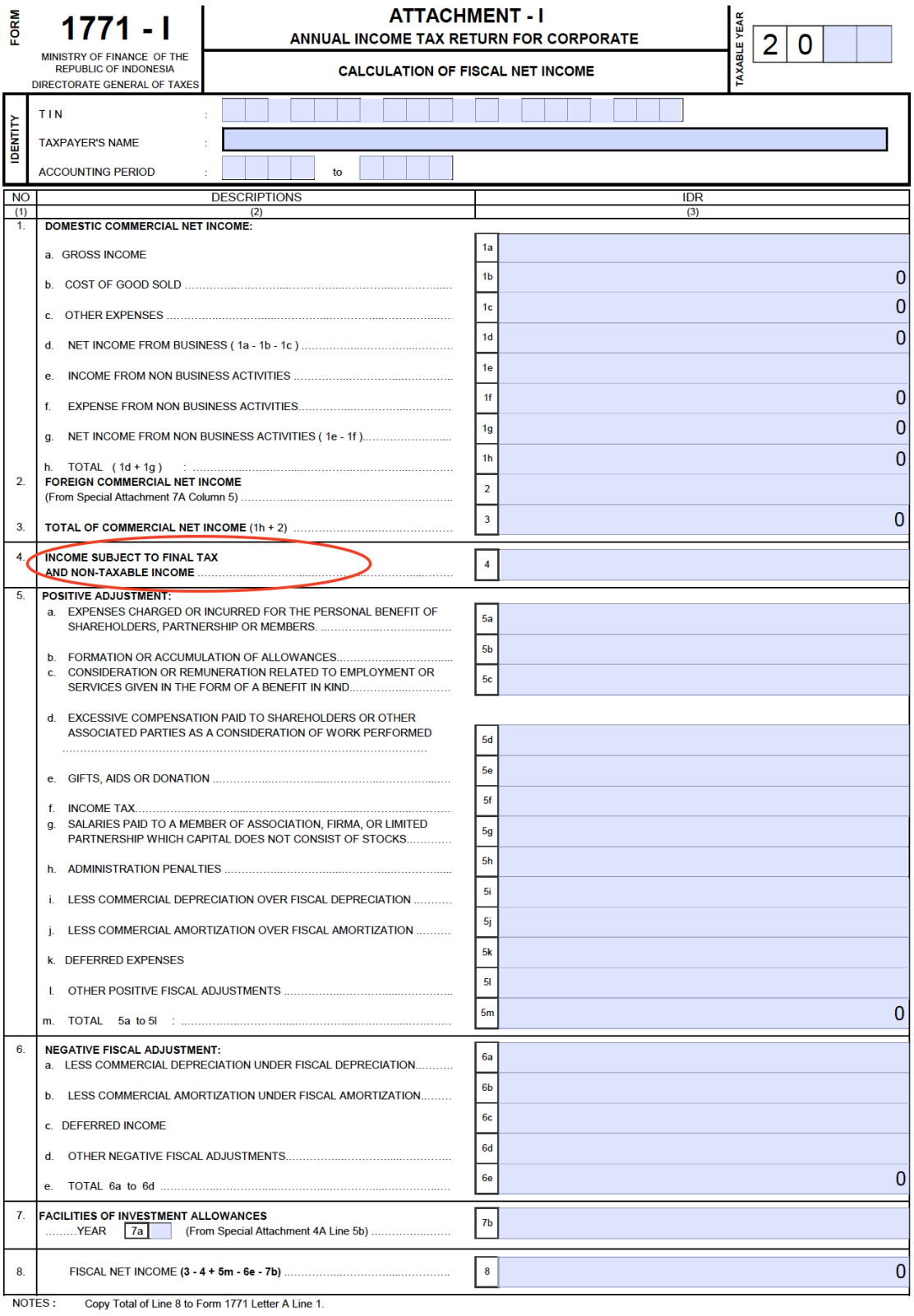
N P W P :
NAMA WAJIB PAJAK :
JENIS USAHA : KLU :
NO. TELEPON : - NO. FAKS : -
PERIODE PEMBUKUAN : s.d.
NEGARA DOMISILI KANTOR PUSAT (khusus BUT) :

PEMBUKUAN / LAPORAN KEUANGAN : ☐ DIAUDIT ☐ OPINI AKUNTAN ☐ TIDAK DIAUDIT
NAMA KANTOR AKUNTAN PUBLIK :
NPWP KANTOR AKUNTAN PUBLIK :
NAMA AKUNTAN PUBLIK :
N P W P AKUNTAN PUBLIK :
NAMA KANTOR KONSULTAN PAJAK :
N P W P KANTOR KONSULTAN PAJAK :
NAMA KONSULTAN PAJAK :
NPWP KONSULTAN PAJAK :

*) Pengisian kolom-kolom yang berisi nilai rupiah harus tanpa nilai desimal (contoh penulisan lihat buku petunjuk hal. 3)

(1)	(2)		RUPIAH *) (3)
A. PENGHASILAN KENA PAJAK	1. PENGHASILAN NETO FISKAL (Diisi dari Formulir 1771-I Nomor 8 Kolom 3)	1	0
	2. KOMPENSASI KERUGIAN FISKAL (Diisi dari Lampiran Khusus 2A Jumlah Kolom 8)	2	
	3. PENGHASILAN KENA PAJAK (1-2)	3	0
B. PPh TERUTANG	4. PPh TERUTANG (Pilih salah satu sesuai dengan kriteria Wajib Pajak. Untuk lebih jelasnya, lihat Buku Petunjuk Pengisian SPT) a. ☐ Tarif PPh Ps. 17 Ayat (1) Huruf b X Angka 3 b. ☐ Tarif PPh Ps. 17 ayat (2b) X Angka 3 c. ☐ Tarif PPh Ps. 31E ayat (1) (Lihat Buku Petunjuk)	4	0
	5. PENGEMBALIAN / PENGURANGAN KREDIT PAJAK LUAR NEGERI (PPh Ps. 24) YANG TELAH DIPERHITUNGKAN TAHUN LALU	5	
	6. JUMLAH PPh TERUTANG (4 + 5)	6	0
C. KREDIT PAJAK	7. PPh DITANGGUNG PEMERINTAH (Proyek Bantuan Luar Negeri)	7	
	8. a. KREDIT PAJAK DALAM NEGERI (Diisi dari Formulir 1771-III Jumlah Kolom 6)	8a	
	b. KREDIT PAJAK LUAR NEGERI (Diisi dari Lampiran Khusus 7A Jumlah Kolom 8)	8b	
	c. JUMLAH (8a + 8b)	8c	0
	9. a. ☐ PPh YANG HARUS DIBAYAR SENDIRI b. ☐ PPh YANG LEBIH DIPOTONG / DIPUNGUT (6 – 7 – 8c)	9	0
	10. PPh YANG DIBAYAR SENDIRI a. PPh Ps. 25 BULANAN	10a	
	b. STP PPh Ps. 25 (Hanya Pokok Pajak)	10b	
	c. JUMLAH (10a + 10b)	10c	0
D. PPh KURANG/ LEBIH BAYAR	11. a. ☐ PPh YANG KURANG DIBAYAR (PPh Ps. 29) b. ☐ PPh YANG LEBIH DIBAYAR (PPh Ps. 28A) (9 – 10c)	11	0
	12. PPh YANG KURANG DIBAYAR PADA ANGKA 11.a DISETOR TANGGAL ☐☐ ☐☐ ☐☐☐☐ (TGL BLN THN)		
	13. PPh YANG LEBIH DIBAYAR PADA ANGKA 11.b MOHON : a. ☐ DIRESTITUSIKAN b. ☐ DIPERHITUNGKAN DENGAN UTANG PAJAK		
	Khusus Restitusi untuk Wajib Pajak dengan Kriteria Tertentu : ☐ Pengembalian Pendahuluan (Pasal 17C atau Pasal 17D UU KUP)		

Figure C.3: Attachment I of the Indonesian Corporate Income Tax Return (English)



FORM **1771 - I**

MINISTRY OF FINANCE OF THE REPUBLIC OF INDONESIA
DIRECTORATE GENERAL OF TAXES

ATTACHMENT - I
ANNUAL INCOME TAX RETURN FOR CORPORATE
CALCULATION OF FISCAL NET INCOME

TAXABLE YEAR 2 0

IDENTITY

T I N :

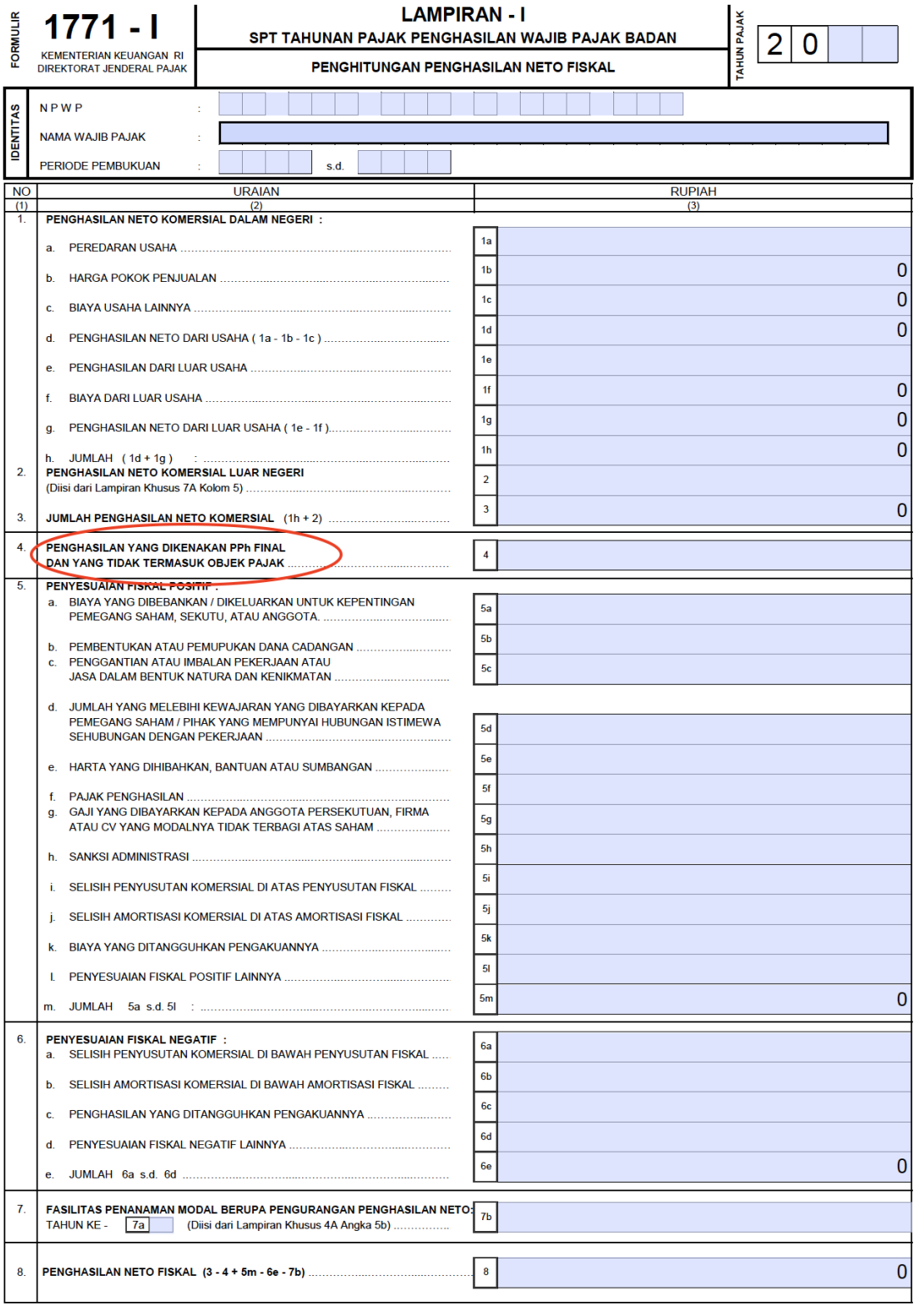
TAXPAYER'S NAME :

ACCOUNTING PERIOD : to

NO	DESCRIPTIONS		IDR
(1)	(2)		(3)
1.	**DOMESTIC COMMERCIAL NET INCOME:**		
	a. GROSS INCOME	1a	
	b. COST OF GOOD SOLD	1b	0
	c. OTHER EXPENSES	1c	0
	d. NET INCOME FROM BUSINESS (1a - 1b - 1c)	1d	0
	e. INCOME FROM NON BUSINESS ACTIVITIES	1e	
	f. EXPENSE FROM NON BUSINESS ACTIVITIES	1f	0
	g. NET INCOME FROM NON BUSINESS ACTIVITIES (1e - 1f)	1g	0
	h. TOTAL (1d + 1g) :	1h	0
2.	**FOREIGN COMMERCIAL NET INCOME** (From Special Attachment 7A Column 5)	2	
3.	**TOTAL OF COMMERCIAL NET INCOME** (1h + 2)	3	0
4.	**INCOME SUBJECT TO FINAL TAX AND NON-TAXABLE INCOME**	4	
5.	**POSITIVE ADJUSTMENT:**		
	a. EXPENSES CHARGED OR INCURRED FOR THE PERSONAL BENEFIT OF SHAREHOLDERS, PARTNERSHIP OR MEMBERS.	5a	
	b. FORMATION OR ACCUMULATION OF ALLOWANCES	5b	
	c. CONSIDERATION OR REMUNERATION RELATED TO EMPLOYMENT OR SERVICES GIVEN IN THE FORM OF A BENEFIT IN KIND	5c	
	d. EXCESSIVE COMPENSATION PAID TO SHAREHOLDERS OR OTHER ASSOCIATED PARTIES AS A CONSIDERATION OF WORK PERFORMED	5d	
	e. GIFTS, AIDS OR DONATION	5e	
	f. INCOME TAX	5f	
	g. SALARIES PAID TO A MEMBER OF ASSOCIATION, FIRMA, OR LIMITED PARTNERSHIP WHICH CAPITAL DOES NOT CONSIST OF STOCKS	5g	
	h. ADMINISTRATION PENALTIES	5h	
	i. LESS COMMERCIAL DEPRECIATION OVER FISCAL DEPRECIATION	5i	
	j. LESS COMMERCIAL AMORTIZATION OVER FISCAL AMORTIZATION	5j	
	k. DEFERRED EXPENSES	5k	
	l. OTHER POSITIVE FISCAL ADJUSTMENTS	5l	
	m. TOTAL 5a to 5l :	5m	0
6.	**NEGATIVE FISCAL ADJUSTMENT:**		
	a. LESS COMMERCIAL DEPRECIATION UNDER FISCAL DEPRECIATION	6a	
	b. LESS COMMERCIAL AMORTIZATION UNDER FISCAL AMORTIZATION	6b	
	c. DEFERRED INCOME	6c	
	d. OTHER NEGATIVE FISCAL ADJUSTMENTS	6d	
	e. TOTAL 6a to 6d	6e	0
7.	**FACILITIES OF INVESTMENT ALLOWANCES** .....YEAR 7a (From Special Attachment 4A Line 5b)	7b	
8.	FISCAL NET INCOME **(3 - 4 + 5m - 6e - 7b)**	8	0

NOTES : Copy Total of Line 8 to Form 1771 Letter A Line 1.

Figure C.4: Attachment I of the Indonesian Corporate Income Tax Return (Bahasa Indonesia)



FORMULIR **1771 - I**
KEMENTERIAN KEUANGAN RI
DIREKTORAT JENDERAL PAJAK

LAMPIRAN - I
SPT TAHUNAN PAJAK PENGHASILAN WAJIB PAJAK BADAN
PENGHITUNGAN PENGHASILAN NETO FISKAL

TAHUN PAJAK 20

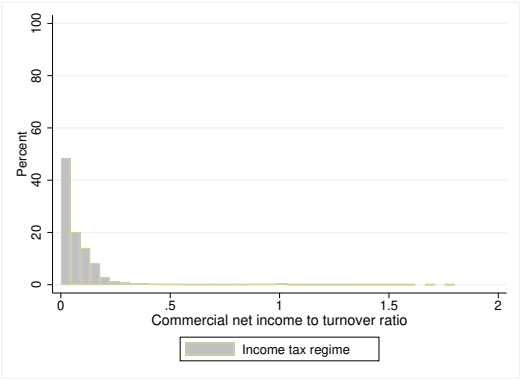
IDENTITAS
N P W P :
NAMA WAJIB PAJAK :
PERIODE PEMBUKUAN : s.d.

NO	URAIAN		RUPIAH
(1)	(2)		(3)
1.	**PENGHASILAN NETO KOMERSIAL DALAM NEGERI :**		
	a. PEREDARAN USAHA	1a	
	b. HARGA POKOK PENJUALAN	1b	0
	c. BIAYA USAHA LAINNYA	1c	0
	d. PENGHASILAN NETO DARI USAHA (1a - 1b - 1c)	1d	0
	e. PENGHASILAN DARI LUAR USAHA	1e	
	f. BIAYA DARI LUAR USAHA	1f	0
	g. PENGHASILAN NETO DARI LUAR USAHA (1e - 1f)	1g	0
	h. JUMLAH (1d + 1g) :	1h	0
2.	**PENGHASILAN NETO KOMERSIAL LUAR NEGERI** (Diisi dari Lampiran Khusus 7A Kolom 5)	2	
3.	**JUMLAH PENGHASILAN NETO KOMERSIAL** (1h + 2)	3	0
4.	**PENGHASILAN YANG DIKENAKAN PPh FINAL DAN YANG TIDAK TERMASUK OBJEK PAJAK**	4	
5.	**PENYESUAIAN FISKAL POSITIF :**		
	a. BIAYA YANG DIBEBANKAN / DIKELUARKAN UNTUK KEPENTINGAN PEMEGANG SAHAM, SEKUTU, ATAU ANGGOTA.	5a	
	b. PEMBENTUKAN ATAU PEMUPUKAN DANA CADANGAN	5b	
	c. PENGGANTIAN ATAU IMBALAN PEKERJAAN ATAU JASA DALAM BENTUK NATURA DAN KENIKMATAN	5c	
	d. JUMLAH YANG MELEBIHI KEWAJARAN YANG DIBAYARKAN KEPADA PEMEGANG SAHAM / PIHAK YANG MEMPUNYAI HUBUNGAN ISTIMEWA SEHUBUNGAN DENGAN PEKERJAAN	5d	
	e. HARTA YANG DIHIBAHKAN, BANTUAN ATAU SUMBANGAN	5e	
	f. PAJAK PENGHASILAN	5f	
	g. GAJI YANG DIBAYARKAN KEPADA ANGGOTA PERSEKUTUAN, FIRMA ATAU CV YANG MODALNYA TIDAK TERBAGI ATAS SAHAM	5g	
	h. SANKSI ADMINISTRASI	5h	
	i. SELISIH PENYUSUTAN KOMERSIAL DI ATAS PENYUSUTAN FISKAL	5i	
	j. SELISIH AMORTISASI KOMERSIAL DI ATAS AMORTISASI FISKAL	5j	
	k. BIAYA YANG DITANGGUHKAN PENGAKUANNYA	5k	
	l. PENYESUAIAN FISKAL POSITIF LAINNYA	5l	
	m. JUMLAH 5a s.d. 5l :	5m	0
6.	**PENYESUAIAN FISKAL NEGATIF :**		
	a. SELISIH PENYUSUTAN KOMERSIAL DI BAWAH PENYUSUTAN FISKAL	6a	
	b. SELISIH AMORTISASI KOMERSIAL DI BAWAH AMORTISASI FISKAL	6b	
	c. PENGHASILAN YANG DITANGGUHKAN PENGAKUANNYA	6c	
	d. PENYESUAIAN FISKAL NEGATIF LAINNYA	6d	
	e. JUMLAH 6a s.d. 6d	6e	0
7.	**FASILITAS PENANAMAN MODAL BERUPA PENGURANGAN PENGHASILAN NETO:** TAHUN KE - 7a (Diisi dari Lampiran Khusus 4A Angka 5b)	7b	
8.	**PENGHASILAN NETO FISKAL (3 - 4 + 5m - 6e - 7b)**	8	0

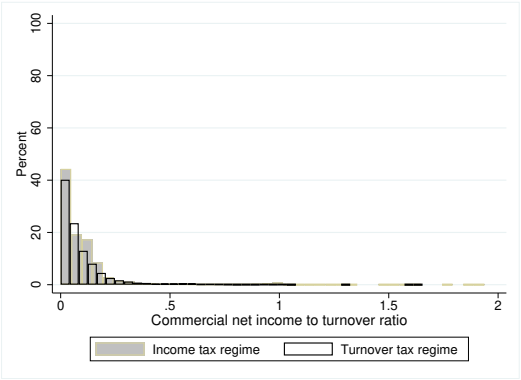
CATATAN : Pindahkan jumlah Angka 8 ke Formulir 1771 Huruf A Angka 1.

Figure C.5: Distribution of Commercial Net Income Ratio (2012-2017)

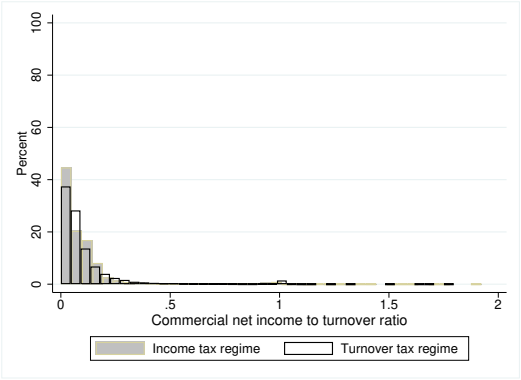
Panel A: 2012



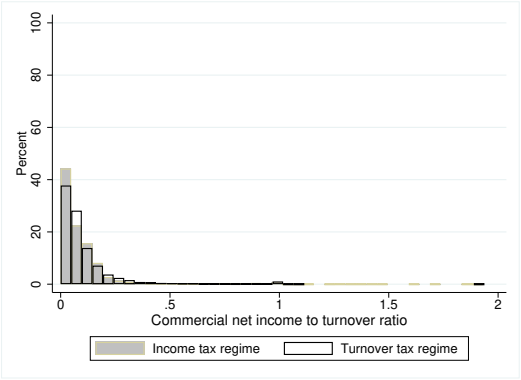
Panel B: 2013



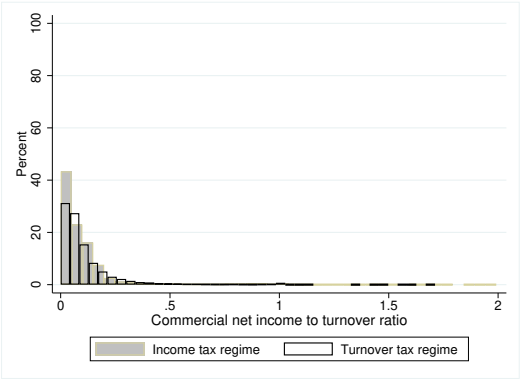
Panel C: 2014



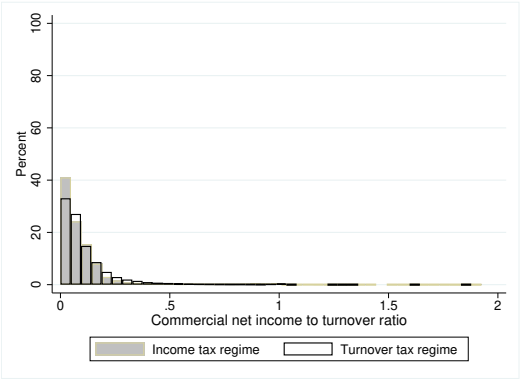
Panel D: 2015



Panel E: 2016



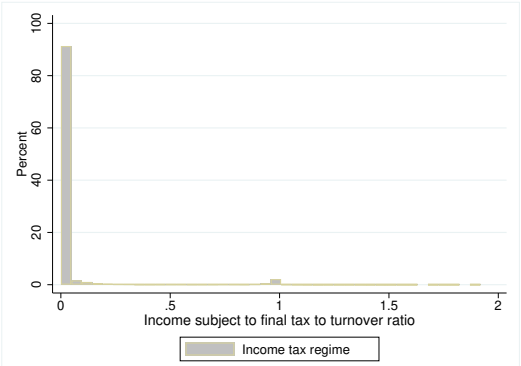
Panel F: 2017



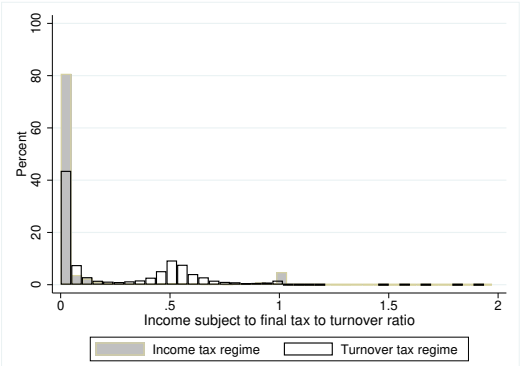
Notes: The figure depicts the distribution of commercial net income to turnover ratio for firms with annual turnover within a range of -2000 million IDR and 2000 million IDR from the threshold. The gray bars represent the percentage of firms in the income tax regime. The hollow bars represent the percentage of firms in the turnover tax regime. The sum of gray bars is 100. The sum of hollow bars is also 100.

Figure C.6: Distribution of Income Subject to Final Tax Ratio (2012-2017)

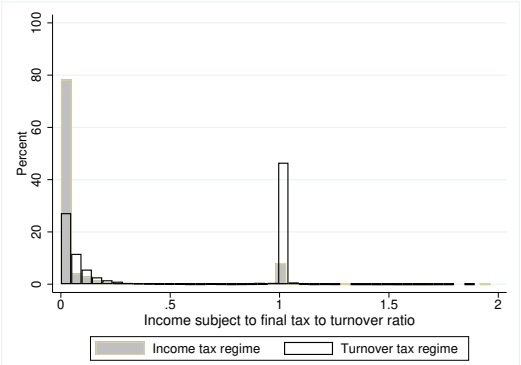
Panel A: 2012



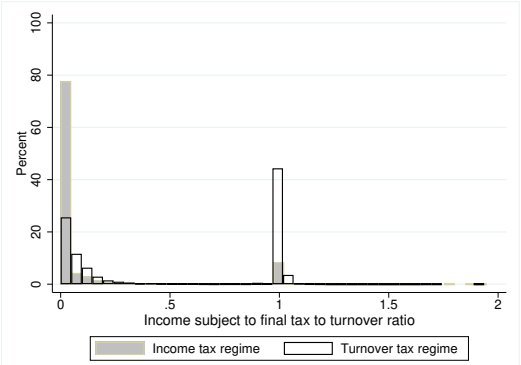
Panel B: 2013



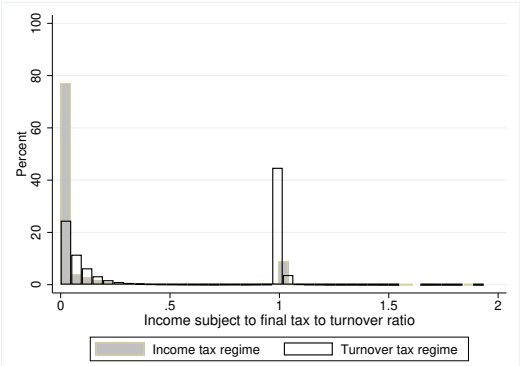
Panel C: 2014



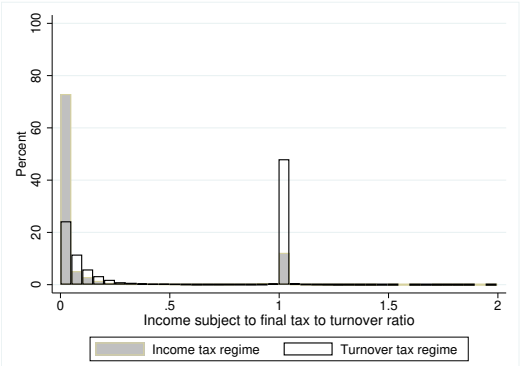
Panel D: 2015



Panel E: 2016



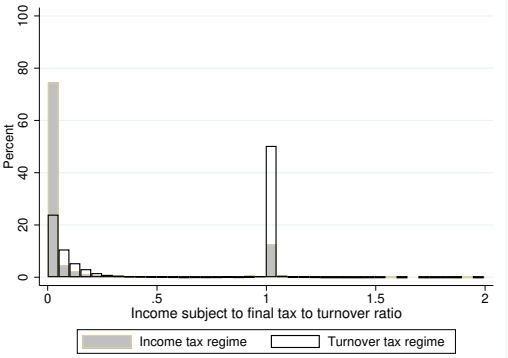
Panel F: 2017



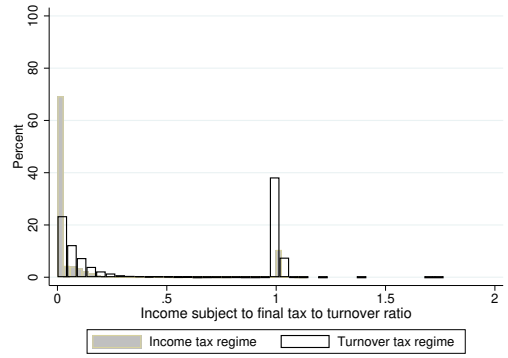
Notes: The figure depicts the distribution of income subject to final tax to turnover ratio for firms with annual turnover within a range of -2000 million IDR and 2000 million IDR from the threshold. The gray bars represent the percentage of firms in the income tax regime. The hollow bars represent the percentage of firms in the turnover tax regime. The sum of gray bars is 100. The sum of hollow bars is also 100.

Figure C.7: Distribution of Income Subject to Final Tax Ratio by Types of Firm (2014-2017)

Panel A: Corporation



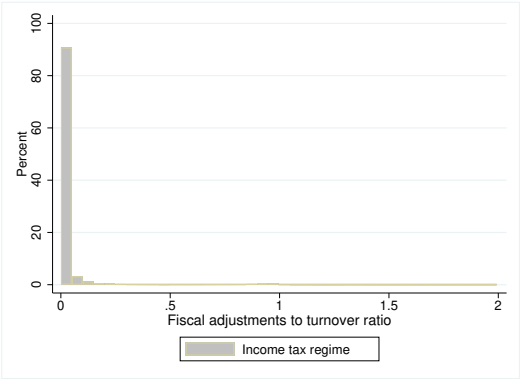
Panel B: Partnership



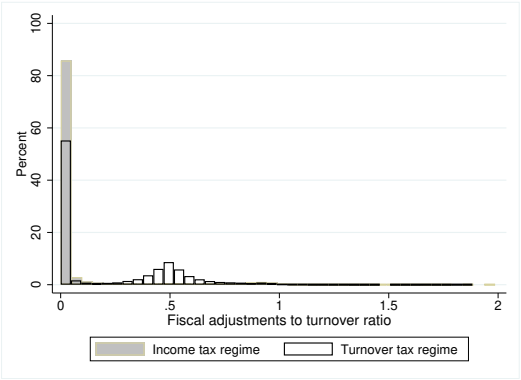
Notes: The figure depicts the distribution of income subject to final tax to turnover ratio for firms with annual turnover within a range of -2000 million IDR and 2000 million IDR from the threshold. The gray bars represent the percentage of firms in the income tax regime. The hollow bars represent the percentage of firms in the turnover tax regime. The sum of gray bars is 100. The sum of hollow bars is also 100.

Figure C.8: Distribution of Fiscal Adjustments Ratio (2012-2017)

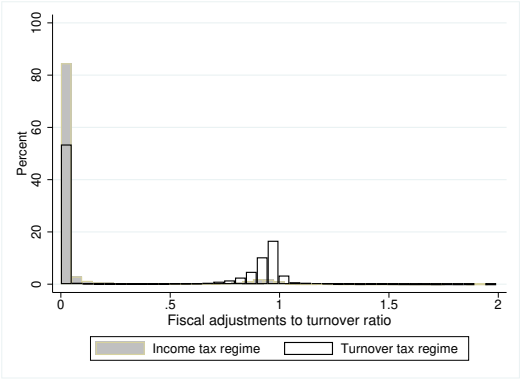
Panel A: 2012



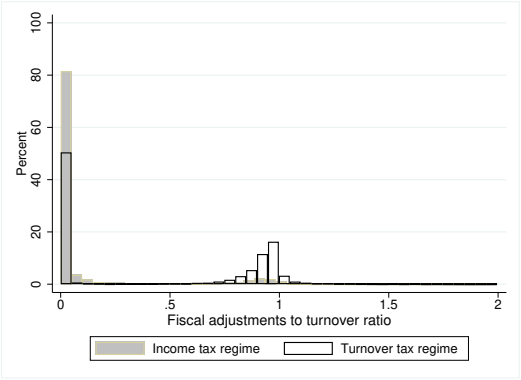
Panel B: 2013



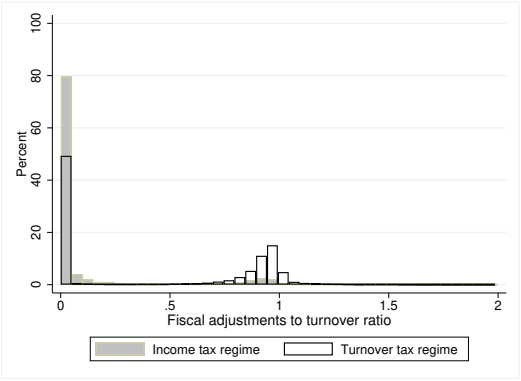
Panel C: 2014



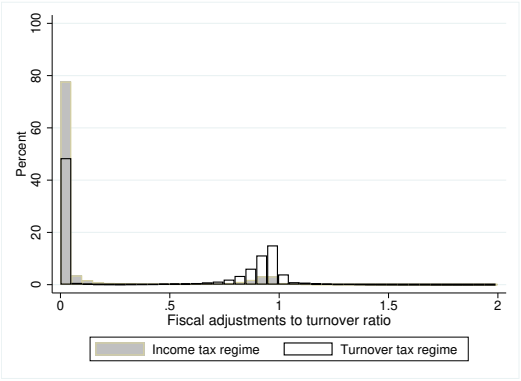
Panel D: 2015



Panel E: 2016



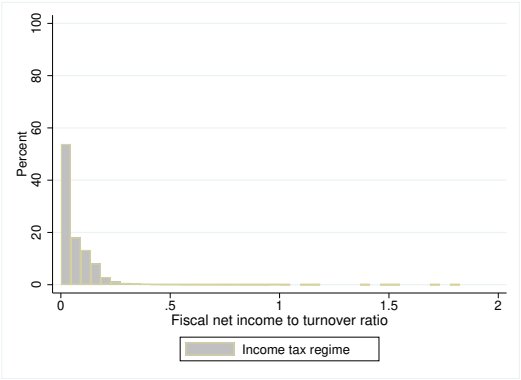
Panel F: 2017



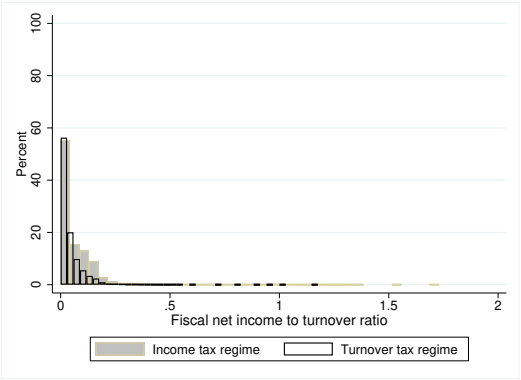
Notes: The figure depicts the distribution of net fiscal adjustments to turnover ratio for firms with annual turnover within a range of -2000 million IDR and 2000 million IDR from the threshold. The gray bars represent the percentage of firms in the income tax regime. The hollow bars represent the percentage of firms in the turnover tax regime. The sum of gray bars is 100. The sum of hollow bars is also 100.

Figure C.9: Distribution of Fiscal Net Income Ratio (2012-2017)

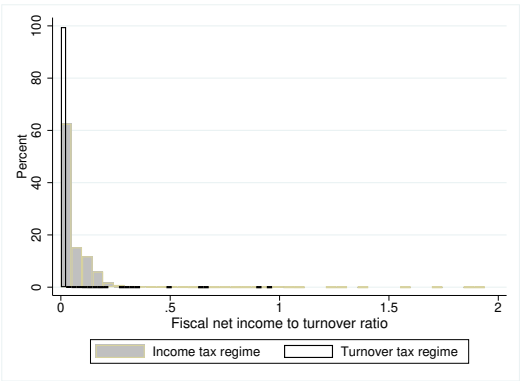
Panel A: 2012



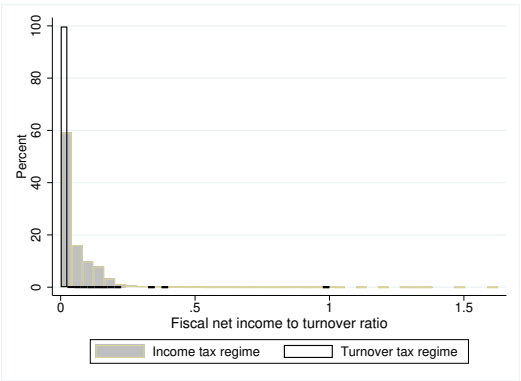
Panel B: 2013



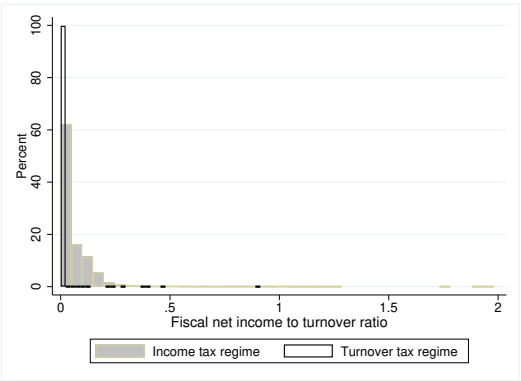
Panel C: 2014



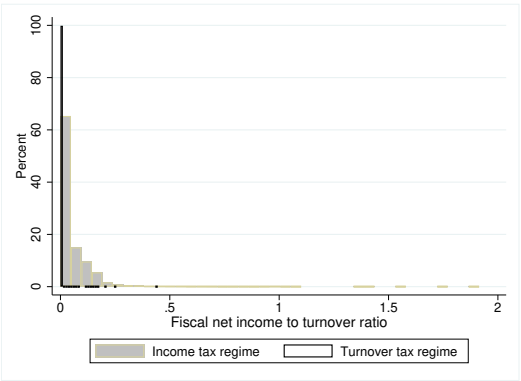
Panel D: 2015



Panel E: 2016



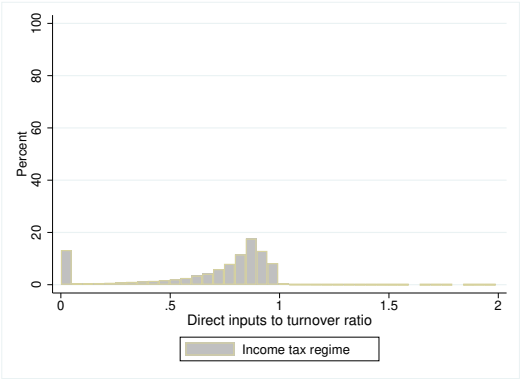
Panel F: 2017



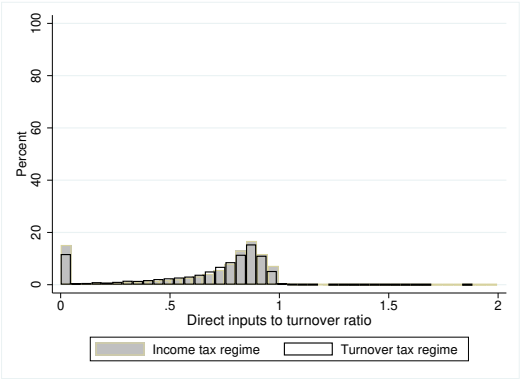
Notes: The figure depicts the distribution of fiscal net income to turnover ratio for firms with annual turnover within a range of -2000 million IDR and 2000 million IDR from the threshold. The gray bars represent the percentage of firms in the income tax regime. The hollow bars represent the percentage of firms in the turnover tax regime. The sum of gray bars is 100. The sum of hollow bars is also 100.

Figure C.10: Distribution of Direct Inputs Ratio (2012-2017)

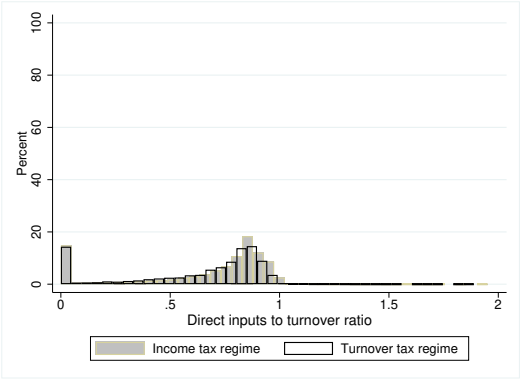
Panel A: 2012



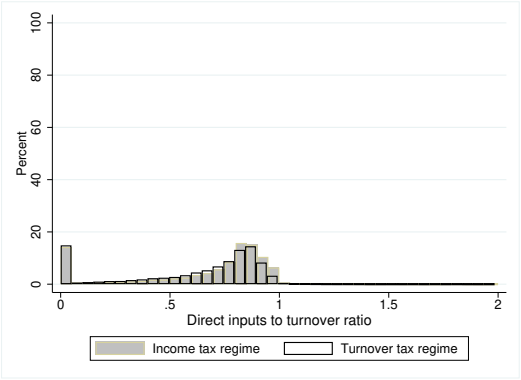
Panel B: 2013



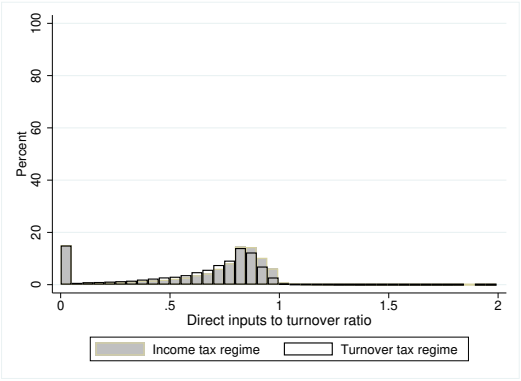
Panel C: 2014



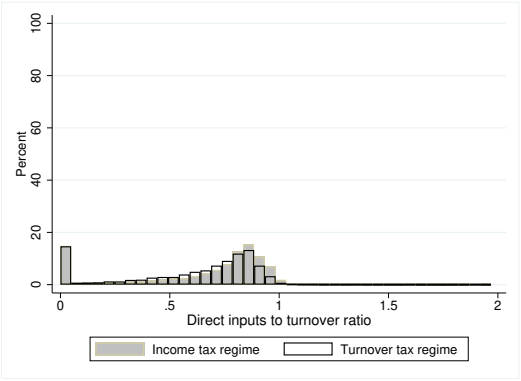
Panel D: 2015



Panel E: 2016



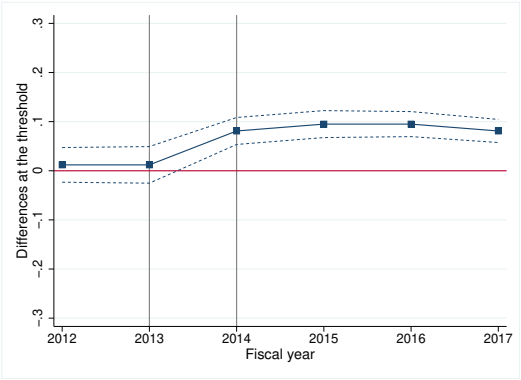
Panel F: 2017



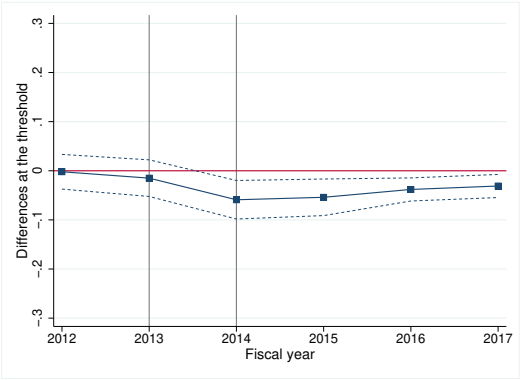
Notes: The figure depicts the distribution of direct inputs (cost of good sold) to turnover ratio for firms with annual turnover within a range of -2000 million IDR and 2000 million IDR from the threshold. The gray bars represent the percentage of firms in the income tax regime. The hollow bars represent the percentage of firms in the turnover tax regime. The sum of gray bars is 100. The sum of hollow bars is also 100.

Figure C.11: Summary of Discontinuities at the Threshold with Incorrect Reporting

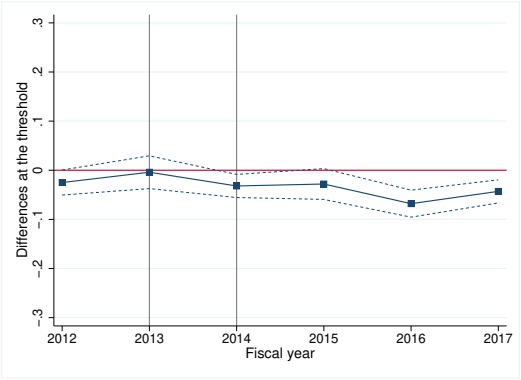
Panel A: Direct Input Ratio



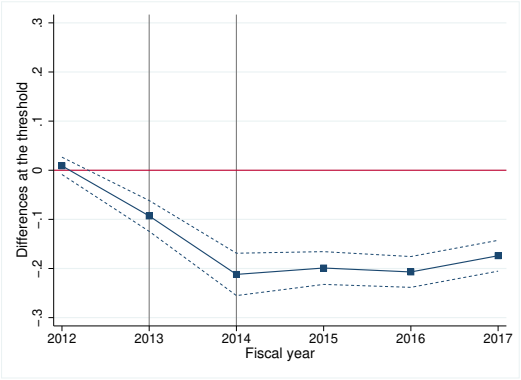
Panel B: Operating Expense Ratio



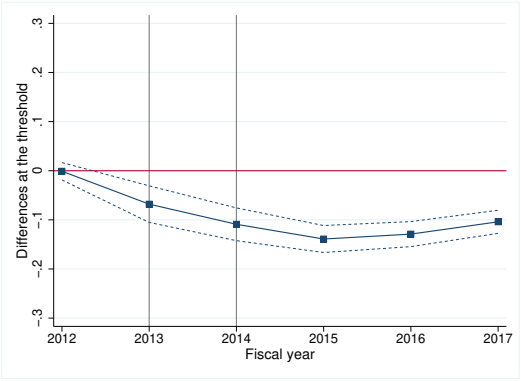
Panel C: Commercial Net Income Ratio



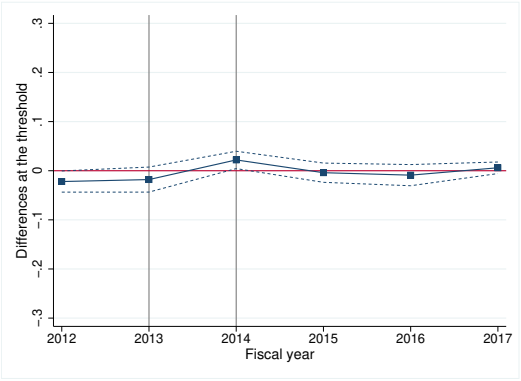
Panel D: Income s.t. Final Tax Ratio



Panel E: Net Fiscal Adjustment Ratio



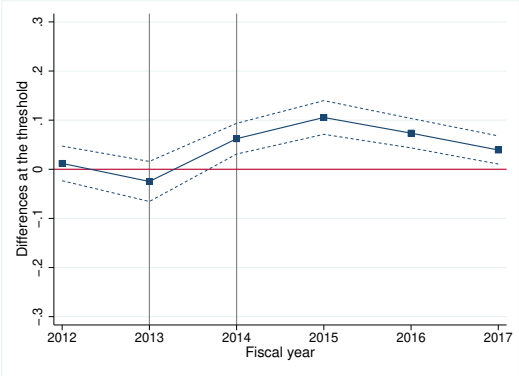
Panel F: Fiscal Net Income Ratio



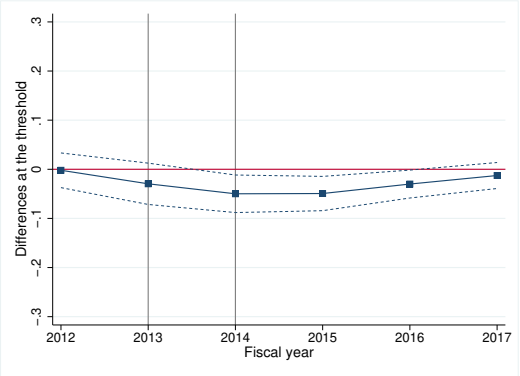
Notes: The figure plots the estimated size of discontinuity in the financial ratio with 95 percent confidence interval at the threshold over 2012-2017 period for the original dataset that contains incorrect reporting. The estimates are graphically presented in Figure C.15, C.17, C.19, C.21, C.23, and C.25. The left solid vertical line denotes the year of the implementation of turnover tax regime. The right solid vertical line denotes the year of the expansion of VAT registration threshold.

Figure C.12: Summary of Discontinuities at the Threshold without Incorrect Reporting

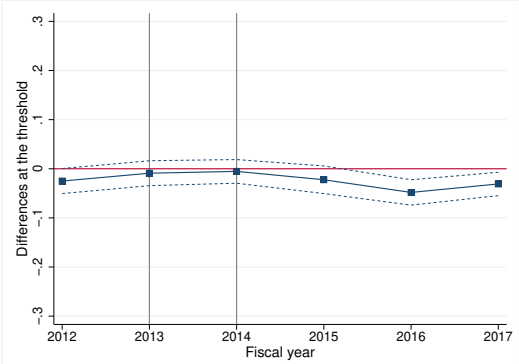
Panel A: Direct Input Ratio



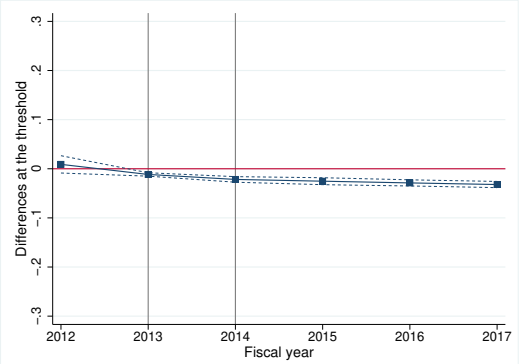
Panel B: Operating Expense Ratio



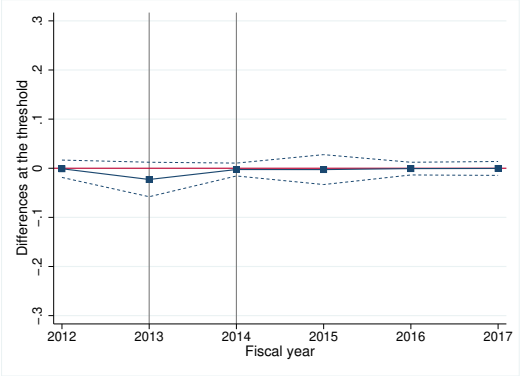
Panel C: Commercial Net Income Ratio



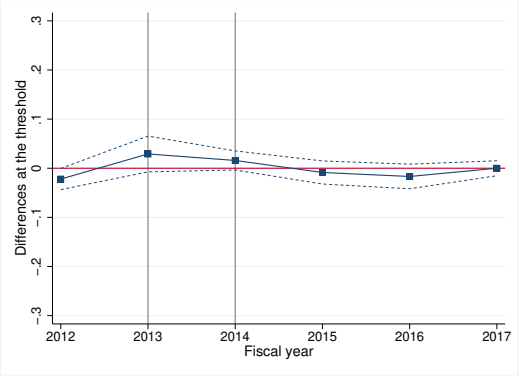
Panel D: Income s.t. Final Tax Ratio



Panel E: Net Fiscal Adjustment Ratio

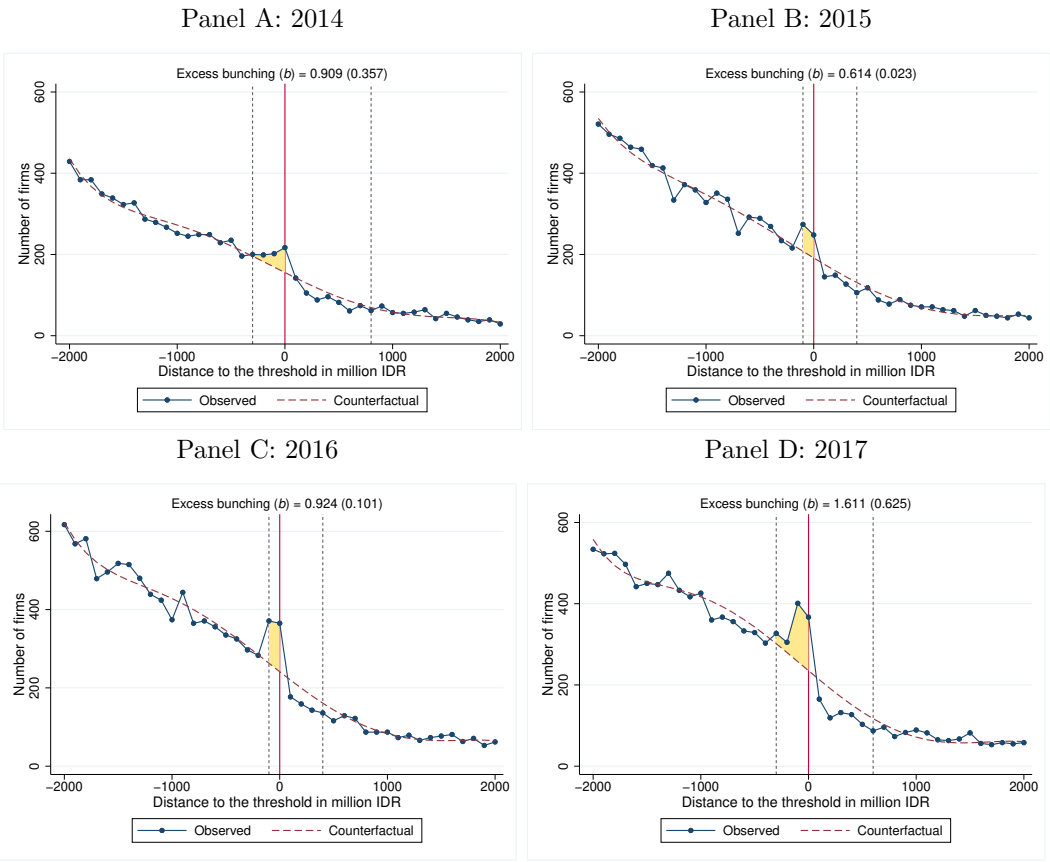


Panel F: Fiscal Net Income Ratio



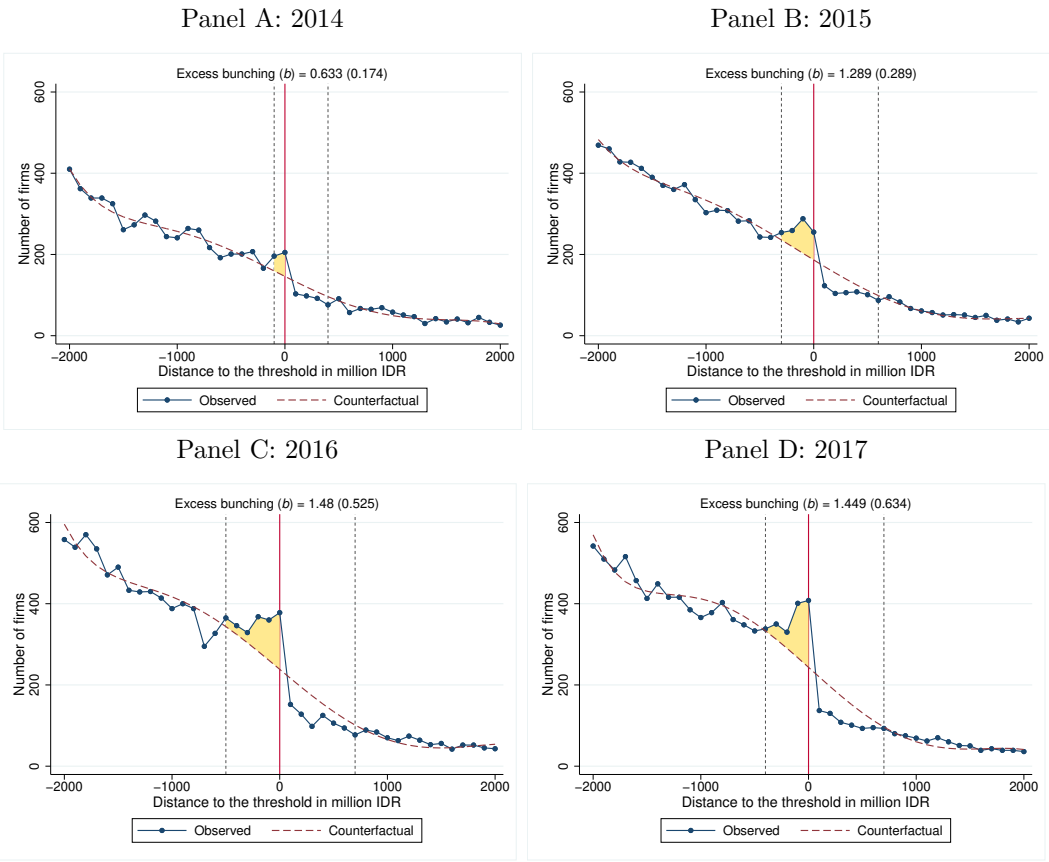
Notes: The figure plots the estimated size of discontinuity in the financial ratio with 95 percent confidence interval at the threshold over 2012-2017 period for the corrected dataset that contains no incorrect reporting. The estimates are graphically presented in Figure C.16, C.18, C.20, C.22, C.24, and C.26. The left solid vertical line denotes the year of the implementation of turnover tax regime. The right solid vertical line denotes the year of the expansion of VAT registration threshold.

Figure C.13: Bunching for Firms with Correct Reporting



Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover after the turnover tax reform and VAT registration threshold expansion (2014-2017) in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

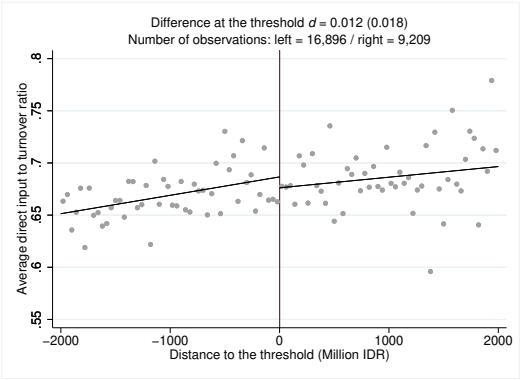
Figure C.14: Bunching for Firms with Incorrect Reporting



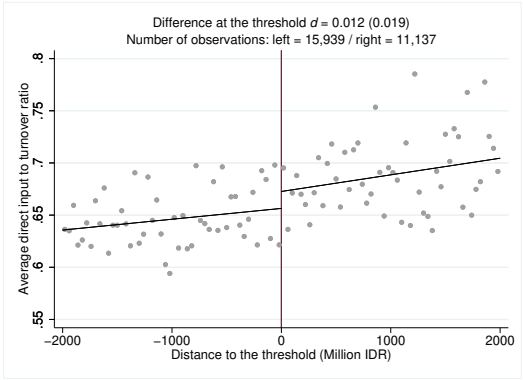
Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover after the turnover tax reform and VAT registration threshold expansion (2014-2017) in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

Figure C.15: Direct Input Ratio for All Firms (Uncorrected, 2012-2017)

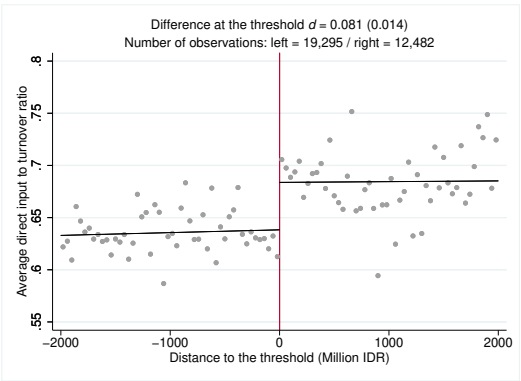
Panel A: 2012



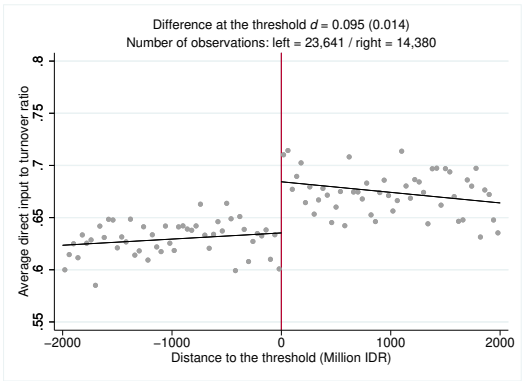
Panel B: 2013



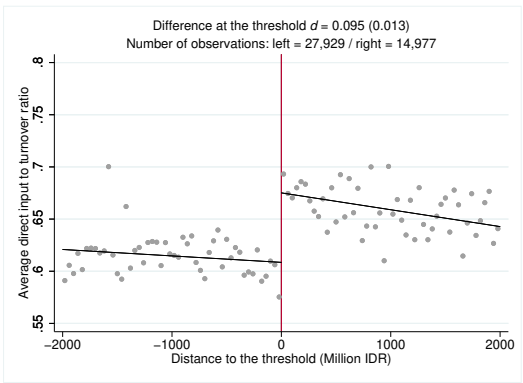
Panel C: 2014



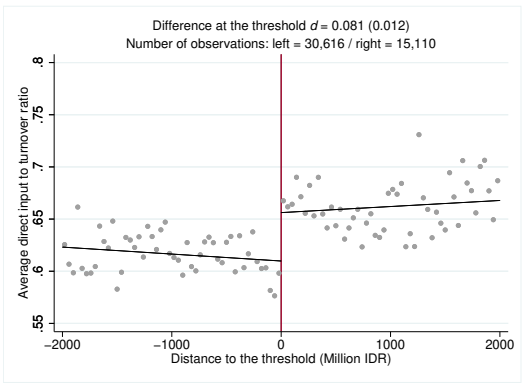
Panel D: 2015



Panel E: 2016



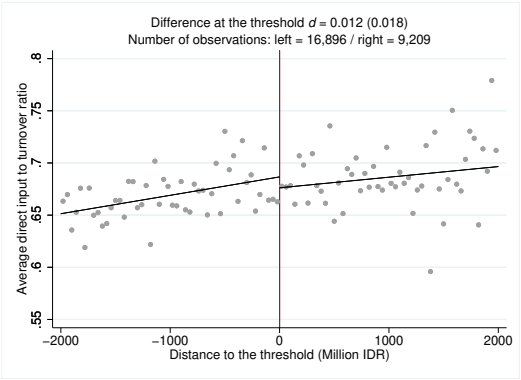
Panel F: 2017



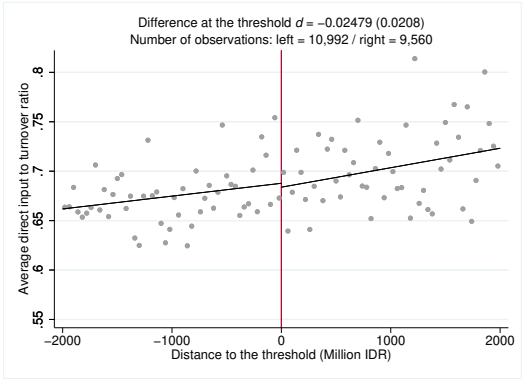
Notes: The figure plots the average direct input to turnover ratio around the 2014 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.16: Direct Input Ratio for All Firms (Corrected, 2012-2017)

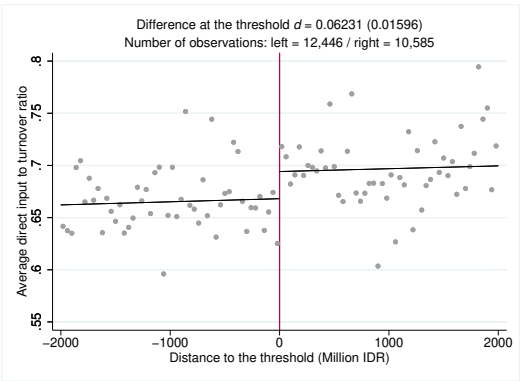
Panel A: 2012



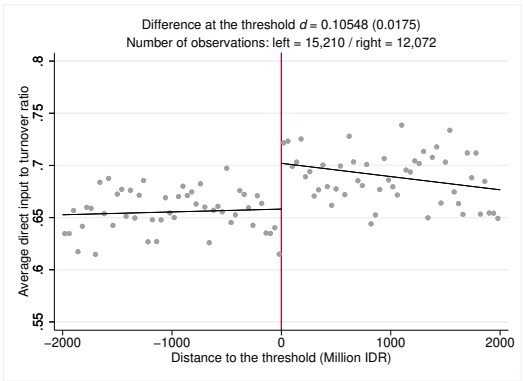
Panel B: 2013



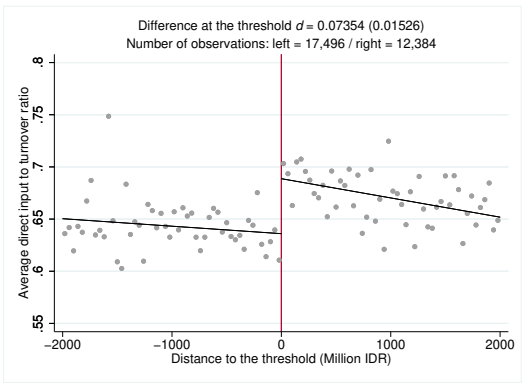
Panel C: 2014



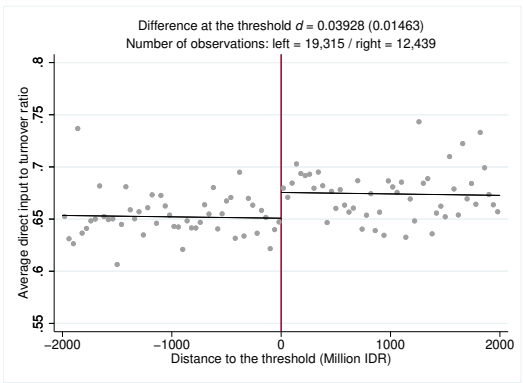
Panel D: 2015



Panel E: 2016



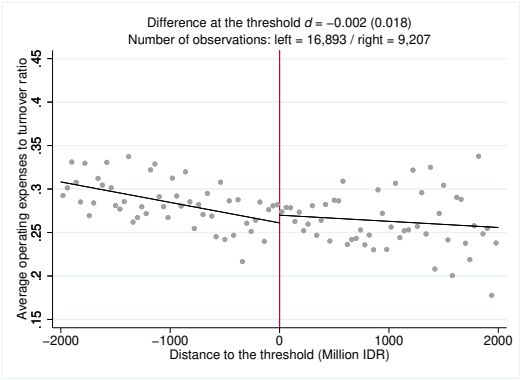
Panel F: 2017



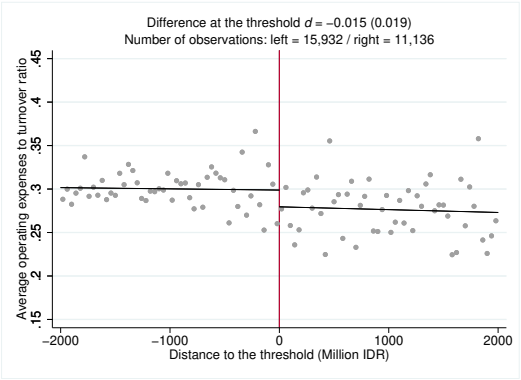
Notes: The figure plots the average direct input to turnover ratio around the 2014 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.17: Operating Expenses Ratio for All Firms (Uncorrected, 2012-2017)

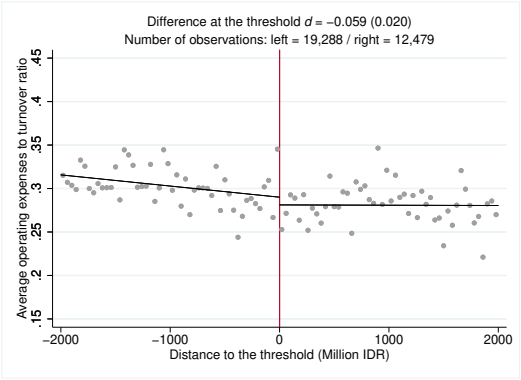
Panel A: 2012



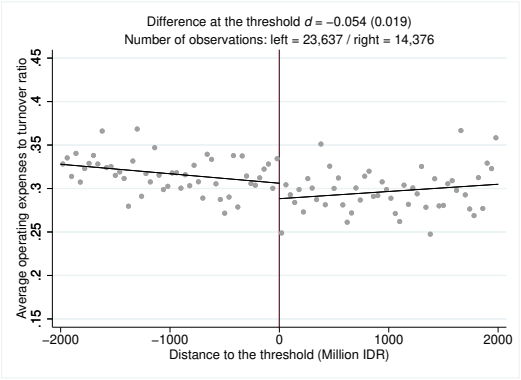
Panel B: 2013



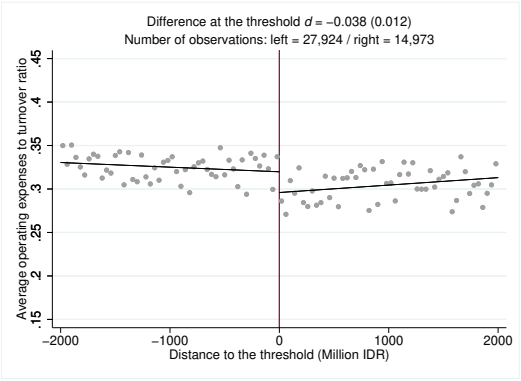
Panel C: 2014



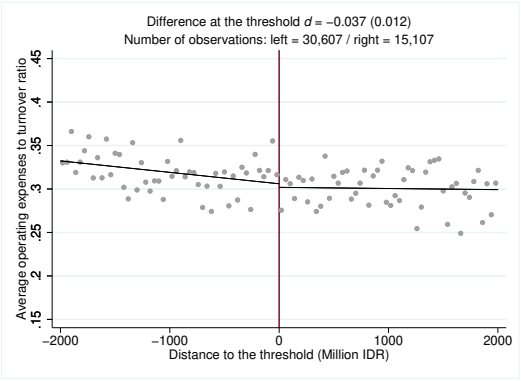
Panel D: 2015



Panel E: 2016



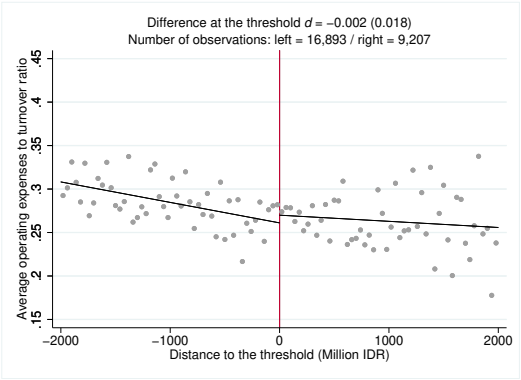
Panel F: 2017



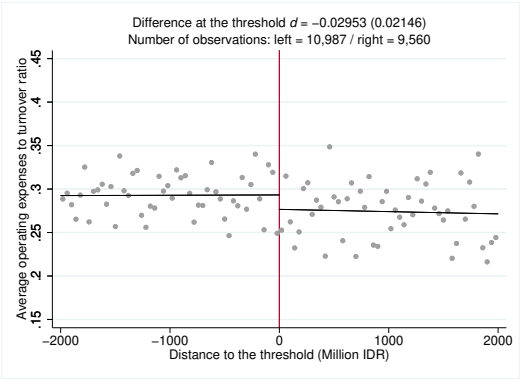
Notes: The figure plots the average operating expense to turnover ratio around the 2014 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.18: Operating Expenses Ratio for All Firms (Corrected, 2012-2017)

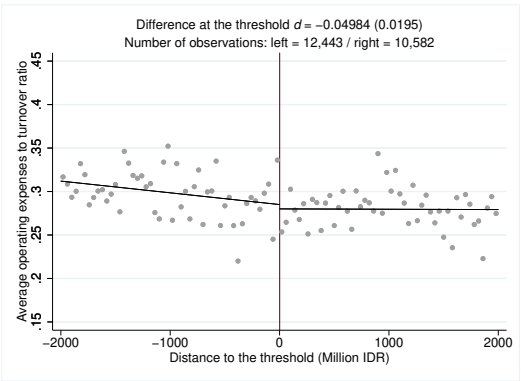
Panel A: 2012



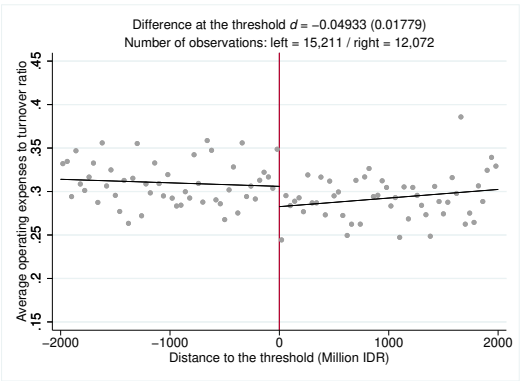
Panel B: 2013



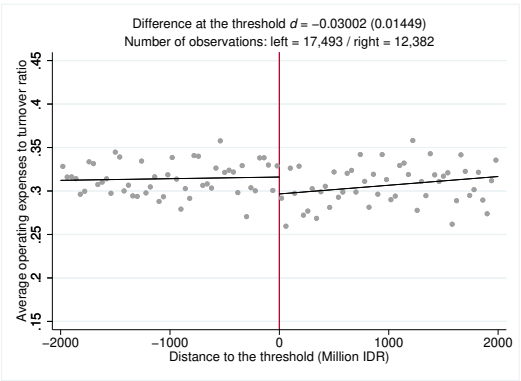
Panel C: 2014



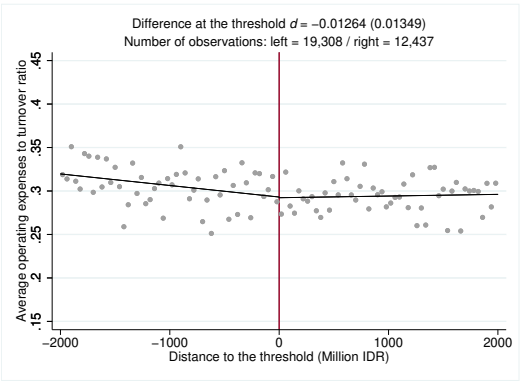
Panel D: 2015



Panel E: 2016



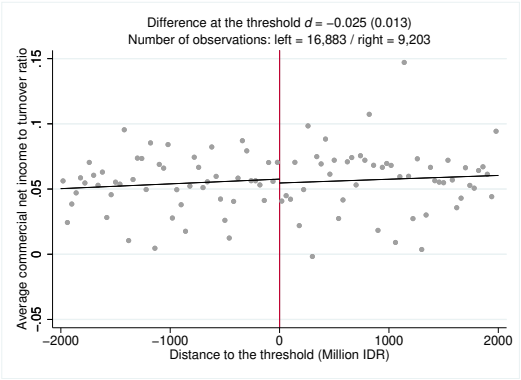
Panel F: 2017



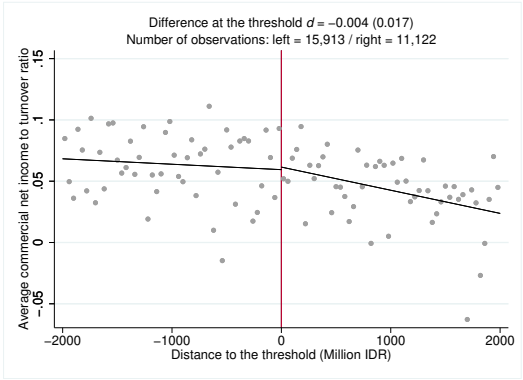
Notes: The figure plots the average operating expense to turnover ratio around the 2014 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.19: Commercial Net Income Ratio for All Firms (Uncorrected, 2012-2017)

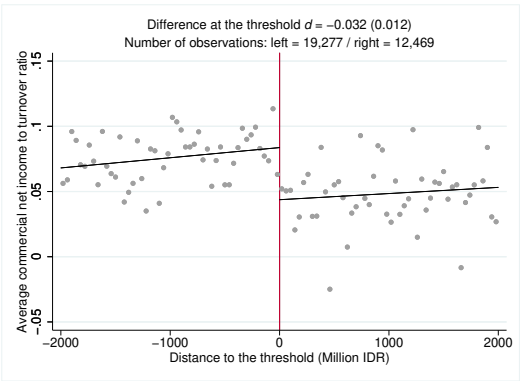
Panel A: 2012



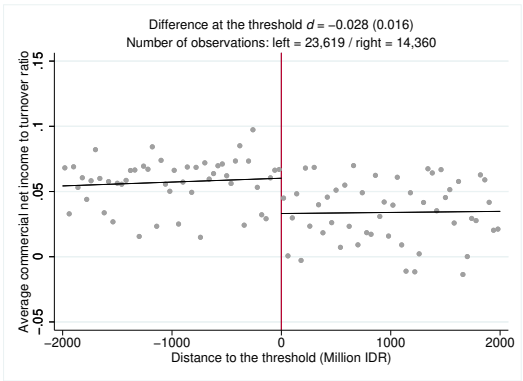
Panel B: 2013



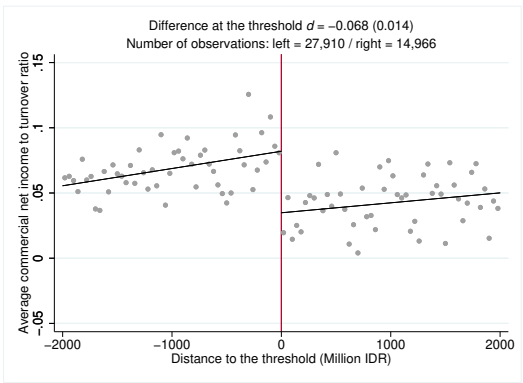
Panel C: 2014



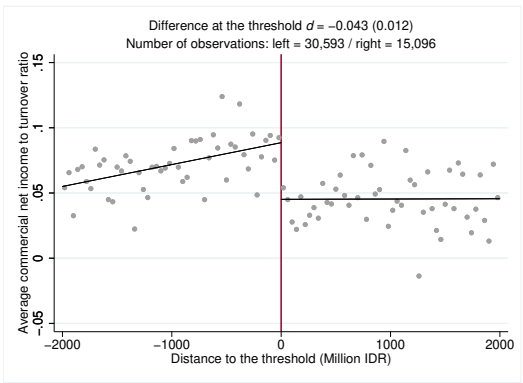
Panel D: 2015



Panel E: 2016



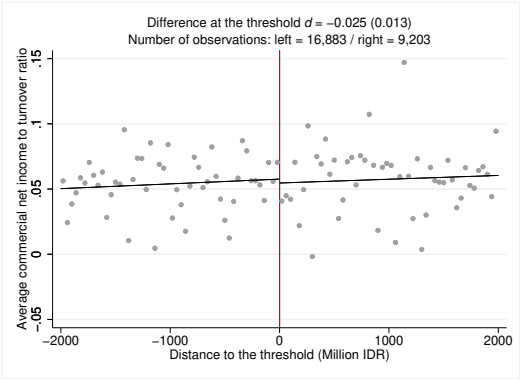
Panel F: 2017



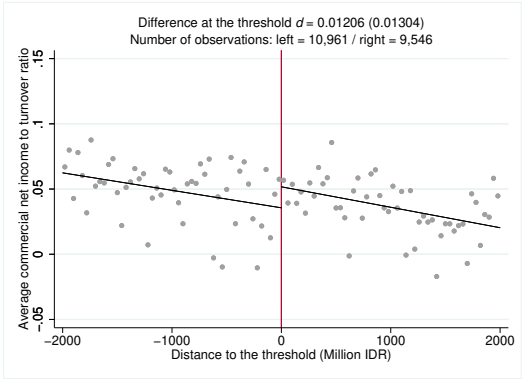
Notes: The figure plots the average commercial net income to turnover ratio around the 2014 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.20: Commercial Net Income Ratio for All Firms (Corrected, 2012-2017)

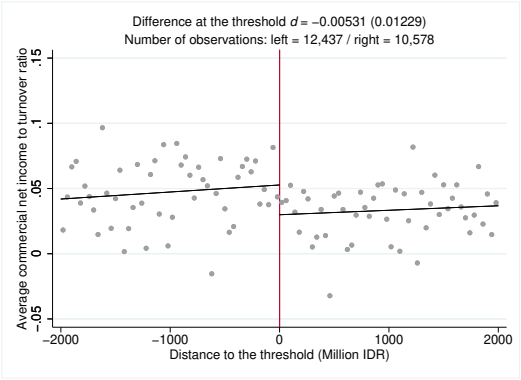
Panel A: 2012



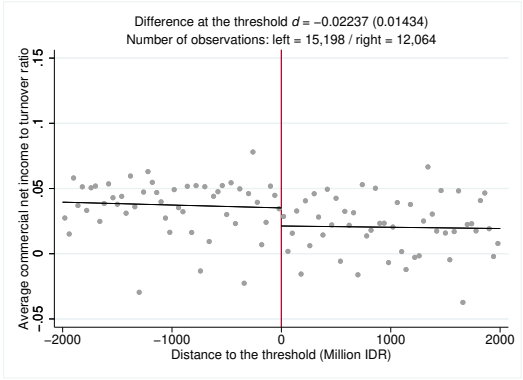
Panel B: 2013



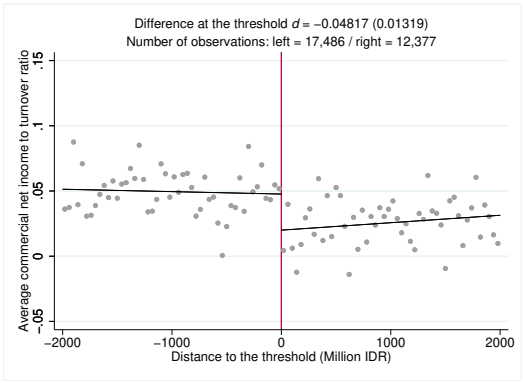
Panel C: 2014



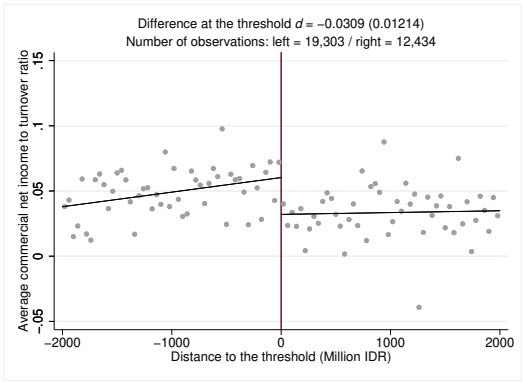
Panel D: 2015



Panel E: 2016



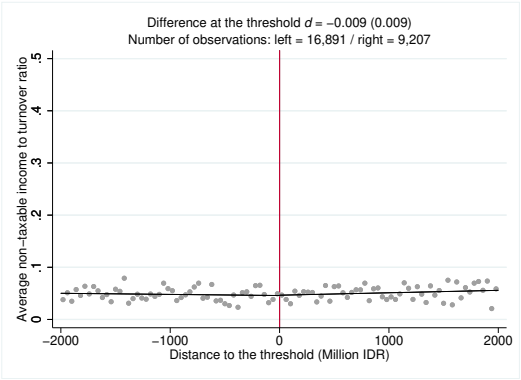
Panel F: 2017



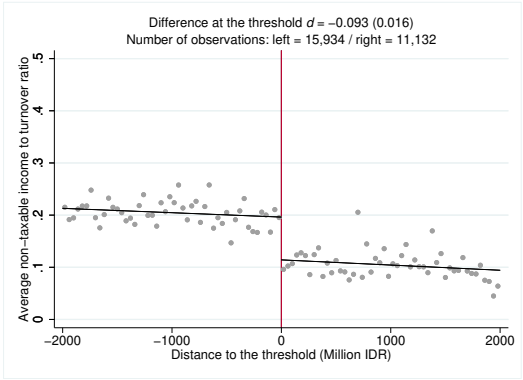
Notes: The figure plots the average commercial net income to turnover ratio around the 2014 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.21: Income s.t. Final Tax Ratio for All Firms (Uncorrected, 2012-2017)

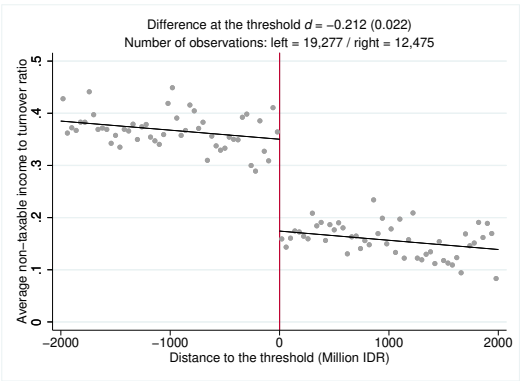
Panel A: 2012



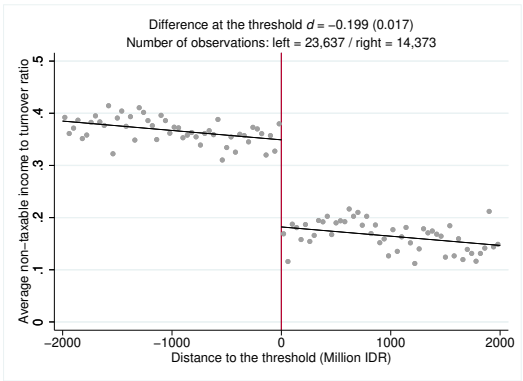
Panel B: 2013



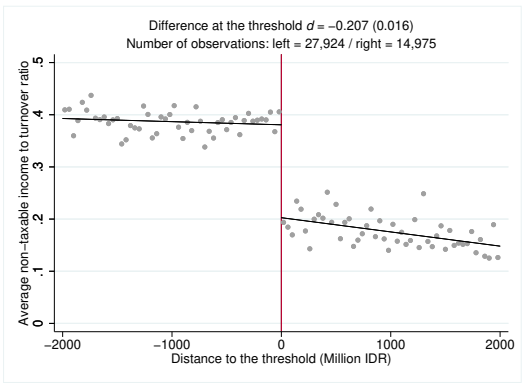
Panel C: 2014



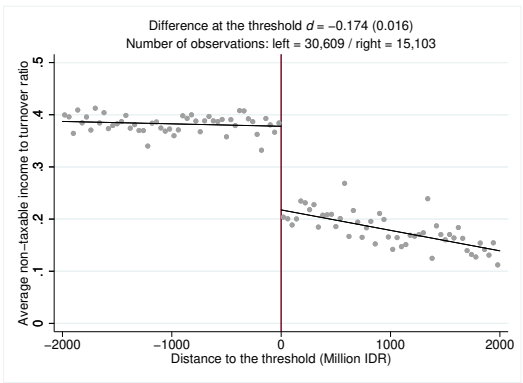
Panel D: 2015



Panel E: 2016



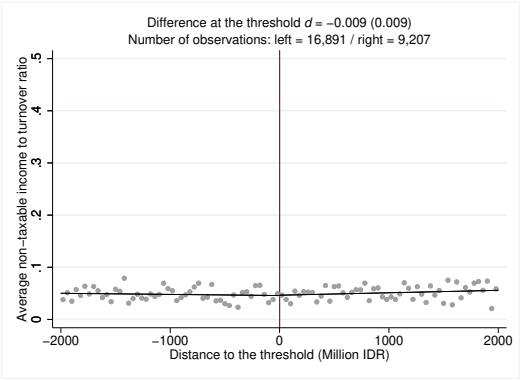
Panel F: 2017



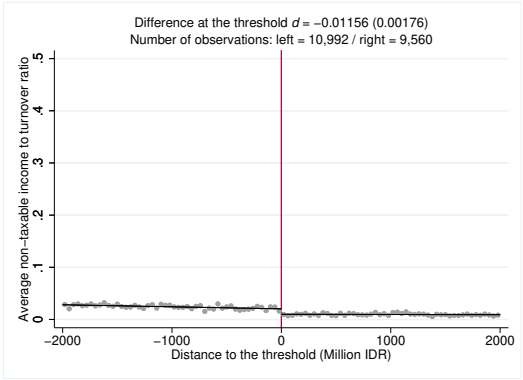
Notes: The figure plots the average non-taxable net income to turnover ratio around the 2014 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.22: Income s.t Final Tax Ratio for All Firms (Corrected, 2012-2017)

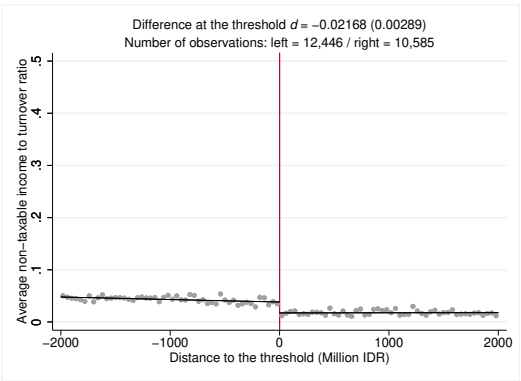
Panel A: 2012



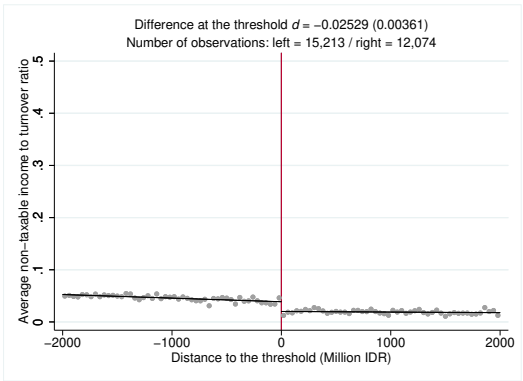
Panel B: 2013



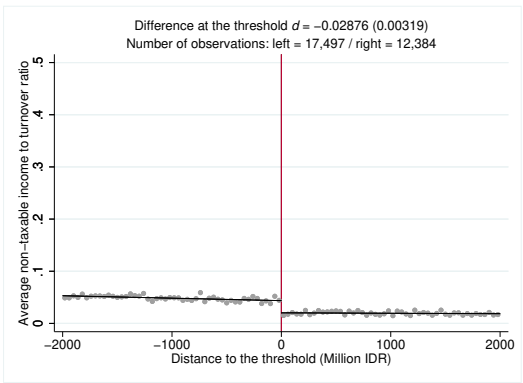
Panel C: 2014



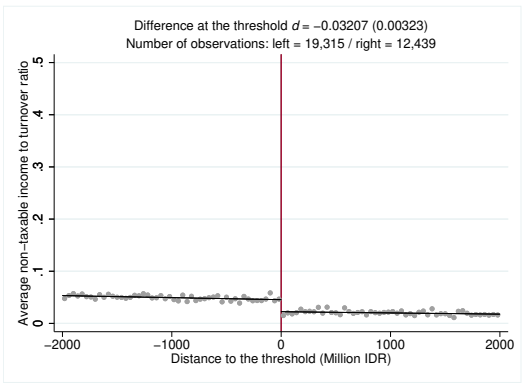
Panel D: 2015



Panel E: 2016



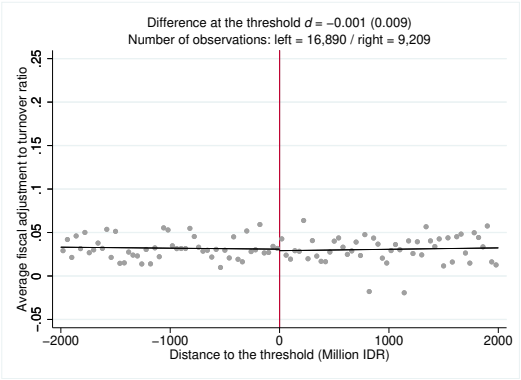
Panel F: 2017



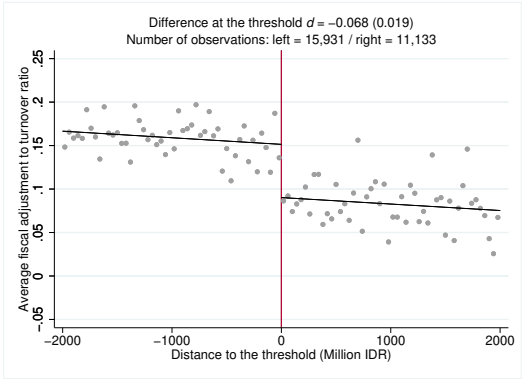
Notes: The figure plots the average non-taxable net income to turnover ratio around the 2014 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.23: Fiscal Adjustments Ratio for All Firms (Uncorrected, 2012-2017)

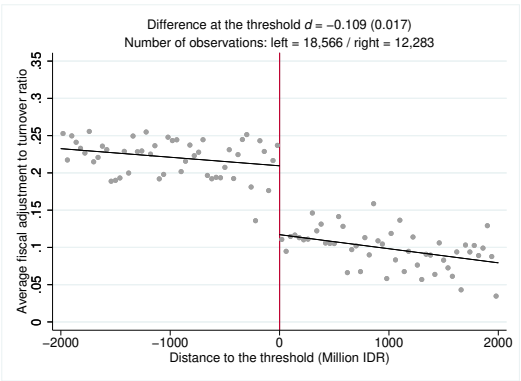
Panel A: 2012



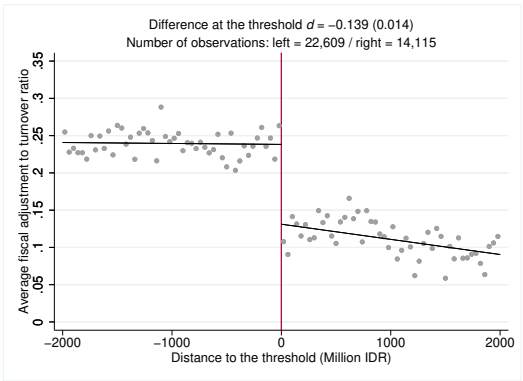
Panel B: 2013



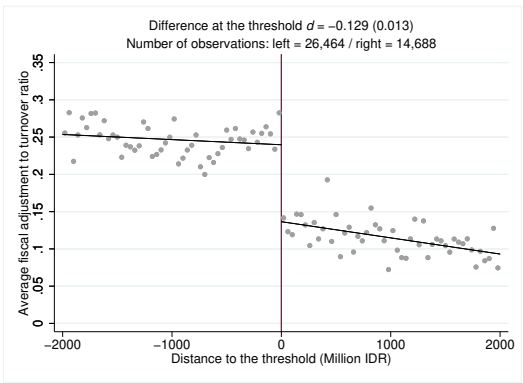
Panel A: 2014



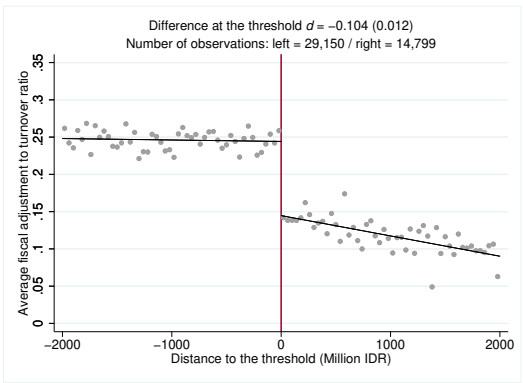
Panel B: 2015



Panel C: 2016



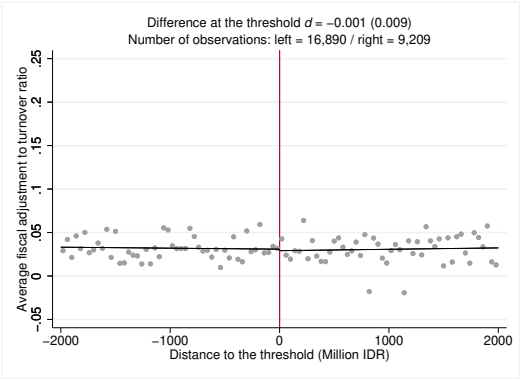
Panel D: 2017



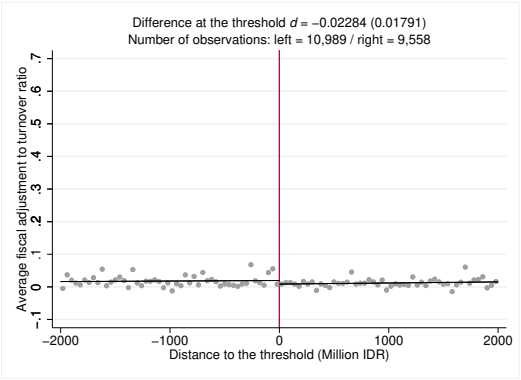
Notes: The figure shows the plot of average fiscal adjustment to turnover ratio near the threshold after the turnover tax reform and VAT registration threshold expansion (2014-2017). The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.24: Fiscal Adjustments Ratio for All Firms (Corrected, 2012-2017)

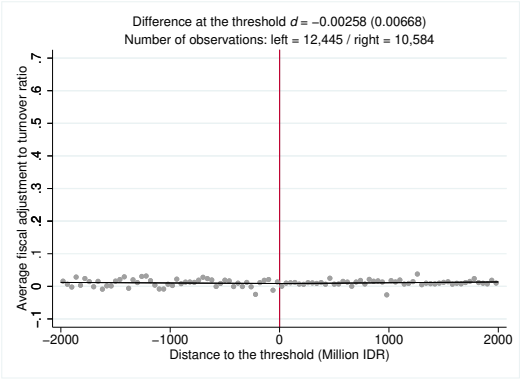
Panel A: 2012



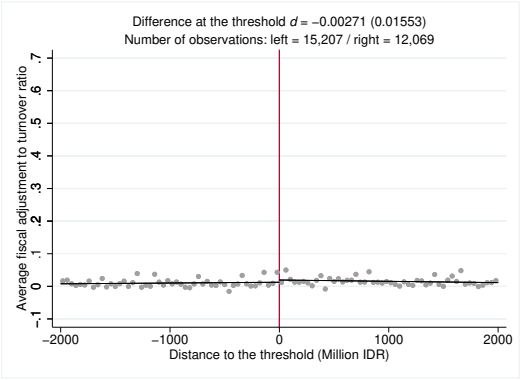
Panel B: 2013



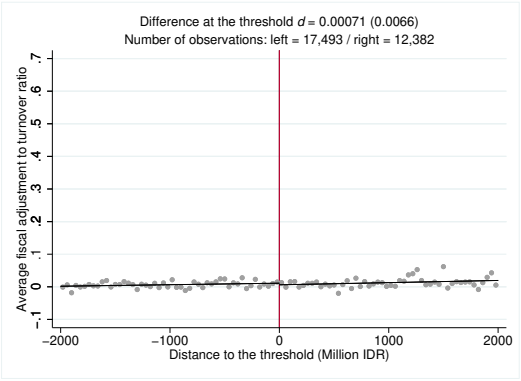
Panel A: 2014



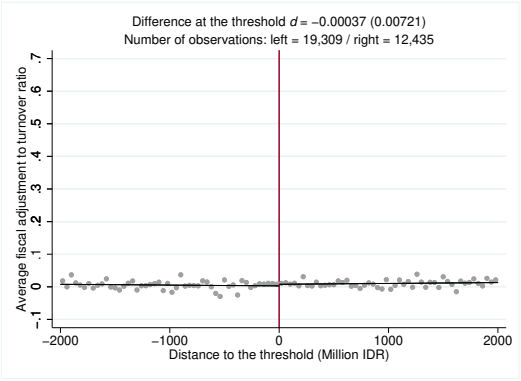
Panel B: 2015



Panel C: 2016



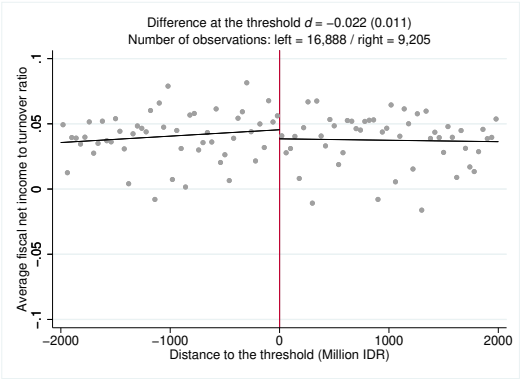
Panel D: 2017



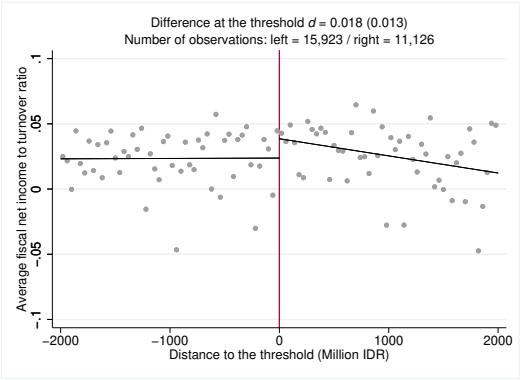
Notes: The figure shows the plot of average fiscal adjustment to turnover ratio near the threshold after the turnover tax reform and VAT registration threshold expansion (2014-2017). The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.25: Fiscal Net Income Ratio for All Firms (Uncorrected, 2012-2017)

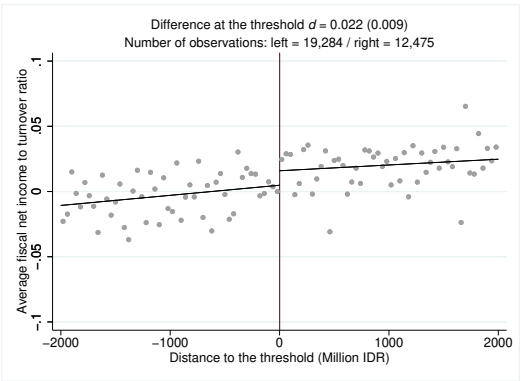
Panel A: 2012



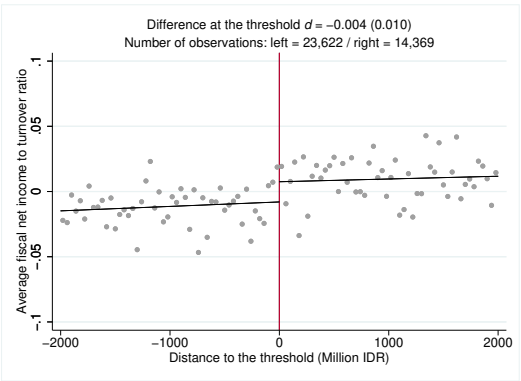
Panel B: 2013



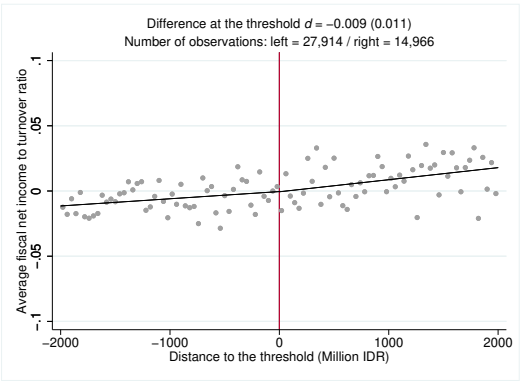
Panel C: 2014



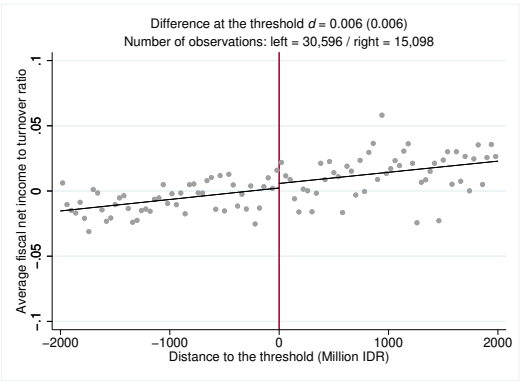
Panel D: 2015



Panel E: 2016



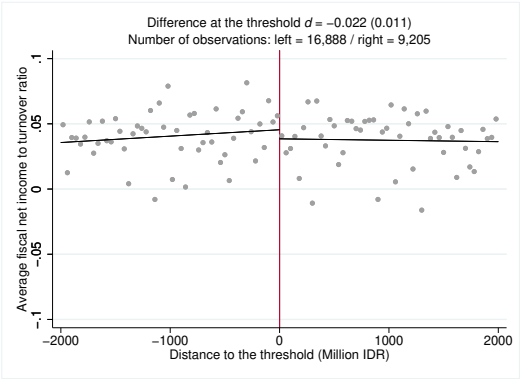
Panel F: 2017



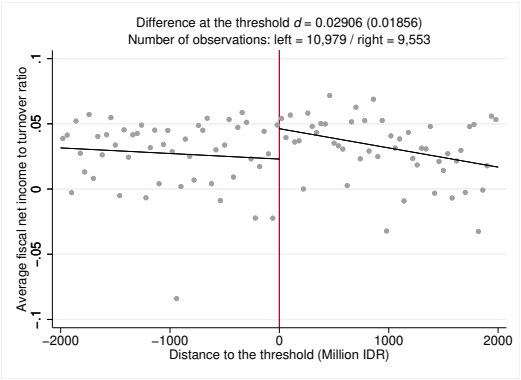
Notes: The figure plots the average fiscal net income to turnover ratio around the 2014 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure C.26: Fiscal Net Income Ratio for All Firms (Corrected, 2012-2017)

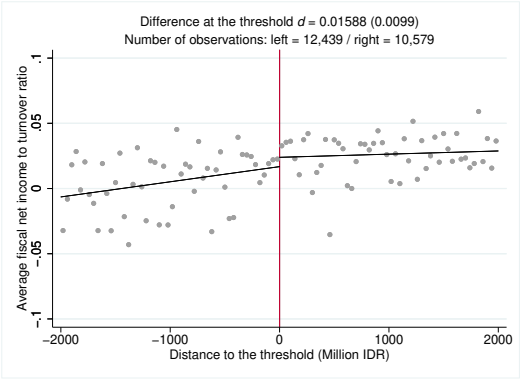
Panel A: 2012



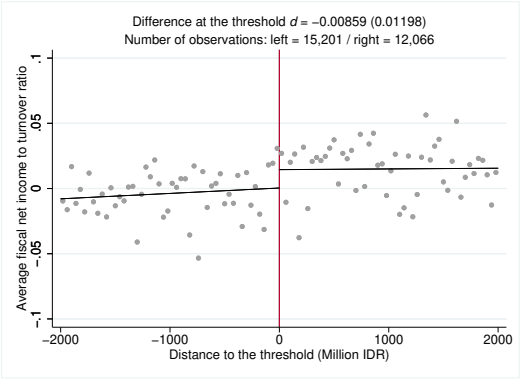
Panel B: 2013



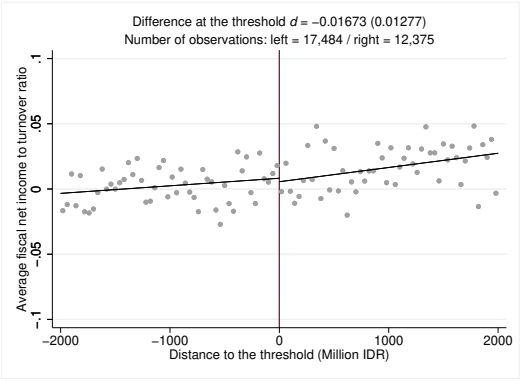
Panel C: 2014



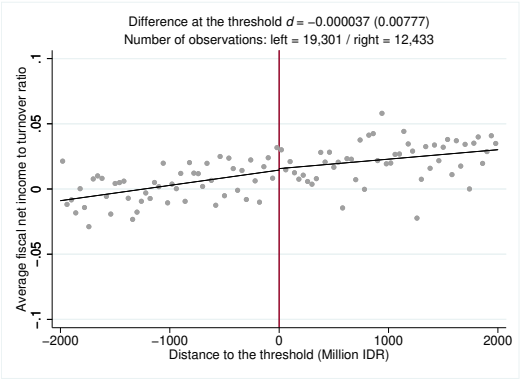
Panel D: 2015



Panel E: 2016



Panel F: 2017



Notes: The figure plots the average fiscal net income to turnover ratio around the 2014 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Appendix D

Bunching at the 2003 VAT Registration Threshold

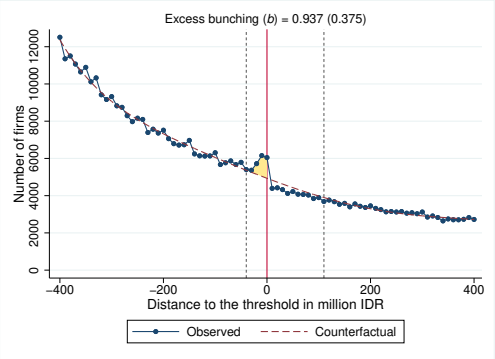
In this appendix, I further study the impacts of VAT registration threshold by comparing the behavioral responses at the old (2003) and the new (2014) thresholds. The threshold is increased fourfold from 600 million to 4.8 billion IDR. Thus, firms around the old threshold have smaller size than the those around the new threshold and might respond the discontinuity differently. Similar to the new threshold, income tax notch occurs at the old threshold where firms with turnover of up to 600 billion IDR can select between presumptive tax (deemed-profit-tax) and income tax. The difference is that the turnover tax offers significantly smaller average tax rate relative to deemed-profit tax scheme.

Figure D.1 displays bunching responses at the old and the new thresholds. The excees bunching at the new VAT notch is similar that of the new threshold. Moreover, Figure D.2 and D.3 show that the excess bunching the old VAT threshold is relatively stable over the 2007-2013 period and disappears after the expansion of VAT threshold in 2014. The results suggest that larger firms are not more responsive to the VAT notch than small firms.

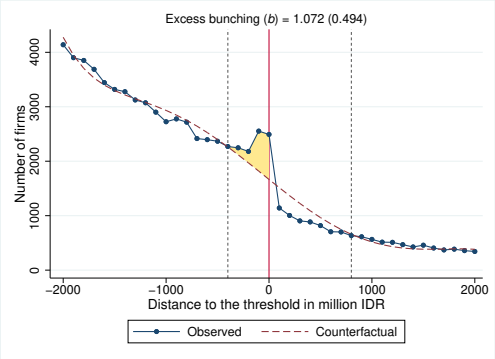
Unlike the new VAT threshold, the previous threshold creates no discontinuity in direct input to turnover ratio as demonstrated in Figure D.4 and D.5. Furthermore, Figure D.6 and D.7 show that there no discontinuity in tax liabilities during 2007-2013 near the old VAT threshold. Finally, Figure D.8 and D.9 show that firms around the old VAT threshold do not manipulate fiscal adjustment to counterbalance the misreporting inputs. The results suggest that the old VAT threshold persuades real responses rather than evasion responses (misreporting inputs) as in the new VAT notch. The differences in the size of annual turnover between firms around the old and those near the new threshold might explain this variation.

Figure D.1: Bunching at the VAT Registration Thresholds

Panel A: Old Threshold (2007-2012)

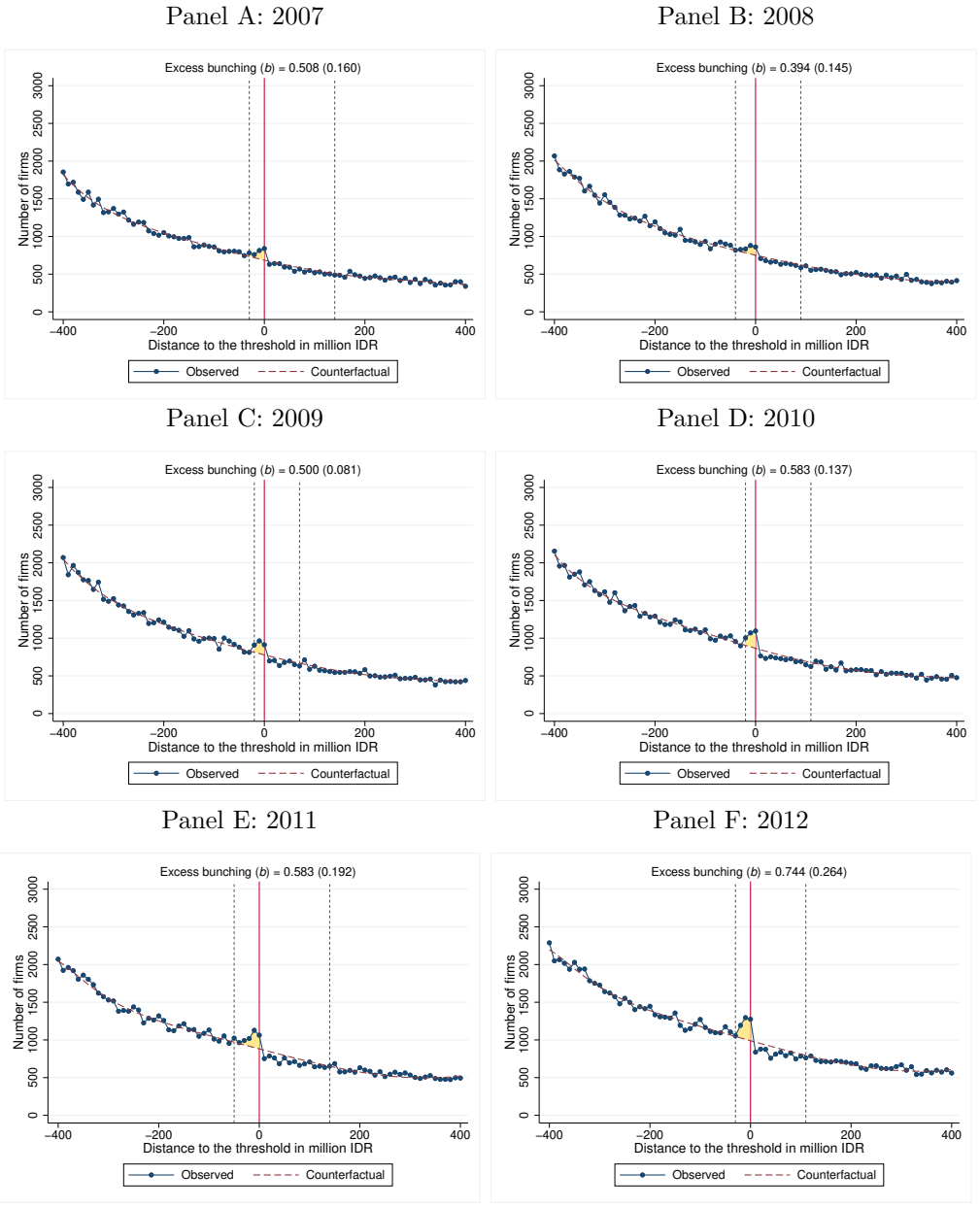


Panel B: New Threshold (2014-2017)



Notes: The figure displays the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover. Panel A shows the turnover distribution at the 2003 VAT registration threshold in bins of 10 million IDR within a range of -400 million IDR and 400 million IDR. Panel B shows the turnover distribution at the 2014 VAT registration threshold in bins of 100 million IDR within a range of -2000 million IDR and 2000 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

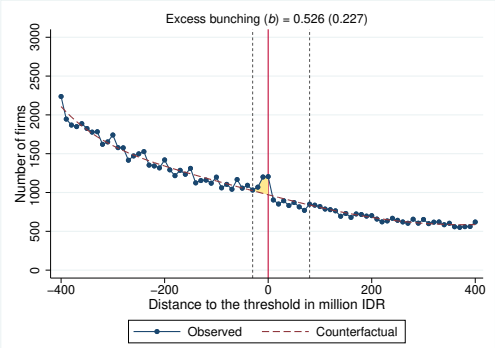
Figure D.2: Bunching at the 2003 VAT Registration Threshold (2007-2012)



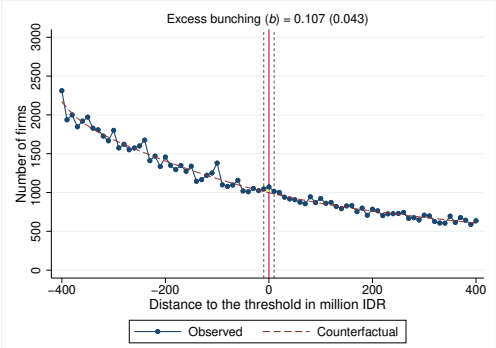
Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover before the VAT reform (2007-2012) in bins of 10 million IDR within a range of -400 million IDR and 400 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

Figure D.3: Bunching at the 2003 VAT Registration Threshold (2013-2017)

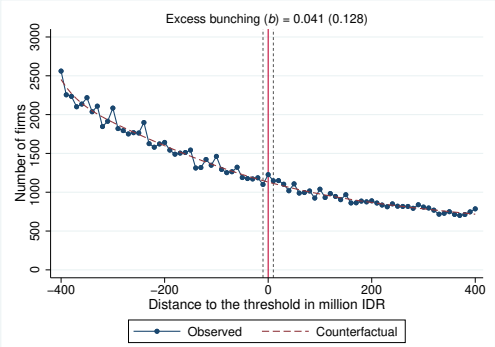
Panel A: 2013



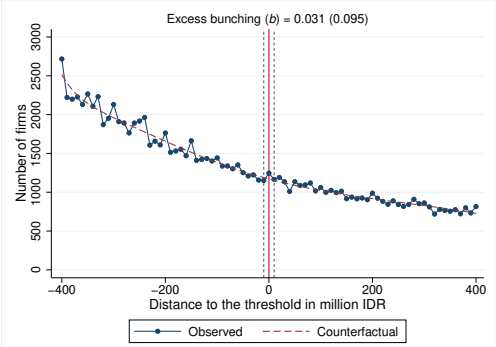
Panel B: 2014



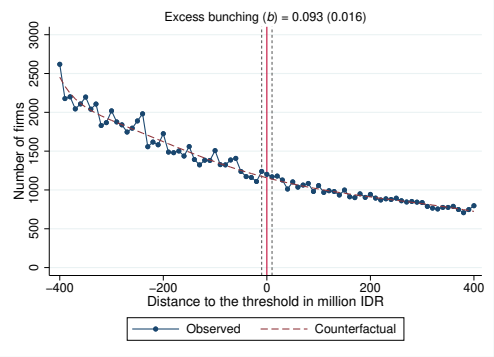
Panel C: 2015



Panel D: 2016



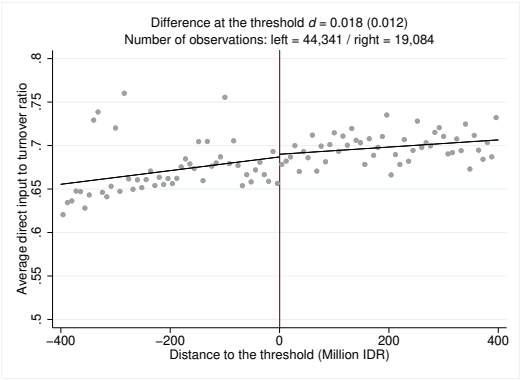
Panel E: 2017



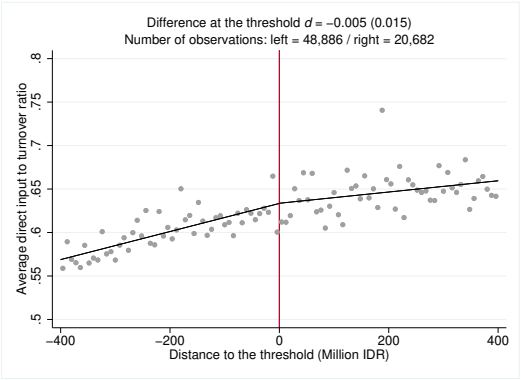
Notes: The figure shows the observed distribution (solid-dotted line) and the estimated counterfactual (solid-dashed line) of annual turnover before (2013) and after (2014-2017) the VAT reform in bins of 10 million IDR within a range of -400 million IDR and 400 million IDR. The threshold is represented by a vertical solid line. The counterfactual is a fifth-order polynomial estimated as in Equation (1.16). The shaded area is the excess mass in the upper part of the excluded region. Excess bunching b is excess bunching in the omitted region near the threshold relative to the average counterfactual count in this region.

Figure D.4: Direct Input Ratio at the 2003 VAT Registration Threshold (2007-2012)

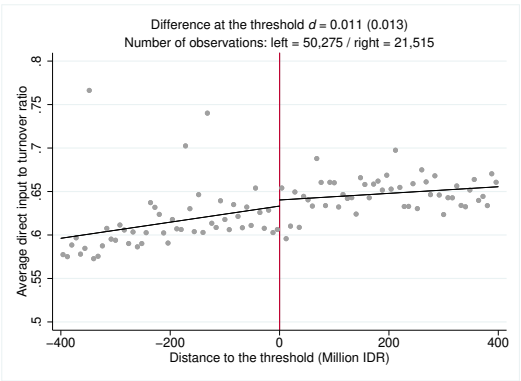
Panel A: 2007



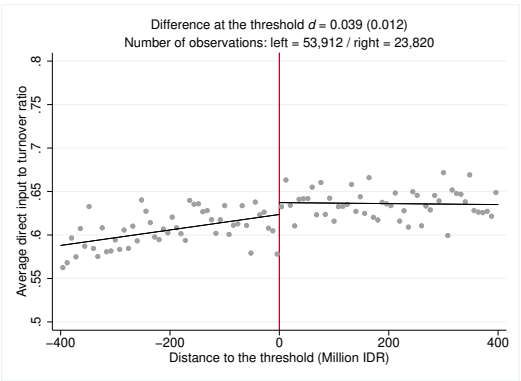
Panel B: 2008



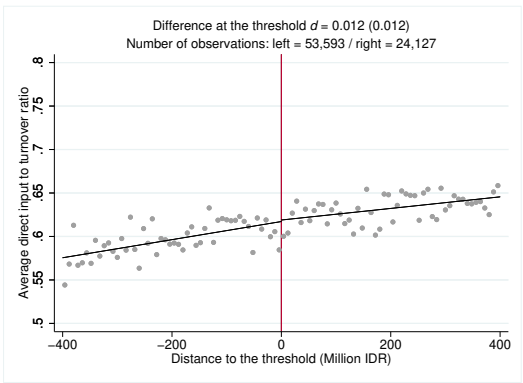
Panel C: 2009



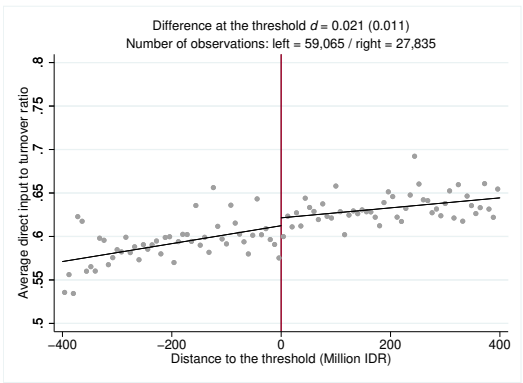
Panel D: 2010



Panel E: 2011



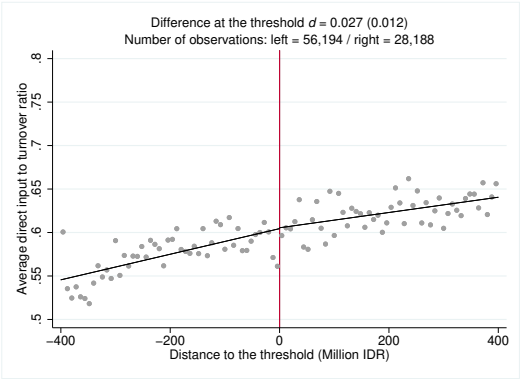
Panel F: 2012



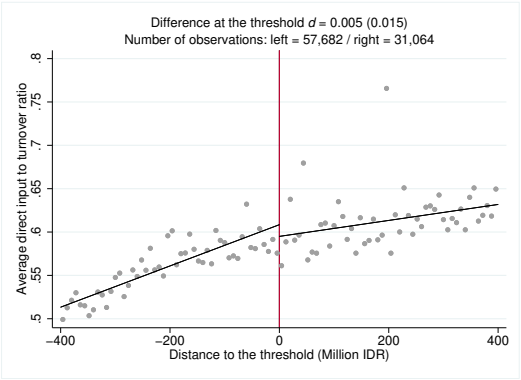
Notes: The figure plots the average direct input to turnover ratio near the 2003 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure D.5: Direct Input Ratio at the 2003 VAT Registration Threshold (2013-2017)

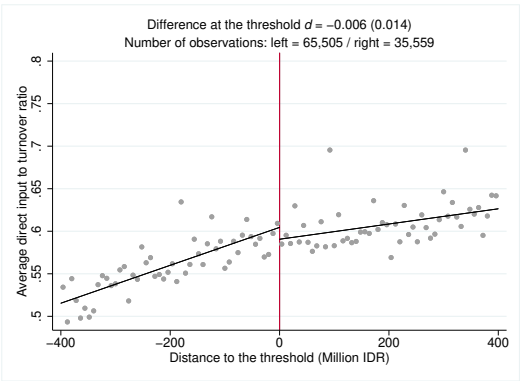
Panel A: 2013



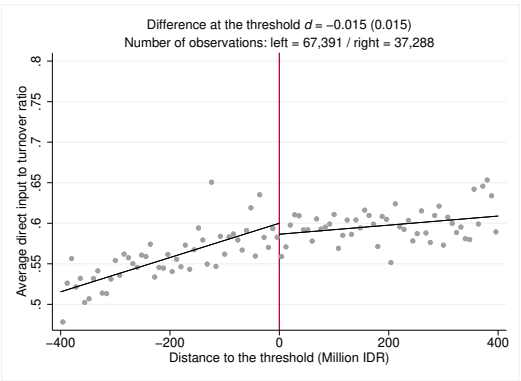
Panel B: 2014



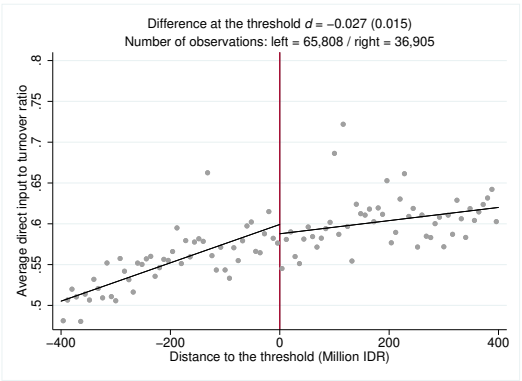
Panel C: 2015



Panel D: 2016



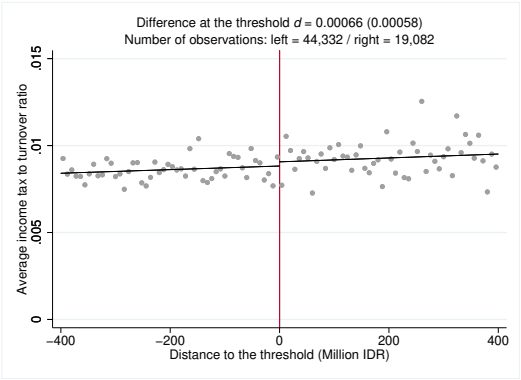
Panel E: 2017



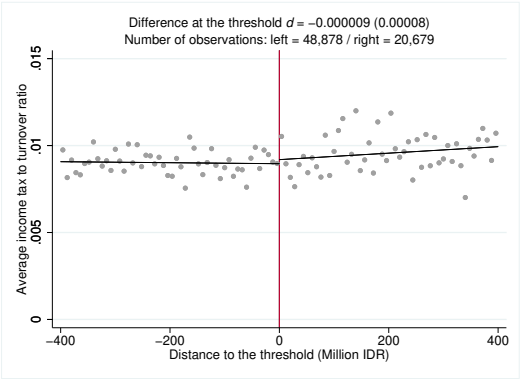
Notes: The figure plots the average direct input to turnover ratio near the 2003 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure D.6: Tax Liabilities at the 2003 VAT Registration Threshold (2007-2012)

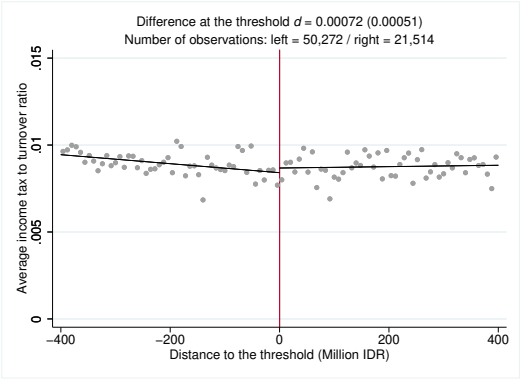
Panel A: 2007



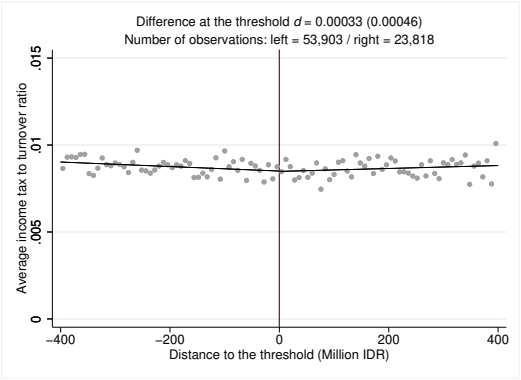
Panel B: 2008



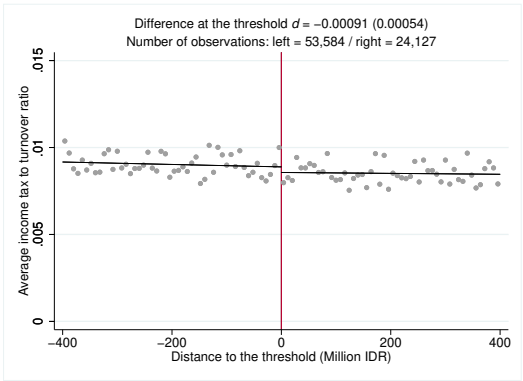
Panel C: 2009



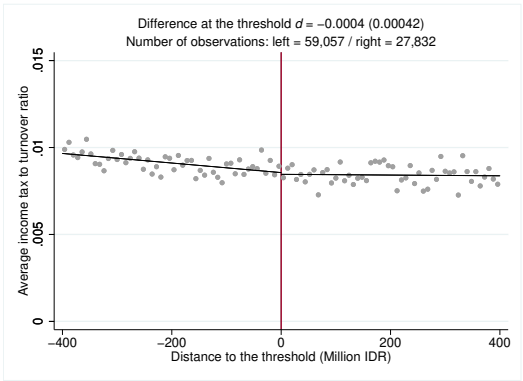
Panel D: 2010



Panel E: 2011



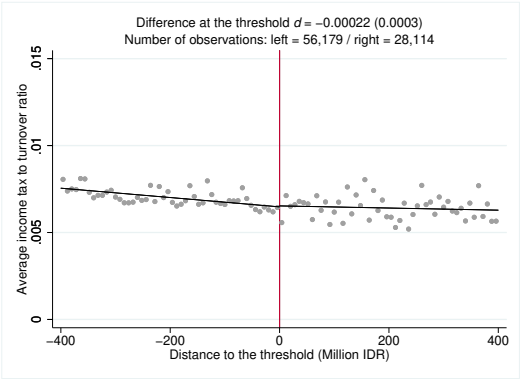
Panel F: 2012



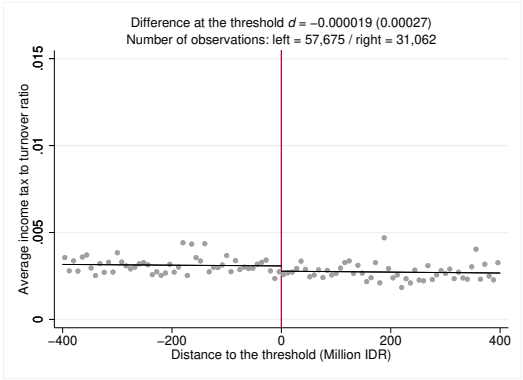
Notes: The figure plots the average tax liability to turnover ratio near the 2003 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure D.7: Tax Liabilities at the 2003 VAT Registration Threshold (2013-2017)

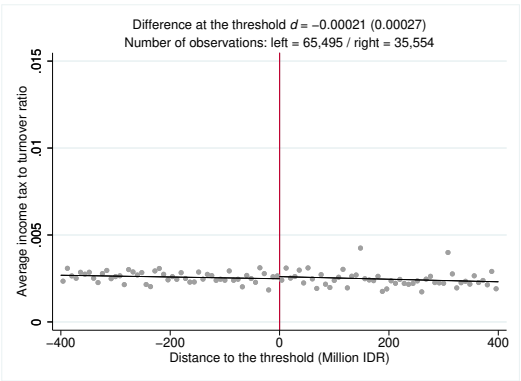
Panel A: 2013



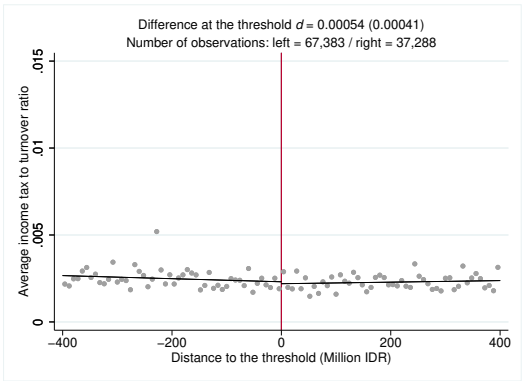
Panel B: 2014



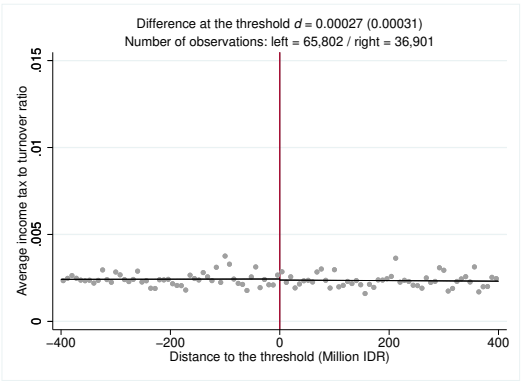
Panel C: 2015



Panel D: 2016



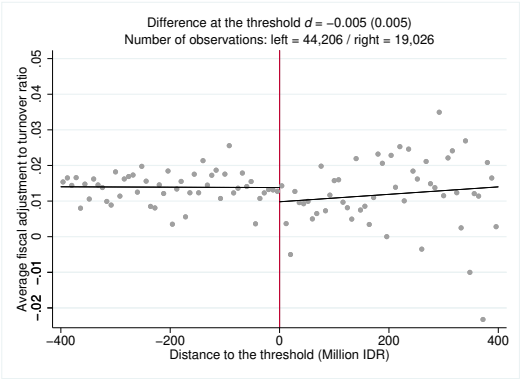
Panel E: 2017



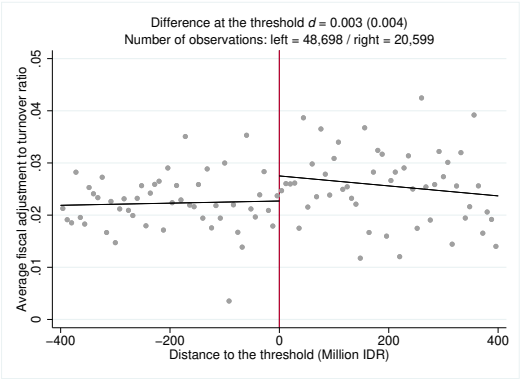
Notes: The figure plots the average tax liability to turnover ratio near the 2003 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure D.8: Fiscal Adjustments at the 2003 VAT Registration Threshold (2007-2012)

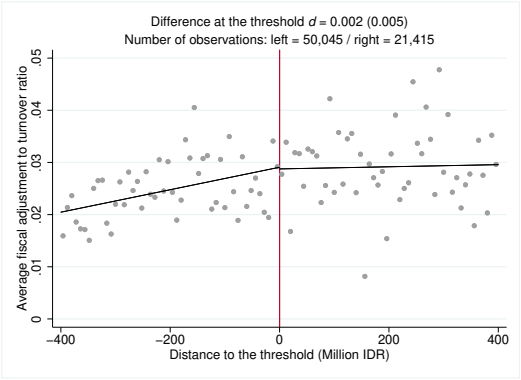
Panel A: 2007



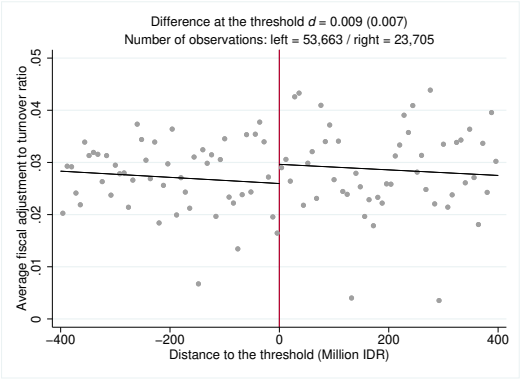
Panel B: 2008



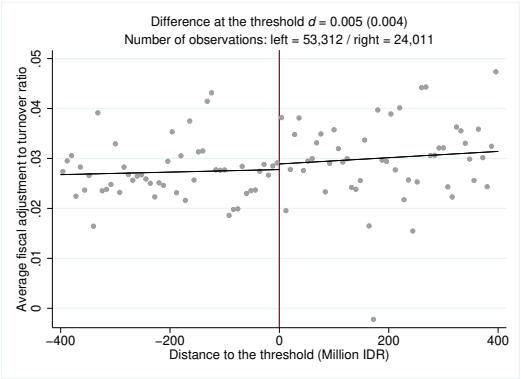
Panel C: 2009



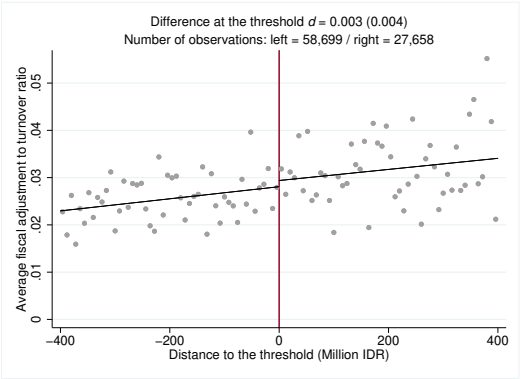
Panel D: 2010



Panel E: 2011



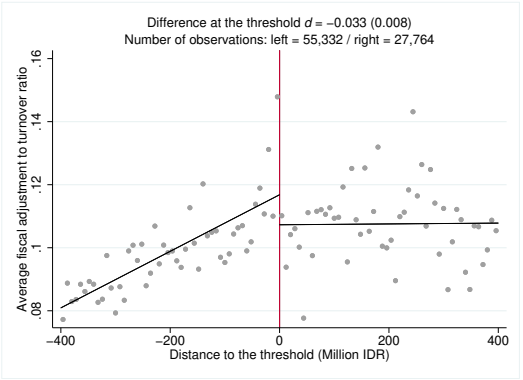
Panel F: 2012



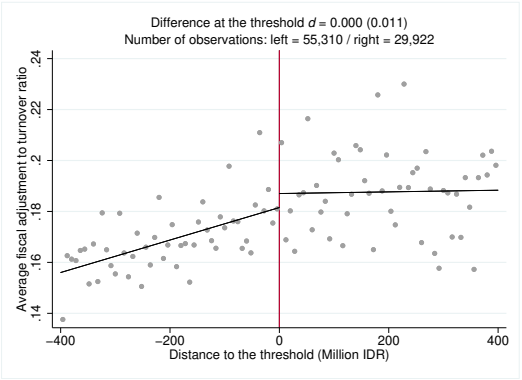
Notes: The figure plots the average fiscal adjustment to turnover ratio near the 2003 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Figure D.9: Fiscal Adjustments at the 2003 VAT Registration Threshold (2013-2017)

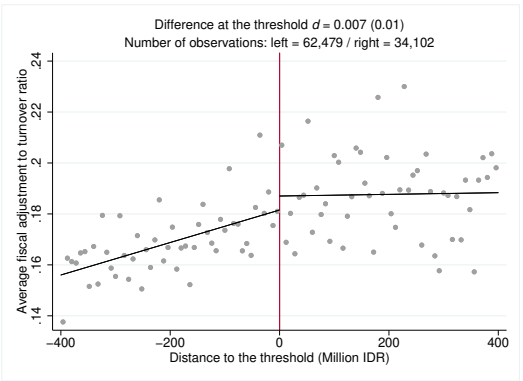
Panel A: 2013



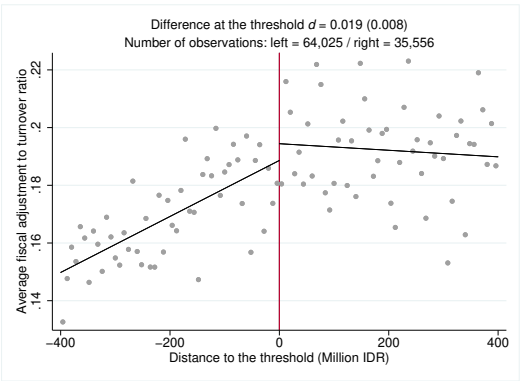
Panel B: 2014



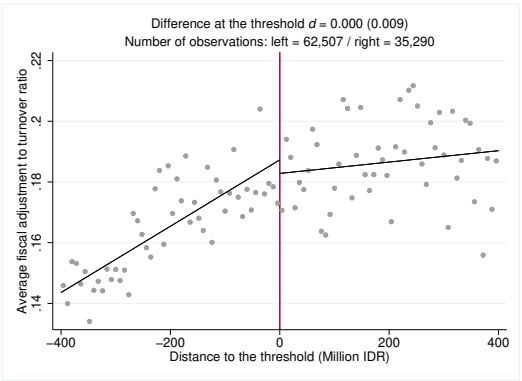
Panel C: 2015



Panel D: 2016



Panel E: 2017



Notes: The figure plots the average fiscal adjustment to turnover ratio near the 2003 VAT threshold. The vertical solid line is the normalized threshold. The number of bins used to the left of the threshold is 50 and to the right of the threshold is also 50. The solid lines in the left and the right of the threshold represent the conditional expectation function for firms below and above the threshold. Difference at the threshold d is the size of discontinuity in the dependent variable at the normalized threshold.

Appendix E

Utility and Profit Maximization Frameworks in Bunching Analysis

This appendix discusses the similarity between of the utility maximization and profit maximization frameworks used in the bunching analysis, specifically around a tax notch. Following Liu and Lockwood (2016), the relationship between bunching responses and other parameters such as input cost ratio and share of B2C sales derived from the profit maximization framework is expressed by the following equation

$$\frac{e}{1+\frac{\Delta y^*}{y^*}} - (e-1)\left(\frac{1}{1+\frac{\Delta y^*}{y^*}}\right)^{e/(e-1)} - T = 0 \tag{E.1}$$

and

$$T = \left(1 - \frac{\lambda(1-(1+t)^{-e})}{\lambda + (1-\lambda)(1+t)^{-e}(\frac{e-1}{e})^e}\right)\left(1+\omega t\right)^{e-1} \tag{E.2}$$

where λ is a measure of household final demand for heterogenous goods produced by small firms relative to the demand for homogenous goods produced by large firms $(1-\lambda)$, ω denotes intermediate good, and t represents VAT rate. Equation (E.2) implies that the sales responses Δy^* increases as the share of B2C sales λ increases and as the share of input to total cost ω decreases. Furthermore, the sales responses Δy^* increases as elasticity of output supply e increases if T is decreasing in e.

Liu and Lockwood (2016) argue that bunching equation derived from profit maximization is similar to that of utility maximization framework when all sales are B2C, firms are price takers, and the production function is fixed-coefficients. They further argue that Equation (E.2) can be converted into the equation prescribing relationship between tax elasticity, bunching responses, and tax notch in Kleven and Waseem (2013) or Equation (1.14) in this paper by assuming that elasticity of tax base $e_L = e - 1$ and $T^{1/e} = 1 - (\Delta t/1-t)$ such as follows

$$\frac{e_L+1}{1+\frac{\Delta y^*}{y^*}} - e_L\left(\frac{1}{1+\frac{\Delta y^*}{y^*}}\right)^{(e_L+1)/e_L} - \left(1-\frac{\Delta t}{1-t}\right)^{e_L+1} = 0 \tag{E.3}$$

$$\frac{1}{e_L+1}\left[\frac{e_L+1}{1+\frac{\Delta y^*}{y^*}} - e_L\left(\frac{1}{1+\frac{\Delta y^*}{y^*}}\right)^{1+1/e_L} - \left(\frac{1-t-\Delta t}{1-t}\right)^{e_L+1}\right] = 0 \tag{E.4}$$

$$\frac{1}{1+\frac{\Delta y^*}{y^*}} - \frac{e_L}{e_L+1}\left(\frac{1}{1+\frac{\Delta y^*}{y^*}}\right)^{1+1/e_L} - \frac{1}{e_L+1}\left(\frac{1-t-\Delta t}{1-t}\right)^{e_L+1} = 0. \tag{E.5}$$

Appendix F

Solutions and Rearrangements in the Bunching Theoretical Framework

This appendix describes the solutions to maximization problems and rearrangements of equations involved in the bunching theoretical framework. I show the steps to solve and rewritten equations common to the bunching analysis as they rarely presented in the literature.

F.1 Single threshold

The first problem to be solved is the utility maximization for the firm just below the threshold in Equation (1.3), e.g. $u(y) = (1-T)y - \frac{a}{1+1/e}\left(\frac{y}{a}\right)^{1+1/e}$ such as follow

$$\frac{\partial u(y)}{\partial y} = (1-T) - \left(\frac{y}{a}\right)^{1/e} = 0 \tag{F.1}$$

$$(1-T) = \left(\frac{y}{a}\right)^{1/e} \tag{F.2}$$

$$(1-T)^e = \frac{y}{a} \tag{F.3}$$

$$y = a(1-T)^e \tag{F.4}$$

Moreover, using the first order condition $y^* = (a^* - \Delta a^*)(1-T)^e$, the utility for the lowest-productivity firm (type L) as the marginal buncher at the best interior point $y^* - \Delta y^*$ can be rearranged as

$$u^L = (1-T)(a^* - \Delta a^*)(1-T)^e - \left(\frac{a^* - \Delta a^*}{1+1/e}\right)\left(\frac{a^* - \Delta a^*(1-T)^e}{a^* - \Delta a^*}\right)^{1+1/e} \tag{F.5}$$

$$u^L = (a^* - \Delta a^*)(1-T)^{e+1} - \left(\frac{1}{(e+1)/e}\right)(a^* - \Delta a^*)(1-T)^{e\left(\frac{e+1}{e}\right)} \tag{F.6}$$

$$u^L = (a^* - \Delta a^*)(1-T)^{e+1} - \left(\frac{e}{e+1}\right)(a^* - \Delta a^*)(1-T)^{e+1} \tag{F.7}$$

$$u^L = (a^* - \Delta a^*)(1-T)^{e+1}\left(1 - \frac{e}{e+1}\right) \tag{F.8}$$

From the condition $u^L = u^H$ and using the relationship $(y^* - \Delta y^*) = (a^* - \Delta a^*)(1-T)^e$, the rearrangement of equation (1.4) to get equation (1.5) is the following

$$(a^* - \Delta a^*)(1-T)^{e+1}\left(1 - \frac{e+1}{e+1}\right) - (1-t)y^* + \frac{a^* - \Delta a^*}{1+1/e}\left(\frac{y^*}{a^* - \Delta a^*}\right)^{1+1/e} = 0 \tag{F.9}$$

$$\left(\frac{y^* - \Delta y^*}{(1-t)^e}\right)(1-T)^{e+1}\left(\frac{1}{e+1}\right) + \frac{\frac{y^*-\Delta y^*}{(1-t)^e}}{1+1/e}\left(\frac{y^*}{\frac{y^*-\Delta y^*}{(1-t)^e}}\right)^{1+1/e} - (1-t)y^* = 0 \quad \text{(F.10)}$$

Moreover, the previous equation can be rewritten by multiplying all of the terms with $\frac{(e+1)}{(1-T)y^*}$ as follows

$$\left(\frac{y^* - \Delta y^*}{y^*(1-T)(1-T)^e}\right)(1-T)^{e+1}\left(\frac{e+1}{e+1}\right)$$
$$+\left(\frac{e(e+1)}{(e+1}\right)\left(\frac{y^* - \Delta y^*}{(1-T)(1-T)^e}\right)\left(\frac{y^*(1-T)^e}{y^* - \Delta y^*}\right)^{\frac{e+1}{e}} - (e+1)\frac{(1-t)y^*}{(1-T)y^*} = 0 \quad \text{(F.11)}$$

$$\left(\frac{y^* - \Delta y^*}{y^*}\right) + e\left(\frac{y^* - \Delta y^*}{y^*}\right)\left(\frac{y^* - \Delta y^*}{y^*}\right)^{-\frac{e+1}{e}} - (e+1)\left(\frac{1-t}{1-T}\right) = 0 \quad \text{(F.12)}$$

$$\left(1 - \frac{\Delta y^*}{y^*}\right) + e\left(1 - \frac{\Delta y^*}{y^*}\right)^{-1/e} - (e+1)\left(\frac{1-t}{1-T}\right) = 0 \quad \text{(F.13)}$$

F.2 Multiple thresholds

F.2.1 Downward tax notch

Using the first-order condition $y^*(1-\alpha) = (a^* - \Delta a^*)(1-\gamma^B)^e$, the utility for the lowest-productivity firm (type L) as the marginal buncher at the best interior point $y^* - \Delta y^*$ can be rearranged as

$$u_D^L = (1-\gamma^B)(a^* - \Delta a^*)(1-\gamma^B)^e - \left(\frac{a^* - \Delta a^*}{1+1/e}\right)\left(\frac{a^* - \Delta a^*(1-\gamma^B)^e}{a^* - \Delta a^*}\right)^{1+1/e} \quad \text{(F.14)}$$

$$u_D^L = (a^* - \Delta a^*)(1-\gamma^B)^{e+1} - \left(\frac{1}{(e+1)/e}\right)(a^* - \Delta a^*)(1-\gamma^B)^{e\left(\frac{e+1}{e}\right)} \quad \text{(F.15)}$$

$$u_D^L = (a^* - \Delta a^*)(1-\gamma^B)^{e+1} - \left(\frac{e}{e+1}\right)(a^* - \Delta a^*)(1-\gamma^B)^{e+1} \quad \text{(F.16)}$$

$$u_D^L = (a^* - \Delta a^*)(1-\gamma^B)^{e+1}\left(1 - \frac{e}{e+1}\right) \quad \text{(F.17)}$$

From the condition $u_D^L = u_D^H$ and using the relationship $(y^* - \Delta y^*)(1-\alpha) = (a^* - \Delta a^*)(1-\gamma^B)^e$, the rearrangement of terms in Equation (1.9) to get Equation (1.10) is the following

$$(a^* - \Delta a^*)(1-\gamma^B)^{e+1}\left(1 - \frac{e}{e+1}\right)$$
$$-(1-\gamma^A-\theta)(1-\alpha)y + \frac{a^* - \Delta a^*}{1+1/e}\left(\frac{(1-\alpha)y}{a^* - \Delta a^*}\right)^{1+1/e} = 0 \quad \text{(F.18)}$$

$$\frac{1}{e+1}(a^* - \Delta a^*)(1-\gamma^B)^{e+1}$$

$$+\frac{e}{e+1}(a^* - \Delta a^*)\left(\frac{(1-\alpha)y}{a^* - \Delta a^*}\right)^{1+1/e} - (1-\gamma^A-\theta)(1-\alpha)y = 0 \tag{F.19}$$

$$\frac{1}{e+1}\left(\frac{(y^* - \Delta y^*)(1-\alpha)}{(1-\gamma^B)^e}\right)(1-\gamma^B)^{e+1} \tag{F.20}$$

$$+\frac{e}{e+1}\left(\frac{(y^* - \Delta y^*)(1-\alpha)}{(1-\gamma^B)^e}\right)\left(\frac{y^*(1-\alpha)(1-\gamma^B)^e}{(y^* - \Delta y^*)(1-\alpha)}\right)^{1+1/e} - (1-\gamma^A-\theta)(1-\alpha)y^* = 0$$

To simplify the previous equation, all of the terms will be multiplied by $\frac{(e+1)}{y^*(1-\alpha)(1-\gamma^B)}$. For the first term, the rearrangement is the following

$$\frac{e+1}{e+1}\left(\frac{(y^* - \Delta y^*)(1-\alpha)}{y^*(1-\alpha)(1-\gamma^B)^{e+1}}\right)(1-\gamma^B)^{e+1} \tag{F.21}$$

$$\frac{y^* - \Delta y^*}{y^*} \tag{F.22}$$

$$1 - \frac{\Delta y^*}{y^*} \tag{F.23}$$

For the second term, the rearrangement is the following

$$\frac{e(e+1)}{e+1}\left(\frac{(y^* - \Delta y^*)(1-\alpha)}{y^*(1-\alpha)(1-\gamma^B)(1-\gamma^B)^e}\right)\left(\frac{y^*(1-\alpha)(1-\gamma^B)^e}{(y^* - \Delta y^*)(1-\alpha)}\right)^{1+1/e} \tag{F.24}$$

$$e\left(\frac{y^* - \Delta y^*}{y^*}\right)\left(\frac{y^*}{y^* - \Delta y^*}\right)^{\frac{e+1}{e}}\frac{(1-\gamma^B)^{e+1}}{(1-\gamma^B)^{e+1}} \tag{F.25}$$

$$e\left(\frac{y^* - \Delta y^*}{y^*}\right)^{\frac{e}{e}}\left(\frac{(y^* - \Delta y^*)}{y^*}\right)^{-\left(\frac{e+1}{e}\right)} \tag{E.26}$$

$$e\left(\frac{y^* - \Delta y^*}{y^*}\right)^{-\frac{1}{e}} \tag{F.26}$$

$$e\left(1 - \frac{\Delta y^*}{y^*}\right)^{-\frac{1}{e}} \tag{F.27}$$

For the third term, the rearrangement is the following

$$\frac{(e+1)(1-\gamma^A+\theta)(1-\alpha)y^*}{y^*(1-\alpha)(1-\gamma^B)} \tag{F.28}$$

$$(e+1)\left(\frac{1-\gamma^A-\theta}{1-\gamma^B}\right) \tag{F.29}$$

F.2.2 Upward tax notch

Using the first order condition $y^* = (a^* + \Delta a^*)(1 - \gamma^A - \theta)^e$, the utility for the highest-productivity firm (type H) as the marginal buncher at the best interior point can be rearranged as

$$u_D^H = (1-\gamma^A-\theta)(a^*+\Delta a^*)(1-\gamma^A-\theta)^e - \left(\frac{a^*+\Delta a^*}{1+1/e}\right)\left(\frac{a^*+\Delta a^*(1-\gamma^A-\theta)^e}{a^*-\Delta a^*}\right)^{1+1/e} \tag{F.30}$$

$$u_D^H = (a^*+\Delta a^*)(1-\gamma^A-\theta)^{e+1} - \left(\frac{1}{(e+1)/e}\right)(a^*+\Delta a^*)(1-\gamma^A-\theta)^{e\left(\frac{e+1}{e}\right)} \tag{F.31}$$

$$u_D^H = (a^*+\Delta a^*)(1-\gamma^A-\theta)^{e+1} - \left(\frac{e}{e+1}\right)(a^*-\Delta a^*)(1-\gamma^A-\theta)^{e+1} \tag{F.32}$$

$$u_U^H = (a^*+\Delta a^*)(1-\gamma^A-\theta)^{e+1}\left(1-\frac{e}{e+1}\right) \tag{F.33}$$

From the condition $u_D^L = u_D^H$ and using the relationship $(y^* + \Delta y^*)(1 - \alpha) = (a^* + \Delta a^*)(1 - \gamma^B)^e$, the rearrangement of terms in Equation (1.13) to get Equation (1.14) is the following

$$y^*(1-\alpha)(1-\gamma^B) - \frac{a^*+\Delta a^*}{1+1/e}\left(\frac{y^*(1-\alpha)}{a^*+\Delta a^*}\right)^{1+1/e} - (a^*+\Delta a^*)(1-\gamma^A-\theta)^{e+1}\left(1-\frac{e}{e+1}\right) = 0 \tag{F.34}$$

$$y^*(1-\alpha)(1-\gamma^B) - \frac{e}{e+1}(a^*+\Delta a^*)\left(\frac{y^*(1-\alpha)}{a^*+\Delta a^*}\right)^{1+1/e} - \frac{1}{e+1}(a^*+\Delta a^*)(1-\gamma^A-\theta)^{e+1} = 0 \tag{F.35}$$

$$y^*(1-\alpha)(1-\gamma^B) - \frac{e}{e+1}\left(\frac{(y^*+\Delta y^*)(1-\alpha)}{(1-\gamma^B)^e}\right)\left(\frac{y^*(1-\alpha)(1-\gamma^B)^e}{(y^*+\Delta y^*)(1-\alpha)}\right)^{1+1/e} - \frac{1}{e+1}\left(\frac{(y^*+\Delta y^*)(1-\alpha)}{(1-\gamma^B)^e}\right)(1-\gamma^A-\theta)^{e+1} = 0 \tag{F.36}$$

To simplify the previous equation, all of the terms will be divided by $(y^*+\Delta y^*)(1-\alpha)(1-\gamma^B)$. For the first term, the rearrangement is the following

$$\frac{y^*(1-\alpha)(1-\gamma^B)}{(y^*+\Delta y^*)(1-\alpha)(1-\gamma^B)} \tag{F.37}$$

$$\frac{y^*}{y^*+\Delta y^*} \tag{F.38}$$

$$\frac{1}{\frac{y^*+\Delta y^*}{y^*}} \tag{F.39}$$

$$\frac{1}{1+\frac{\Delta y^*}{y^*}} \tag{F.40}$$

For the second term, the rearrangement is the following

$$\frac{e}{e+1}\left(\frac{(y^*+\Delta y^*)(1-\alpha)}{(y^*+\Delta y^*)(1-\alpha)(1-\gamma^B)(1-\gamma^B)^e}\right)\left(\frac{y^*(1-\alpha)(1-\gamma^B)^e}{(y^*+\Delta y^*)(1-\alpha)}\right)^{1+1/e} \tag{F.41}$$

$$\frac{e}{e+1}\left(\frac{1}{(1-\gamma^B)^{e+1}}\right)\left(\frac{y^*(1-\gamma^B)^e}{(y^*+\Delta y^*)}\right)^{1+1/e} \tag{F.42}$$

$$\frac{e}{e+1}\left(\frac{\left(y^*(1-\gamma^B)^e\right)^{1+1/e}}{\left((y^*+\Delta y^*)\right)^{1+1/e}(1-\gamma^B)^{e+1}}\right) \tag{F.43}$$

$$\frac{e}{e+1}\left(\frac{(y^*)^{1+1/e}(1-\gamma^B)^{e+1}}{(y^*+\Delta y^*)^{1+1/e}(1-\gamma^B)^{e+1}}\right) \tag{F.44}$$

$$\frac{e}{e+1}\left(\frac{(y^*)^{1+1/e}}{(y^*+\Delta y^*)^{1+1/e}}\right) \tag{F.45}$$

$$\frac{e}{e+1}\left(\frac{y^*}{y^*+\Delta y^*}\right)^{1+1/e} \tag{F.46}$$

$$\frac{e}{e+1}\left(\frac{1}{\frac{y^*+\Delta y^*}{y^*}}\right)^{1+1/e} \tag{F.47}$$

$$\frac{e}{e+1}\left(\frac{1}{1+\frac{\Delta y^*}{y^*}}\right)^{1+1/e} \tag{F.48}$$

For the third term, the rearrangement is the following

$$\frac{1}{e+1}\left(\frac{(y^*+\Delta y^*)(1-\alpha)}{(y^*+\Delta y^*)(1-\alpha)(1-\gamma^B)(1-\gamma^B)^e}\right)(1-\gamma^A-\theta)^{e+1} \tag{F.49}$$

$$\frac{1}{e+1}\left(\frac{1}{(1-\gamma^B)^{e+1}}\right)(1-\gamma^A-\theta)^{e+1} \tag{F.50}$$

$$\frac{1}{e+1}\left(\frac{1-\gamma^A-\theta}{1-\gamma^B}\right)^{e+1} \tag{F.51}$$

Appendix G

Probability of Participating in Tax Amnesty Using Linear and Ordered Logit Specifications

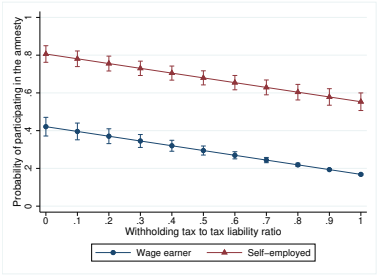
This appendix describes the probability of participation by income decile for the linear as well as ordered logit specifications. Figure G.1 shows that the slopes of the probability distribution produced from linear regresssion are similar for both wage earners and self-employed individuals. On the other hand, Figure G.2 demonstrates the ordered logit regression creates variation in slopes conditional on income decile and types of employment. The results suggest that the ordered logit specification provides better estimates on the probability of participation as a proxy for past probability of conducting evasion.

Moreover, Figure G.2 demonstrates that the ordered logit specification is suitable to exploit variation in the size of tax amnesty rates as well as timing of the net assets declaration. The figure shows that the probability of participation in the first period of tax amnesty which offers the lowest tax rates is significantly higher than in other periods in almost all income deciles. The finding suggests that lower tax rates induced taxpayers to accurately report their taxable base.

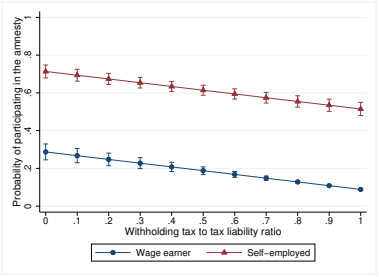
However, Figure G.2 depicts that the probability of participation in the second period is relatively similar to that in the second period, in spite of the former's lower tax rates. The result suggest the tax rate differential does not matter in the two-last period of amnesty, implying that the probability of participation in the first period is not only affected by tax rates but also the preference in timing of declaration. In other words, all else equal, taxpayers prefers to declare unreported net-assets in the first period relative to other periods.

Figure G.1: The Probability of Participation by Decile (Linear Regression)

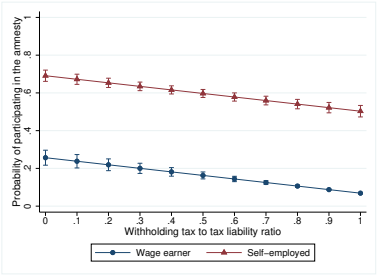
Panel A: Decile 10



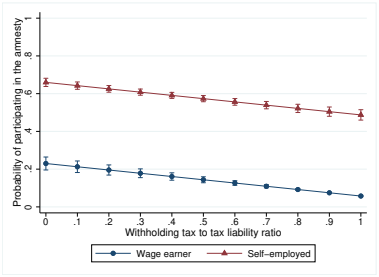
Panel B: Decile 9



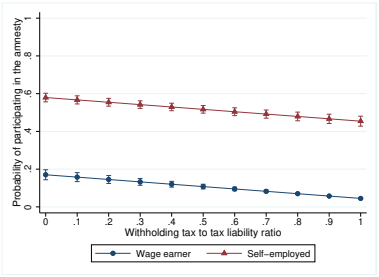
Panel C: Decile 8



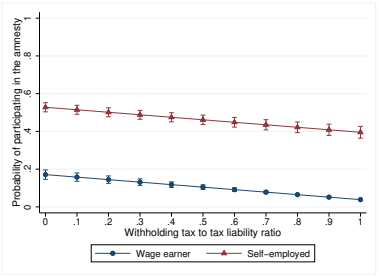
Panel D: Decile 7



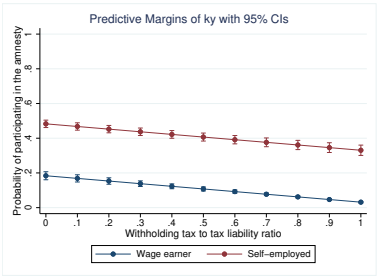
Panel E: Decile 6



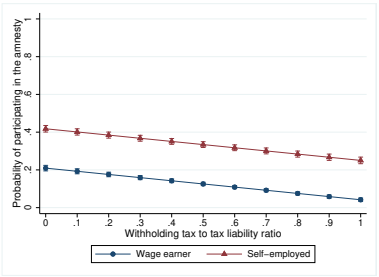
Panel F: Decile 5



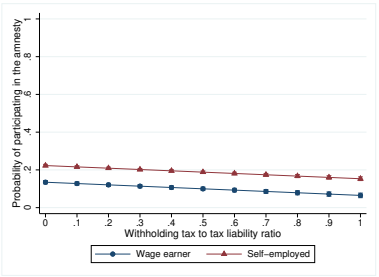
Panel G: Decile 4



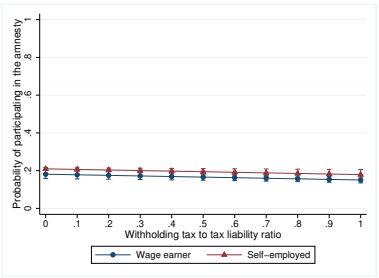
Panel H: Decile 3



Panel I: Decile 2



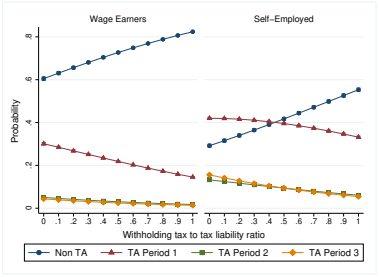
Panel J: Decile 1



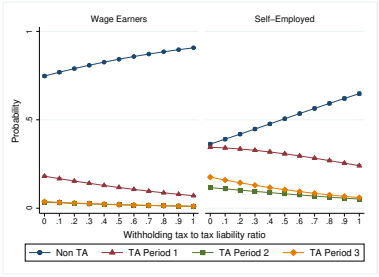
Notes: The figure shows the probability of participating in each period of the amnesty program conditional on withholding tax ratio and income decile.

Figure G.2: The Probability of Participation by Decile (Ordered Logit)

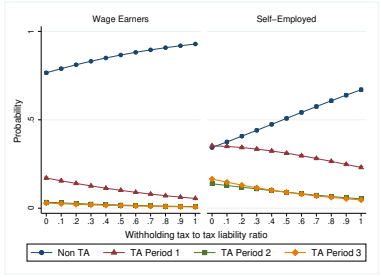
Panel A: Decile 10



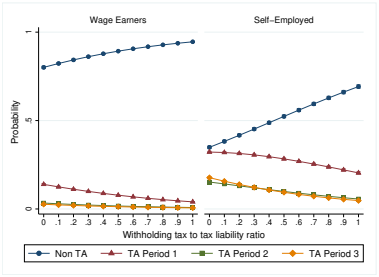
Panel B: Decile 9



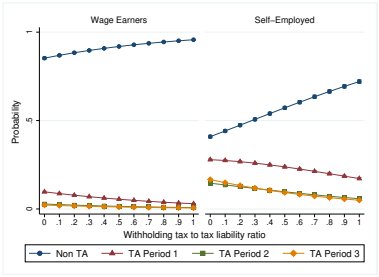
Panel C: Decile 8



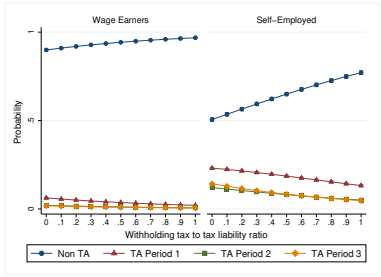
Panel D: Decile 7



Panel E: Decile 6

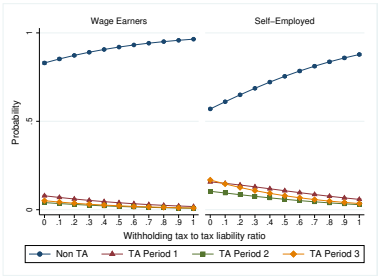


Panel F: Decile 5



Panel G: Decile 4

Panel H: Decile 3



Panel I: Decile 2

Panel J: Decile 1

Notes: The figure shows the probability of participating in each period of the amnesty program conditional on withholding tax ratio, income decile, and types of employment.

Appendix H

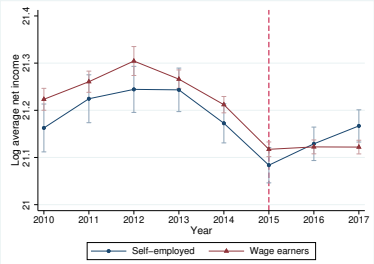
Despriptive Evidence on Amnesty Impacts

This appendix provides the descriptive evidence for the impact of tax amnesty program on the reported net income by income percentile. The quantile estimation strategy allows better comparison of control and treatment group relative to the mean estimation framework by acknowledging the left-skewness of probability distribution of tax evasion.

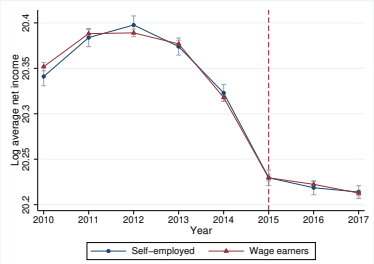
Figure H.1 shows that similar pre-trends are observed in most of the percentiles in the Decile 10. Likewise, the figure shows that the post-trends are also similar except in percentile 100 (Panel A). Furthermore, Figure H.2 to H.9 show that parellel pre- and post-trends are observed in all percetiles. The results suggest that tax amnesty affects compliance limiltedly of those in the percentile 100.

Figure H.1: Reported Income by Percentile in Decile 10: Self-Employed vs Wage Earners

Panel A: Percentile 100

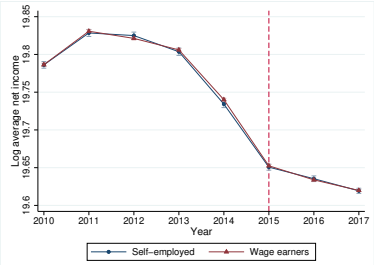


Panel B: Percentile 99



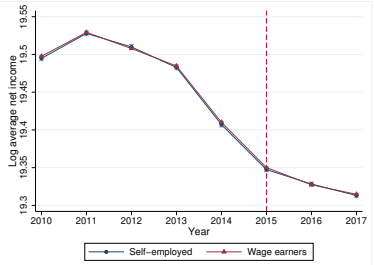
Panel C: Percentile 98

Panel D: Percentile 97



Panel E: Percentile 96

Panel F: Percentile 95

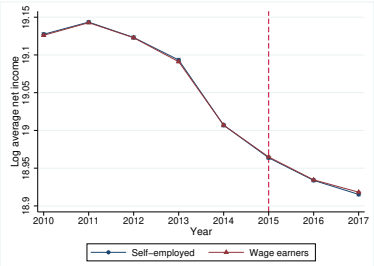


Panel G: Percentile 94

Panel H: Percentile 93

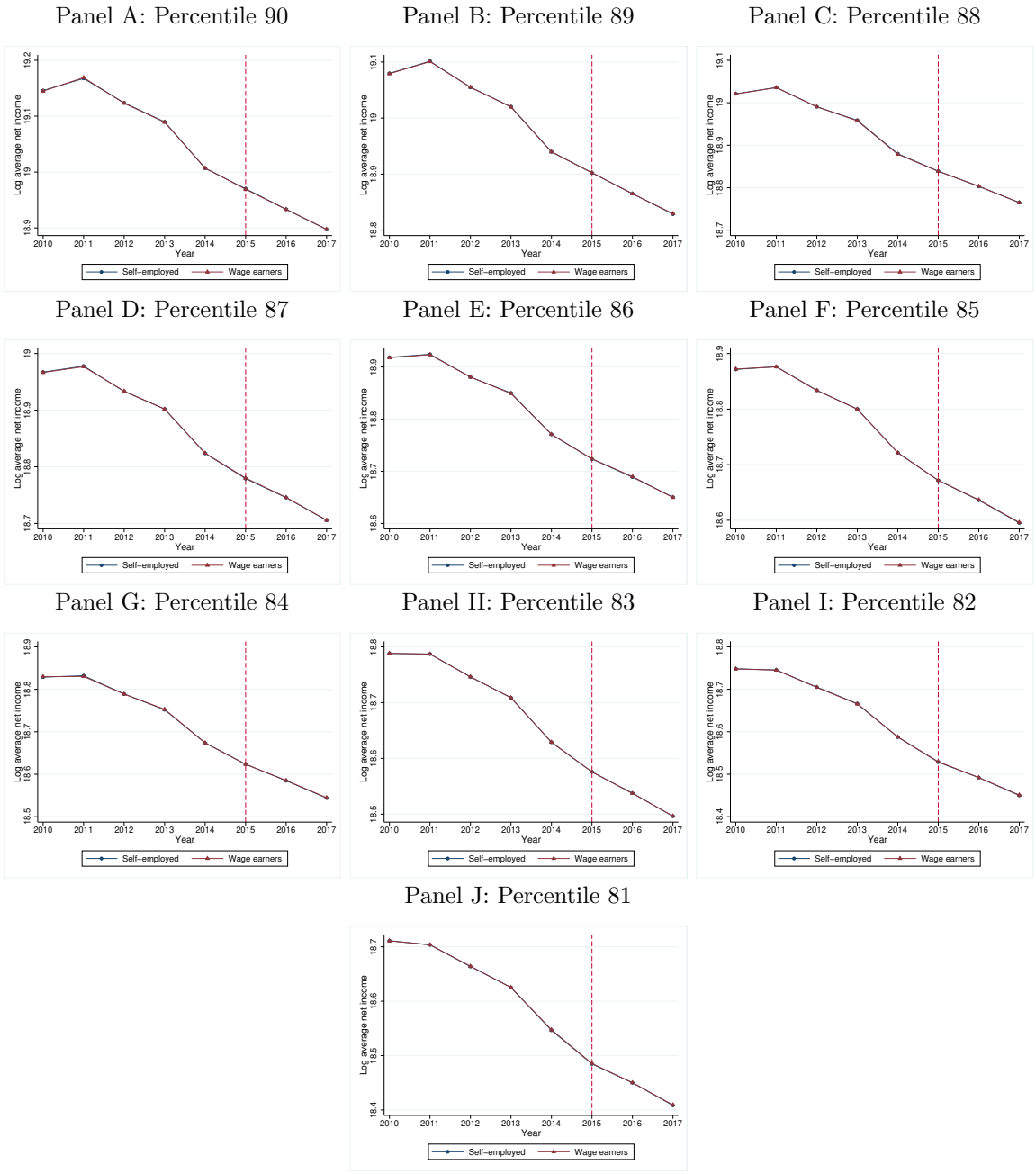
Panel I: Percentile 92

Panel J: Percentile 91



Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. Panel A through I show the evolution of income taxes for Percentile 91 through 100. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

Figure H.2: Reported Income by Percentile in Decile 9: Self-Employed vs Wage Earners



Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. Panel A through I show the evolution of income taxes for Percentile 81 through 90. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

Figure H.3: Reported Income by Percentile in Decile 8: Self-Employed vs Wage Earners

Panel A: Percentile 80

Panel B: Percentile 79

Panel C: Percentile 78

Panel D: Percentile 77

Panel E: Percentile 76

Panel F: Percentile 75

Panel G: Percentile 74

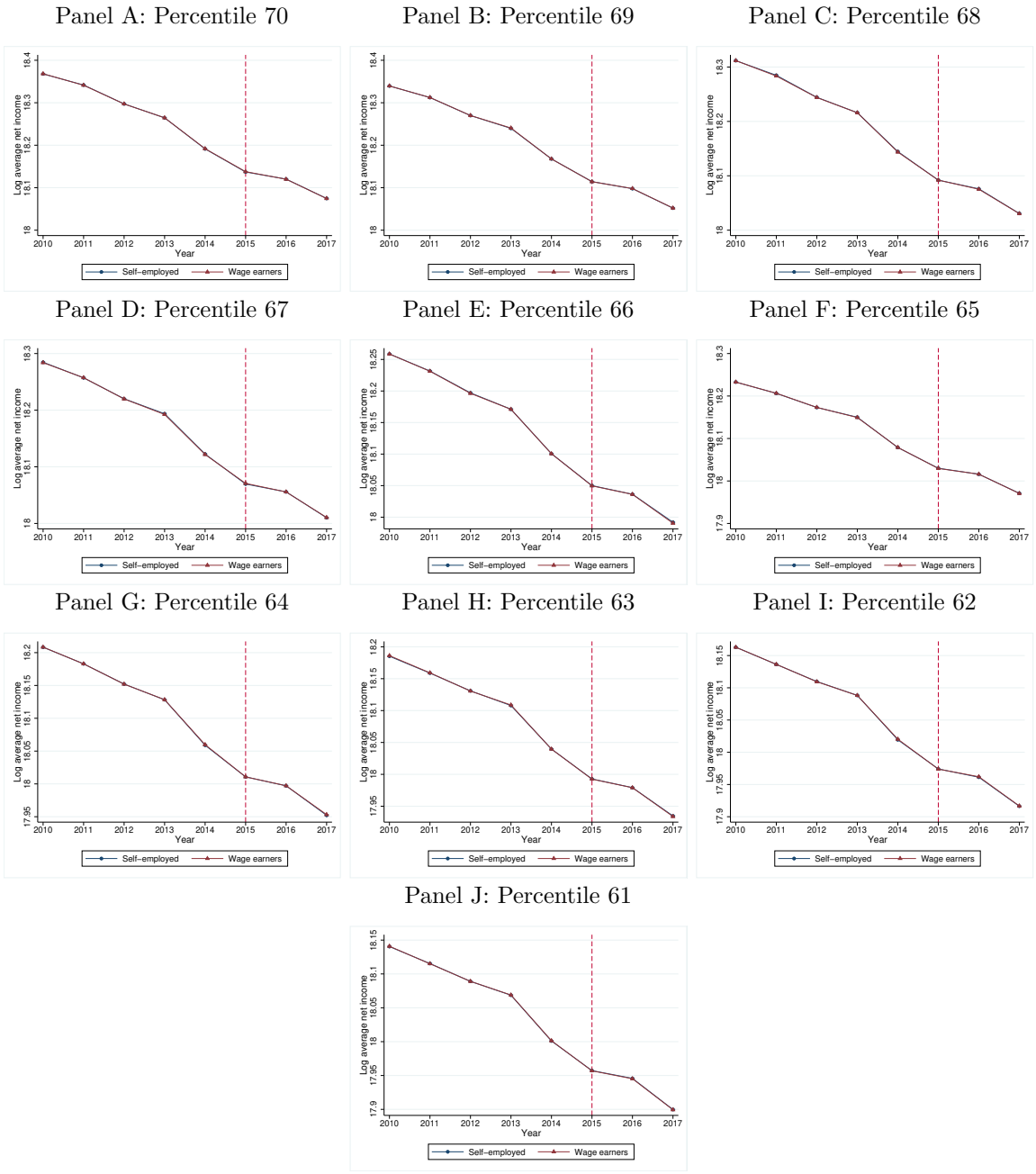
Panel H: Percentile 73

Panel I: Percentile 72

Panel J: Percentile 71

Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. Panel A through I show the evolution of income taxes for Percentile 71 through 80. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

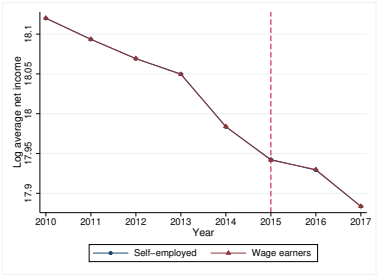
Figure H.4: Reported Income by Percentile in Decile 7: Self-Employed vs Wage Earners



Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. Panel A through I show the evolution of income taxes for Percentile 61 through 70. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

Figure H.5: Reported Income by Percentile in Decile 6: Self-Employed vs Wage Earners

Panel A: Percentile 60



Panel B: Percentile 59

Panel C: Percentile 58

Panel D: Percentile 57

Panel E: Percentile 56

Panel F: Percentile 55

Panel G: Percentile 54

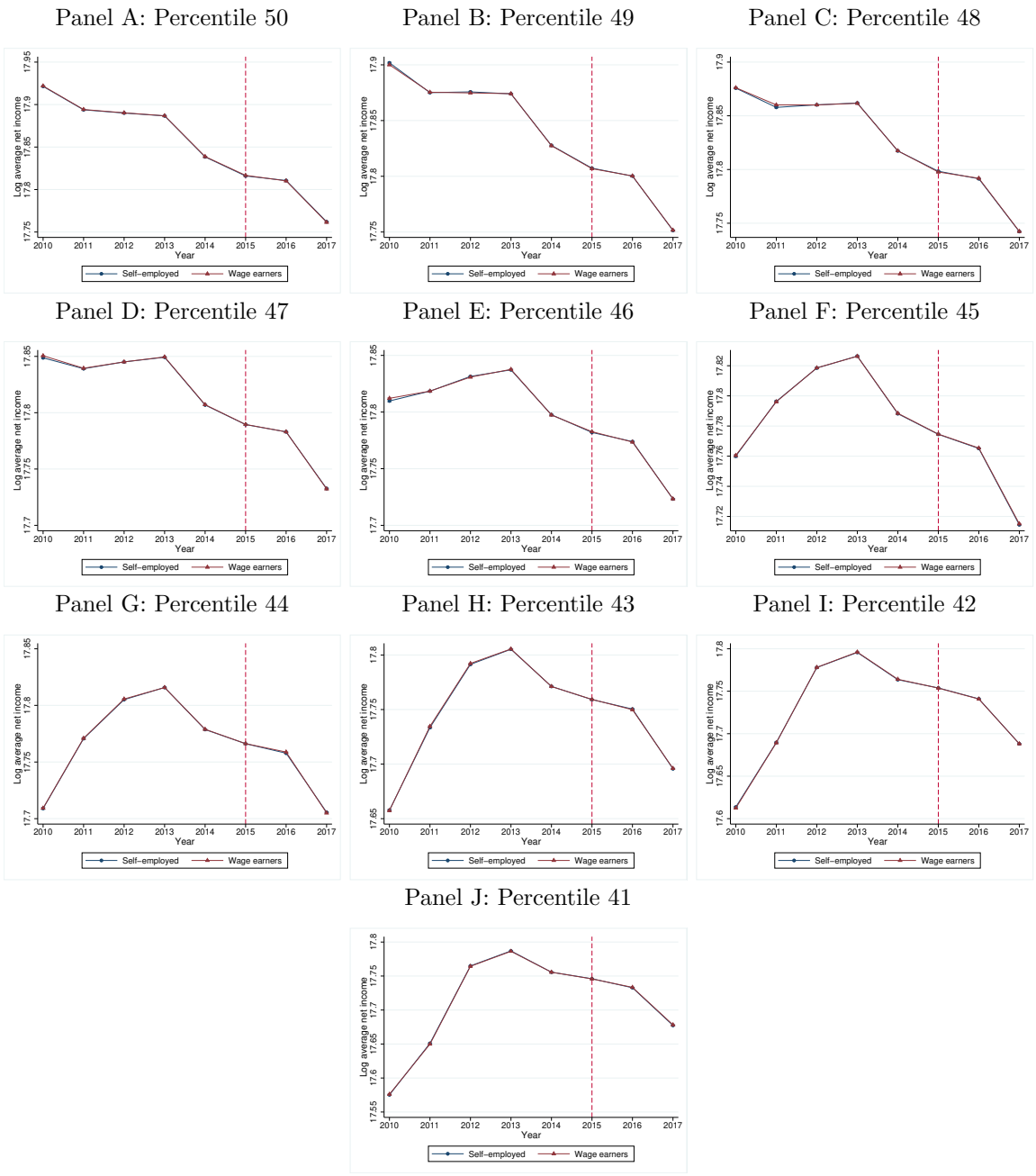
Panel H: Percentile 53

Panel I: Percentile 52

Panel J: Percentile 51

Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. Panel A through I show the evolution of income taxes for Percentile 51 through 60. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

Figure H.6: Reported Income by Percentile in Decile 5: Self-Employed vs Wage Earners

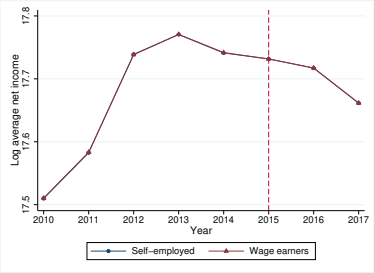


Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. Panel A through I show the evolution of income taxes for Percentile 41 through 50. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

Figure H.7: Reported Income by Percentile in Decile 4: Self-Employed vs Wage Earners

Panel A: Percentile 40

Panel B: Percentile 39



Panel C: Percentile 38

Panel D: Percentile 37

Panel E: Percentile 36

Panel F: Percentile 35

Panel G: Percentile 34

Panel H: Percentile 33

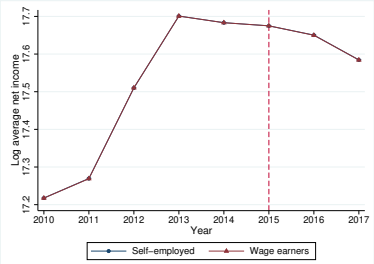
Panel I: Percentile 32

Panel J: Percentile 31

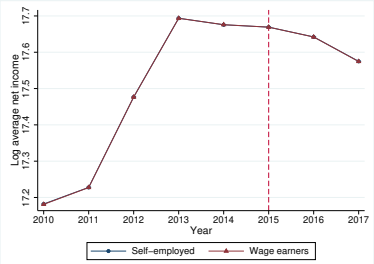
Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. Panel A through I show the evolution of income taxes for Percentile 31 through 40. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

Figure H.8: Reported Income by Percentile in Decile 3: Self-Employed vs Wage Earners

Panel A: Percentile 30

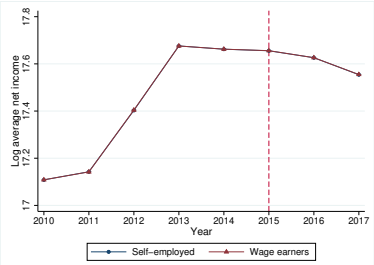


Panel B: Percentile 29

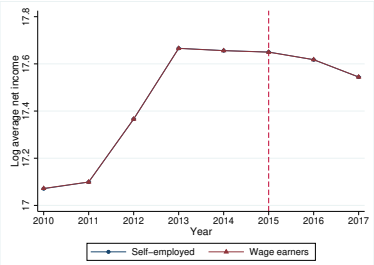


Panel C: Percentile 28

Panel D: Percentile 27

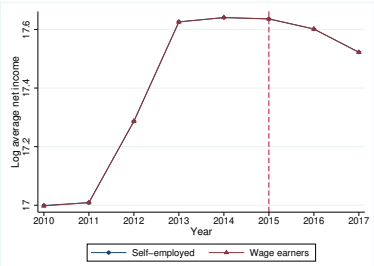


Panel E: Percentile 26

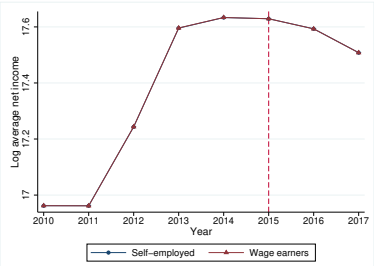


Panel F: Percentile 25

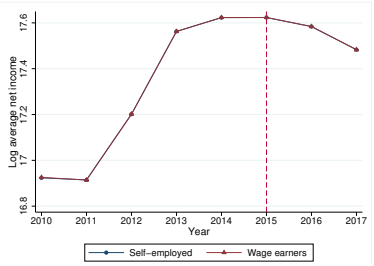
Panel G: Percentile 24



Panel H: Percentile 23



Panel I: Percentile 22

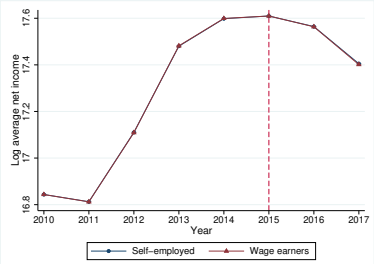


Panel J: Percentile 21

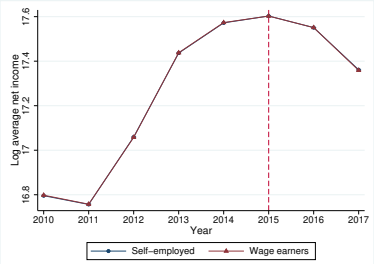
Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. Panel A through I show the evolution of income taxes for Percentile 21 through 30. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

Figure H.9: Reported Income by Percentile in Decile 2: Self-Employed vs Wage Earners

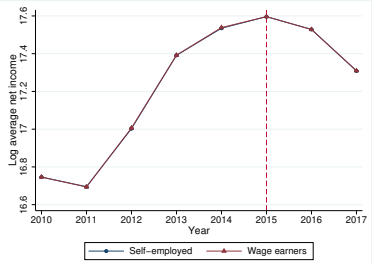
Panel A: Percentile 20



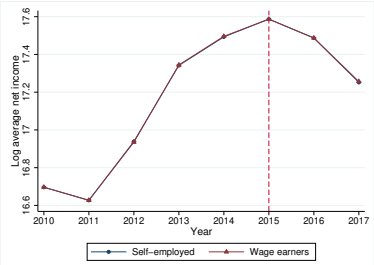
Panel B: Percentile 19



Panel C: Percentile 18

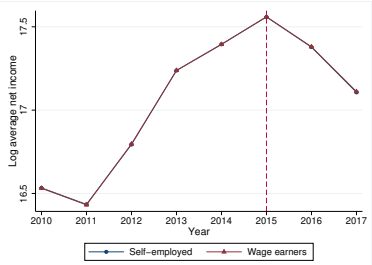


Panel D: Percentile 17



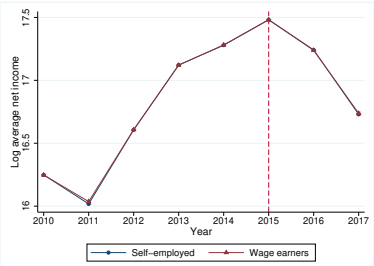
Panel E: Percentile 16

Panel F: Percentile 15

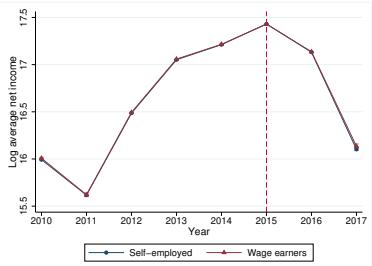


Panel G: Percentile 14

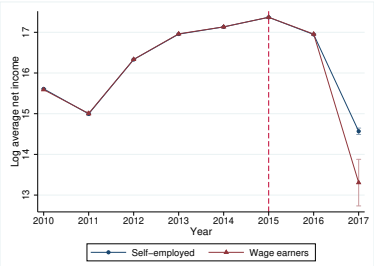
Panel H: Percentile 13



Panel I: Percentile 12



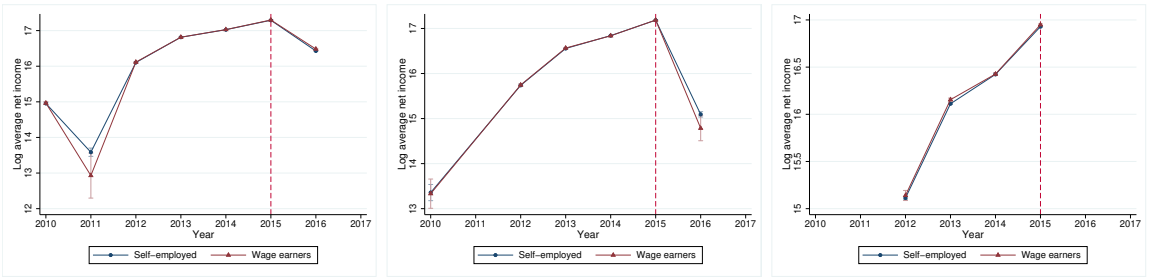
Panel J: Percentile 11



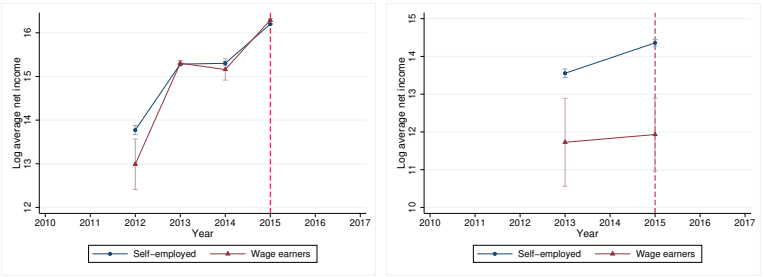
Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. Panel A through I show the evolution of income taxes for Percentile 11 through 20. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

Figure H.10: Reported Income by Percentile in Decile 1: Self-Employed vs Wage Earners

Panel A: Percentile 10 Panel B: Percentile 9 Panel C: Percentile 8



Panel D: Percentile 7 Panel E: Percentile 6



Notes: The figure shows the evolution of mean log real net income for self-employed (solid-diamond line) and wage earners (solid-dotted line) before (2010-2015) and after (2016-2017) the amnesty program. Panel A through I show the evolution of income taxes for Percentile 1 through 10. The vertical solid-dashed lines represent the fiscal year of tax return (2015) when the amnesty program was implemented.

Appendix I

Robustness Checks on the Amnesty Impacts

Table I.1: Tax Amnesty Impacts on Reported Net Income (Unbalanced Panel)

	(1) P-20	(2) P-30	(3) P-40	(4) P-50	(5) P-60	(6) P-70	(7) P-80	(8) P-90	(9) P-100
Before Amnesty									
(2010 to 2014) x	-0.000	0.000	-0.000***	0.000***	-0.001***	0.000*	0.000	0.000	-0.018
Self-employed	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.019)
After Amnesty									
(2016 to 2017) x	0.003***	0.000	-0.001***	0.001***	-0.002***	0.000	0.000	0.000	0.053***
Self-employed	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.014)
R^2	0.998	0.999	0.996	0.995	0.996	0.994	0.989	0.953	0.080
N Obs.	266809	267210	266587	266446	266526	266483	266670	266448	266444

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment, industry classification, and regional tax office fixed effects.

Appendix J

Amnesty Impacts by Income Decile

Table J.1: Compliance Impact of Amnesty in Decile 10

	(1) P-91	(2) P-92	(3) P-93	(4) P-94	(5) p-95	(6) P-96	(7) P-97	(8) P-98	(9) P-99	(10) P-100
Before	-0.001	0.002	-0.004***	-0.001	-0.000	-0.004*	0.002	-0.002	-0.002	-0.019
(2010-14)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.020)
After	-0.000	-0.000	-0.004***	0.002	-0.000	-0.002	0.001	-0.002	0.005	0.064**
(2016-17)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.020)
Constant	19.041***	19.119***	19.207***	19.308***	19.422***	19.553***	19.726***	19.949***	20.296***	21.125***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.005)
R^2	0.947	0.937	0.919	0.897	0.866	0.825	0.730	0.561	0.304	0.019
N Obs.	70352	71811	73519	77934	81044	83641	86191	89285	93915	84450

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment and regional tax office fixed effects.

Table J.2: Compliance Impact of Amnesty in Decile 9

	(1) P-81	(2) P-82	(3) P-83	(4) P-84	(5) p-85	(6) P-86	(7) P-87	(8) P-88	(9) P-89	(10) P-90
Before	0.001	0.001*	-0.000	-0.000	0.000	0.001	0.001	0.000	0.001	-0.001
(2010-14)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
After	0.000	0.000	-0.000	-0.001	-0.000	0.000	0.001	-0.001	-0.000	-0.001
(2016-17)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	18.486***	18.529***	18.576***	18.623***	18.672***	18.724***	18.780***	18.839***	18.903***	18.969***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.989	0.987	0.985	0.983	0.981	0.977	0.973	0.967	0.963	0.955
N Obs.	48739	51069	53168	55454	57692	59751	61129	62969	64506	67268

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment and regional tax office fixed effects.

Table J.3: Compliance Impact of Amnesty in Decile 8

	(1) P-71	(2) P-72	(3) P-73	(4) P-74	(5) p-75	(6) P-76	(7) P-77	(8) P-78	(9) P-79	(10) P-80
Before	-0.001	-0.001	0.001	-0.000	0.001	-0.000	-0.000	0.003***	0.001*	0.000
(2010-14)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
After	0.000	-0.000	0.001**	0.000	0.000	0.000	-0.000	0.001**	0.001*	-0.000
(2016-17)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Constant	18.162***	18.188***	18.214***	18.242***	18.272***	18.302***	18.335***	18.371***	18.406***	18.445***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.994	0.993	0.993	0.993	0.993	0.993	0.992	0.992	0.991	0.990
N Obs.	30411	31455	33093	34595	36592	38451	40357	43174	44939	46666

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment and regional tax office fixed effects.

Table J.4: Compliance Impact of Amnesty in Decile 7

	(1) P-61	(2) P-62	(3) P-63	(4) P-64	(5) p-65	(6) P-66	(7) P-67	(8) P-68	(9) P-69	(10) P-70
Before	-0.001	-0.000	-0.001*	-0.000	-0.000	-0.000	0.002***	0.001	-0.001	0.001*
(2010-14)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
After	0.000	-0.001*	0.000	-0.001	-0.000	0.000	0.001**	0.001	-0.001	0.001**
(2016-17)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	17.957***	17.974***	17.992***	18.011***	18.029***	18.050***	18.071***	18.092***	18.114***	18.138***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994	0.994
N Obs.	20809	21450	22883	23531	24229	25034	26001	27097	27623	28837

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment and regional tax office fixed effects.

Table J.5: Compliance Impact of Amnesty in Decile 6

	(1) P-51	(2) P-52	(3) P-53	(4) P-54	(5) p-55	(6) P-56	(7) P-57	(8) P-58	(9) P-59	(10) P-60
Before	0.000	0.000	0.001***	0.000	-0.000	-0.000	0.000	-0.000	-0.001**	-0.001*
(2010-14)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
After	-0.000	0.000	0.001***	0.001**	0.000	-0.000	0.000	0.000	-0.001*	-0.001**
(2016-17)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	17.826***	17.836***	17.847***	17.860***	17.872***	17.884***	17.897***	17.911***	17.926***	17.942***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.993	0.992	0.992	0.994	0.994	0.994	0.994	0.994	0.994	0.994
N Obs.	13057	13326	14101	14858	16605	16354	17156	18270	18919	20402

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment and regional tax office fixed effects.

Table J.6: Compliance Impact of Amnesty in Decile 5

	(1) P-41	(2) P-42	(3) P-43	(4) P-44	(5) p-45	(6) P-46	(7) P-47	(8) P-48	(9) P-49	(10) P-50
Before	-0.000	0.000	-0.000	-0.000	-0.000	-0.000	-0.001*	-0.001***	0.000	0.000
(2010-14)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
After	-0.001***	-0.000	0.000	-0.000	-0.000	0.001***	0.000	-0.001***	-0.001*	0.001***
(2016-17)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	17.746***	17.754***	17.759***	17.766***	17.775***	17.783***	17.790***	17.798***	17.807***	17.817***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.990	0.979	0.960	0.943	0.909	0.920	0.972	0.983	0.989	0.990
N Obs.	10729	10681	10647	10359	10505	11113	10813	11513	11523	11699

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment and regional tax office fixed effects.

Table J.7: Compliance Impact of Amnesty in Decile 4

	(1) P-31	(2) P-32	(3) P-33	(4) P-34	(5) p-35	(6) P-36	(7) P-37	(8) P-38	(9) P-39	(10) P-40
Before	0.000	-0.001	-0.001*	-0.001**	-0.001**	0.000	-0.000	0.000	-0.001*	-0.000
(2010-14)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
After	0.001***	0.000	0.000	-0.000	-0.001*	0.000	-0.000	0.001**	-0.000	-0.001**
(2016-17)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	17.681***	17.688***	17.694***	17.700***	17.706***	17.712***	17.720***	17.727***	17.732***	17.738***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.998	0.998	0.997	0.997	0.997	0.997	0.997	0.996	0.995	0.993
N Obs.	8270	8663	8808	9537	9174	9480	10258	9429	9526	10201

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment and regional tax office fixed effects.

Table J.8: Compliance Impact of Amnesty in Decile 3

	(1) P-21	(2) P-22	(3) P-23	(4) P-24	(5) p-25	(6) P-26	(7) P-27	(8) P-28	(9) P-29	(10) P-30
Before	0.000	-0.000	-0.000	0.001	0.001***	-0.001*	0.000	0.002***	0.000	0.000
(2010-14)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
After	-0.001*	0.001	0.000	0.000	0.000	-0.001***	0.000	0.001***	0.000	0.000
(2016-17)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	17.617***	17.624***	17.629***	17.636***	17.643***	17.650***	17.656***	17.662***	17.669***	17.675***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.998	0.998	0.998
N Obs.	8557	9029	8478	8129	8206	7100	7356	7861	7342	7780

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment and regional tax office fixed effects.

Table J.9: Compliance Impact of Amnesty in Decile 2

	(1) P-11	(2) P-12	(3) P-13	(4) P-14	(5) p-15	(6) P-16	(7) P-17	(8) P-18	(9) P-19	(10) P-20
Before	0.002	-0.008***	-0.003**	0.003**	0.002*	0.000	-0.002***	-0.001**	-0.001*	-0.000
(2010-14)	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
After	0.375***	-0.023**	-0.005	0.005**	-0.002*	-0.002**	-0.003***	-0.000	0.002*	0.003***
(2016-17)	(0.091)	(0.009)	(0.004)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	17.370***	17.429***	17.481***	17.527***	17.560***	17.576***	17.586***	17.596***	17.603***	17.610***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.779	0.953	0.985	0.994	0.997	0.997	0.998	0.998	0.998	0.998
N Obs.	12238	13942	13079	11762	11146	10516	10582	10034	9337	9394

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment and regional tax office fixed effects.

Table J.10: Compliance Impact of Amnesty in Decile 1

	(1) P-6	(2) P-7	(3) P-8	(4) P-9	(5) P-10
Before (2010-2014)	-0.601	0.237**	0.001	0.001	0.025*
	(0.769)	(0.075)	(0.008)	(0.012)	(0.012)
After (2016-2017)				0.310*	-0.048***
				(0.145)	(0.012)
Constant	11.931***	16.293***	16.949***	17.187***	17.298***
	(0.491)	(0.016)	(0.004)	(0.001)	(0.001)
R^2	0.197	0.514	0.894	0.744	0.906
N Obs.	722	7119	9137	10743	12215

Notes: Standard errors are clustered at the regional tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of employment and regional tax office fixed effects.

Appendix K

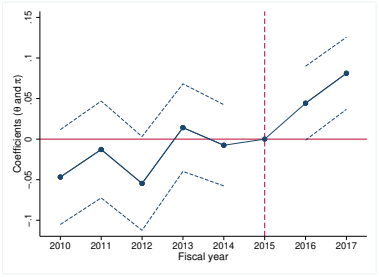
Amnesty Impacts by Income Percentile

This appendix provides the event study graphs that plots the coefficients from the estimating Equation (2.2), representing the impact of tax amnesty program on the reported net income by income percentile. The quantile generalized difference-in-differences framework requires the estimating equation to be applied independently to each percentile to reflect the shape of probability distribution of tax evasion.

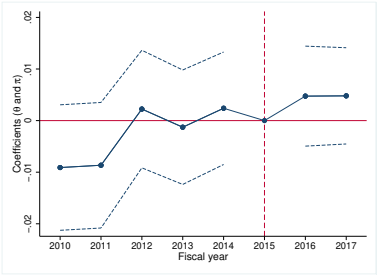
Figure K.1 shows that coefficients θ_{2010} to θ_{2014} are around zero in most of the percentiles in the Decile 10. Similarly, the figure shows that coefficients π_{2016} and π_{2017} are indifference from zero in most of the percentiles in the Decile 10 except in percentile 100. Moreover, Figures K.2 to K.9 show that coefficients θ and π are neither statistically nor economically significance in the rest of income percentiles, suggesting that the amnesty program provides no compliance effect except to taxpayers in the top 1 percent of income earners.

Figure K.1: The Impact of Amnesty on Reported Income in Percentile 91-100

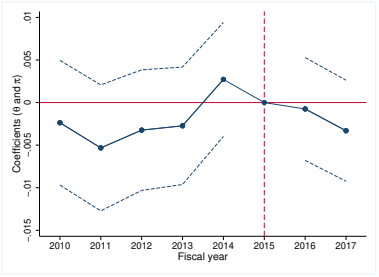
Panel A: Percentile 100



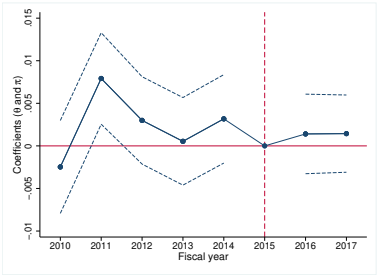
Panel B: Percentile 99



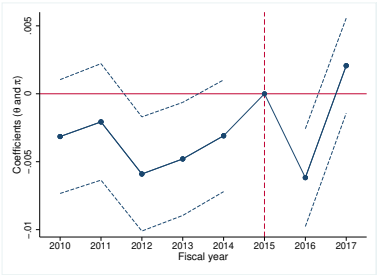
Panel C: Percentile 98



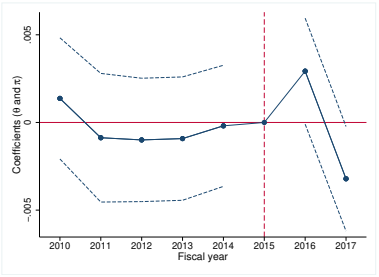
Panel D: Percentile 97



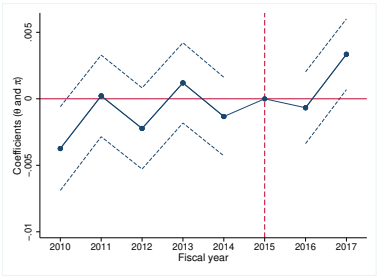
Panel E: Percentile 96



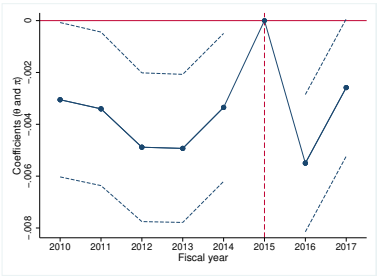
Panel F: Percentile 95



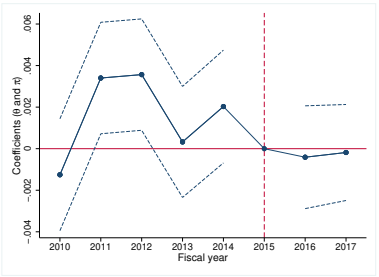
Panel G: Percentile 94



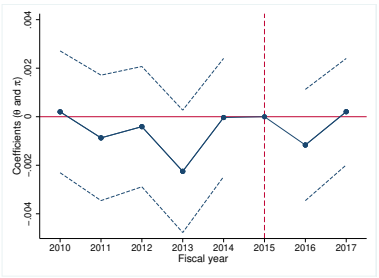
Panel H: Percentile 93



Panel I: Percentile 92

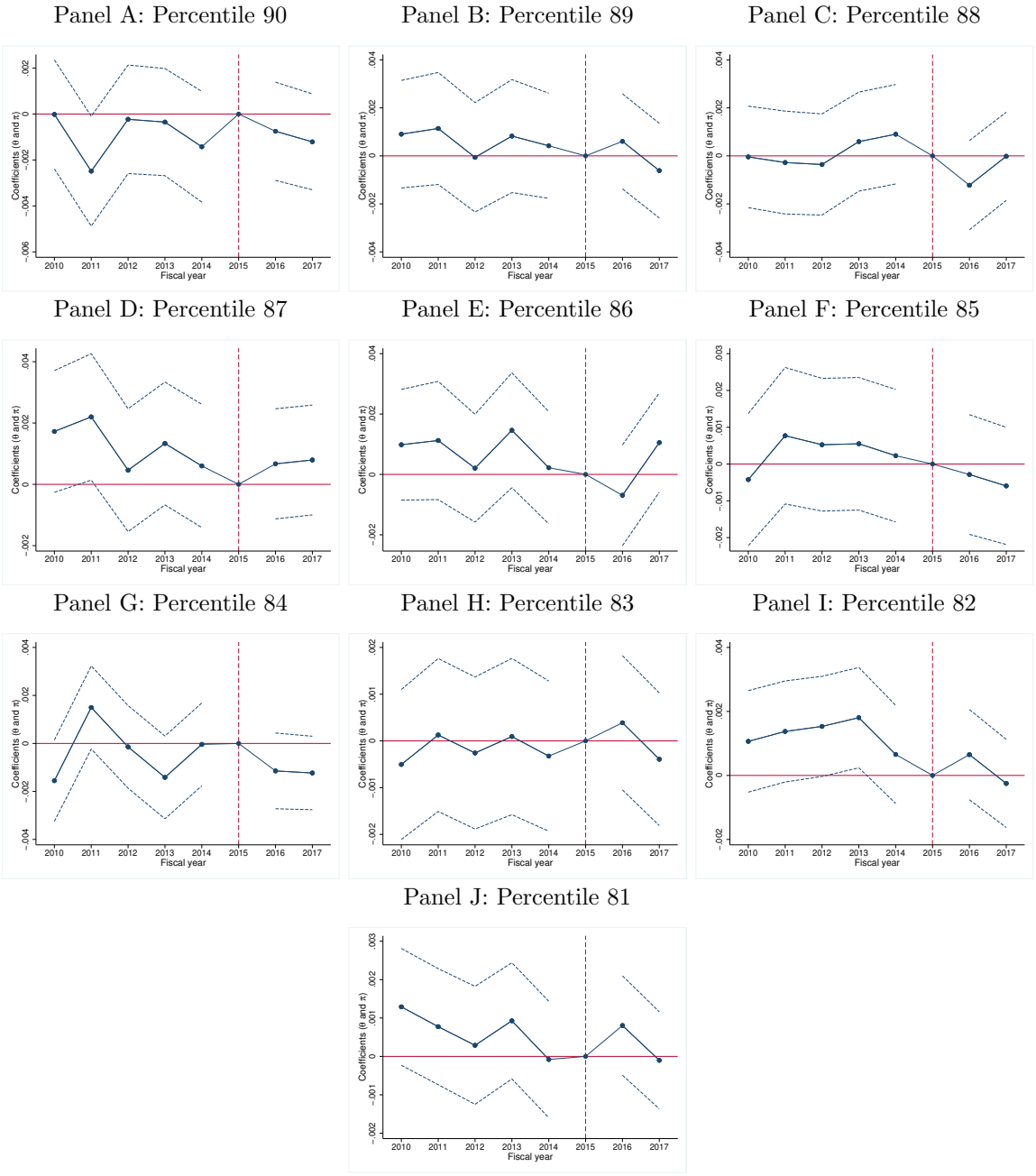


Panel J: Percentile 91



Notes: The figure displays the coefficients θ and π from Equation (2.2) that represent the differences in reported net income between self-employed and and wage earners (the solid-dotted line). The x-axis represents the fiscal years that correspond to annual period of taxpayers' bookkeping and financial statements. The vertical solid-dashed line indicates one fiscal year before (2015) the amnesty implementation where the coefficient is normalized to zero. The solid-dashed lines plot the 95 percent condifence interval.

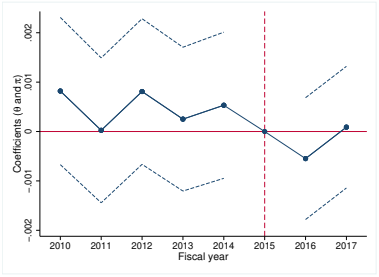
Figure K.2: The Impact of Amnesty on Reported Income in Percentile 81-90



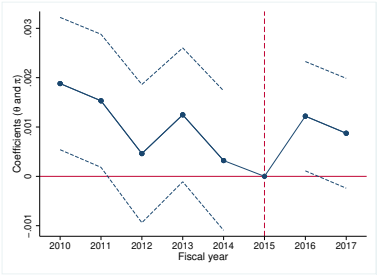
Notes: The figure displays the coefficients θ and π from Equation (2.2) that represent the differences in reported net income between self-employed and and wage earners (the solid-dotted line). The x-axis represents the fiscal years that correspond to annual period of taxpayers' bookkeping and financial statements. The vertical solid-dashed line indicates one fiscal year before (2015) the amnesty implementation where the coefficient is normalized to zero. The solid-dashed lines plot the 95 percent condifence interval.

Figure K.3: The Impact of Amnesty on Reported Income in Percentile 71-80

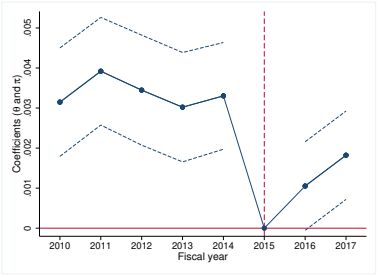
Panel A: Percentile 80



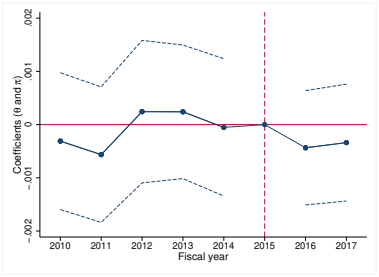
Panel B: Percentile 79



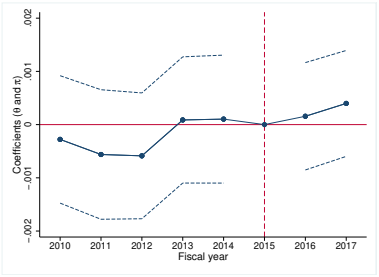
Panel C: Percentile 78



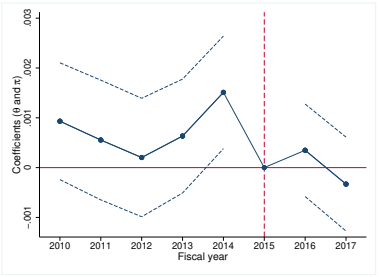
Panel D: Percentile 77



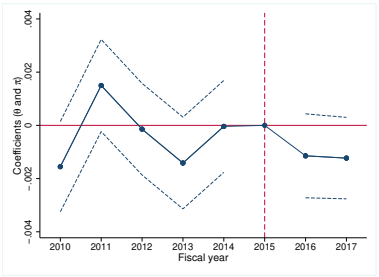
Panel E: Percentile 76



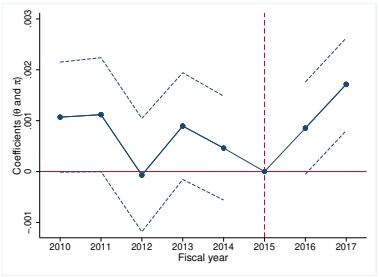
Panel F: Percentile 75



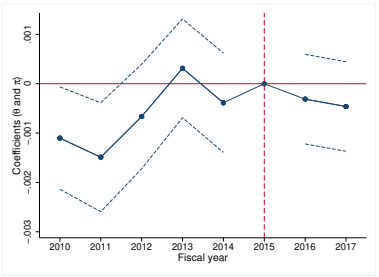
Panel G: Percentile 74



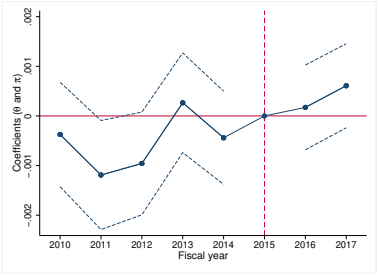
Panel H: Percentile 73



Panel I: Percentile 72



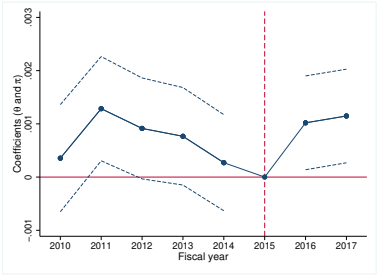
Panel J: Percentile 71



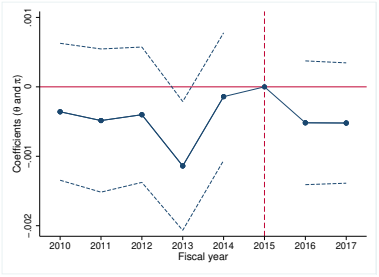
Notes: The figure displays the coefficients θ and π from Equation (2.2) that represent the differences in reported net income between self-employed and and wage earners (the solid-dotted line). The x-axis represents the fiscal years that correspond to annual period of taxpayers' bookkeping and financial statements. The vertical solid-dashed line indicates one fiscal year before (2015) the amnesty implementation where the coefficient is normalized to zero. The solid-dashed lines plot the 95 percent condifence interval.

Figure K.4: The Impact of Amnesty on Reported Income in Percentile 61-70

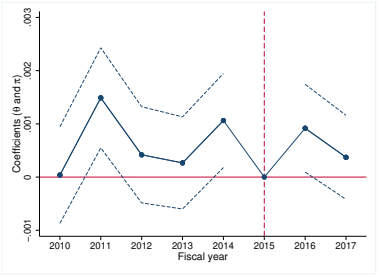
Panel A: Percentile 70



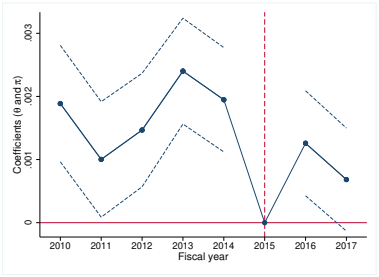
Panel B: Percentile 69



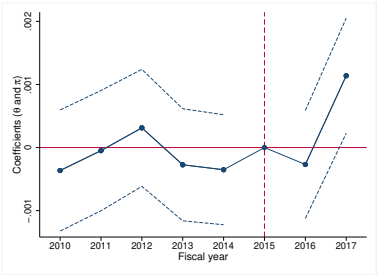
Panel C: Percentile 68



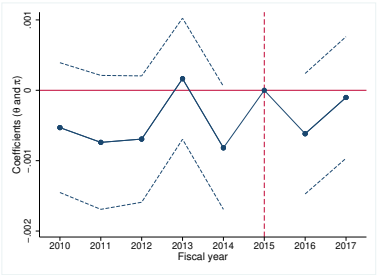
Panel D: Percentile 67



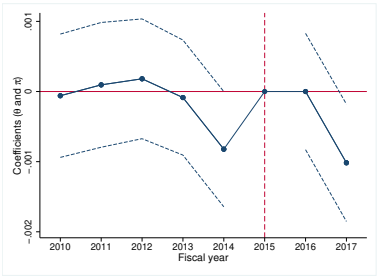
Panel E: Percentile 66



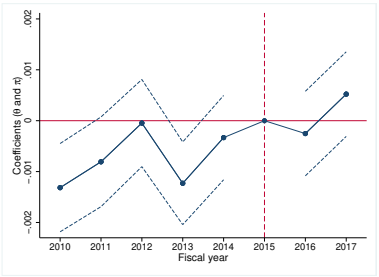
Panel F: Percentile 65



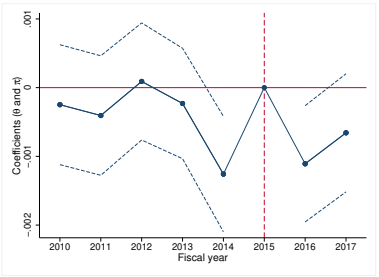
Panel G: Percentile 64



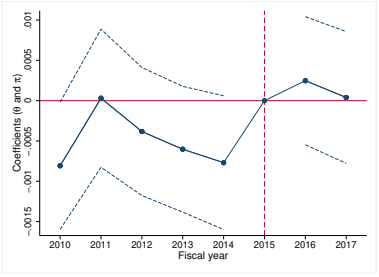
Panel H: Percentile 63



Panel I: Percentile 62



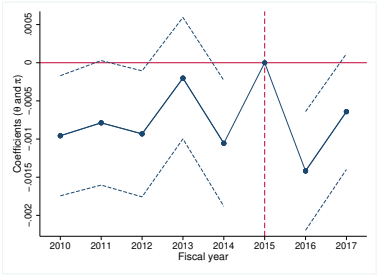
Panel J: Percentile 61



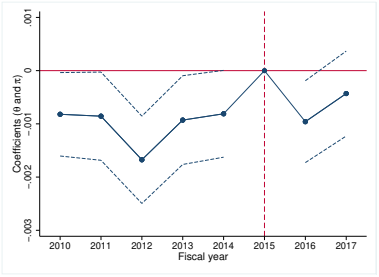
Notes: The figure displays the coefficients θ and π from Equation (2.2) that represent the differences in reported net income between self-employed and and wage earners (the solid-dotted line). The x-axis represents the fiscal years that correspond to annual period of taxpayers' bookkeping and financial statements. The vertical solid-dashed line indicates one fiscal year before (2015) the amnesty implementation where the coefficient is normalized to zero. The solid-dashed lines plot the 95 percent condifence interval.

Figure K.5: The Impact of Amnesty on Reported Income in Percentile 51-60

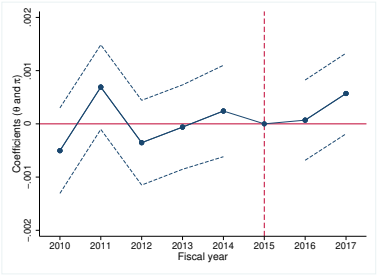
Panel A: Percentile 60



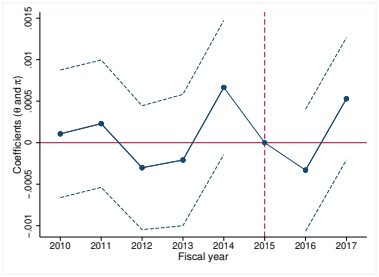
Panel B: Percentile 59



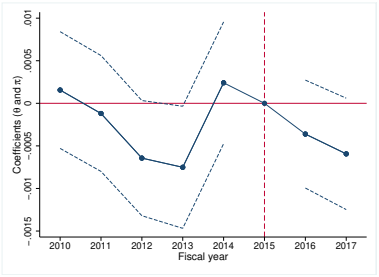
Panel C: Percentile 58



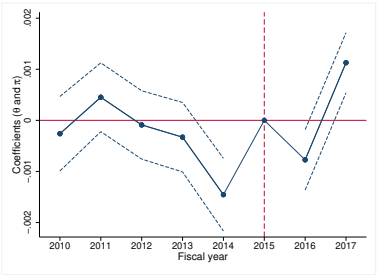
Panel D: Percentile 57



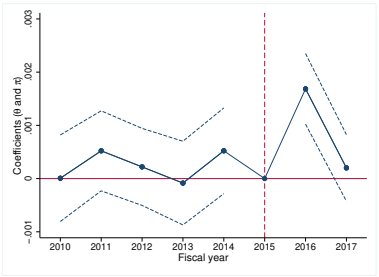
Panel E: Percentile 56



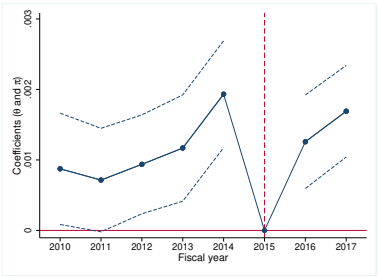
Panel F: Percentile 55



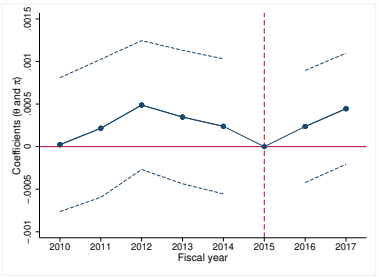
Panel G: Percentile 54



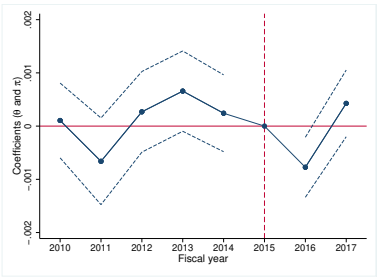
Panel H: Percentile 53



Panel I: Percentile 52



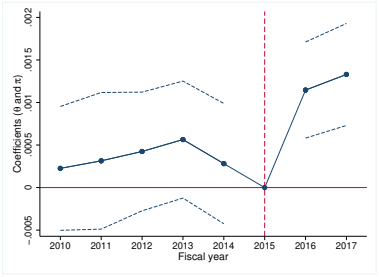
Panel J: Percentile 51



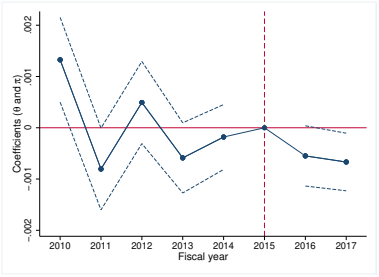
Notes: The figure displays the coefficients θ and π from Equation (2.2) that represent the differences in reported net income between self-employed and and wage earners (the solid-dotted line). The x-axis represents the fiscal years that correspond to annual period of taxpayers' bookkeping and financial statements. The vertical solid-dashed line indicates one fiscal year before (2015) the amnesty implementation where the coefficient is normalized to zero. The solid-dashed lines plot the 95 percent condifence interval.

Figure K.6: The Impact of Amnesty on Reported Income in Percentile 41-50

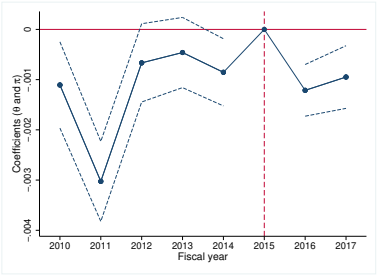
Panel A: Percentile 50



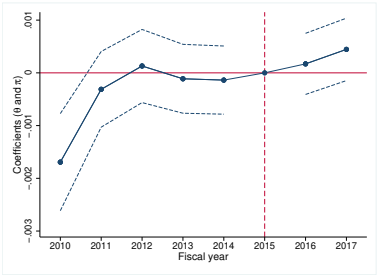
Panel B: Percentile 49



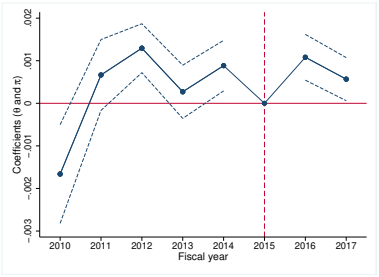
Panel C: Percentile 48



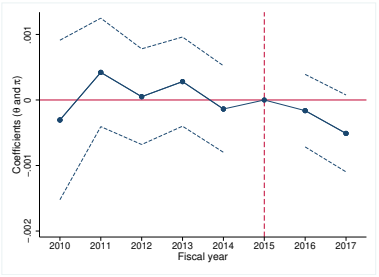
Panel D: Percentile 47



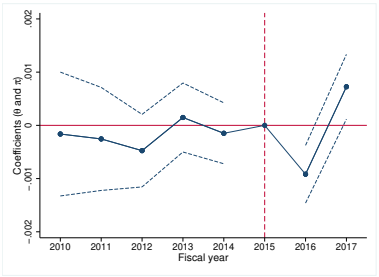
Panel E: Percentile 46



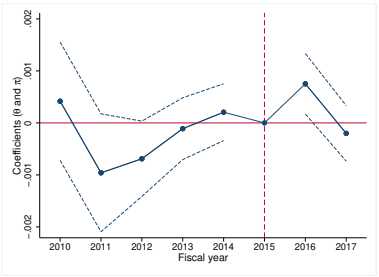
Panel F: Percentile 45



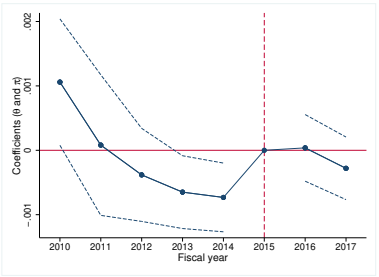
Panel G: Percentile 44



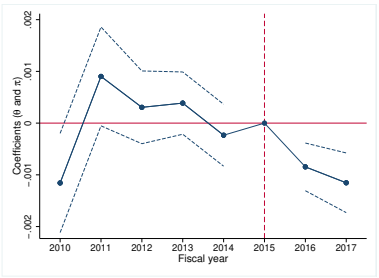
Panel H: Percentile 43



Panel I: Percentile 42



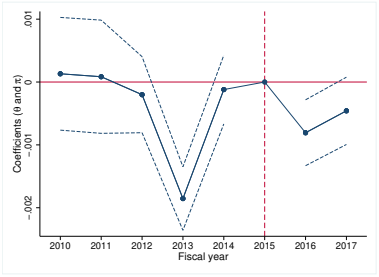
Panel J: Percentile 41



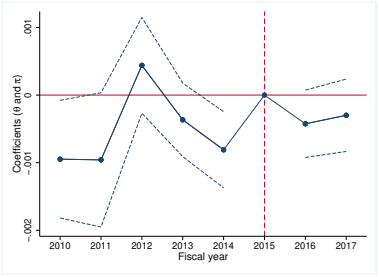
Notes: The figure displays the coefficients θ and π from Equation (2.2) that represent the differences in reported net income between self-employed and and wage earners (the solid-dotted line). The x-axis represents the fiscal years that correspond to annual period of taxpayers' bookkeping and financial statements. The vertical solid-dashed line indicates one fiscal year before (2015) the amnesty implementation where the coefficient is normalized to zero. The solid-dashed lines plot the 95 percent condifence interval.

Figure K.7: The Impact of Amnesty on Reported Income in Percentile 31-40

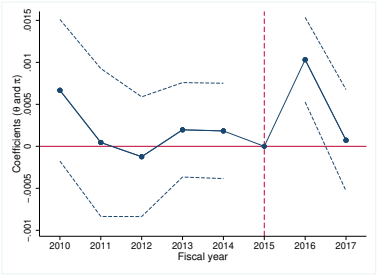
Panel A: Percentile 40



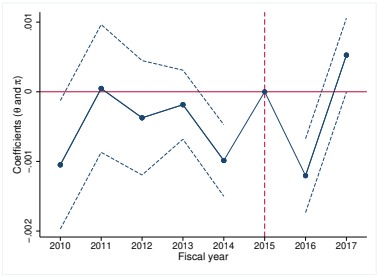
Panel B: Percentile 39



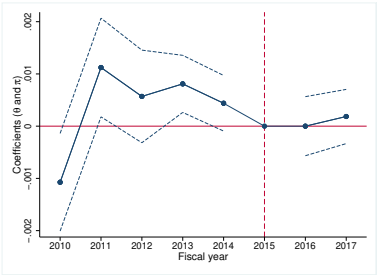
Panel C: Percentile 38



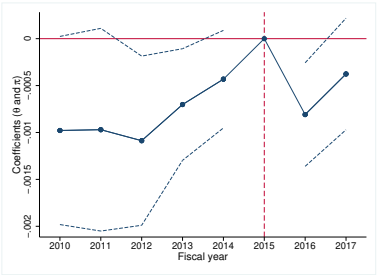
Panel D: Percentile 37



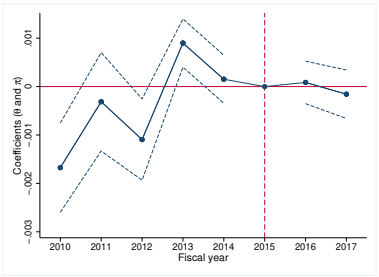
Panel E: Percentile 36



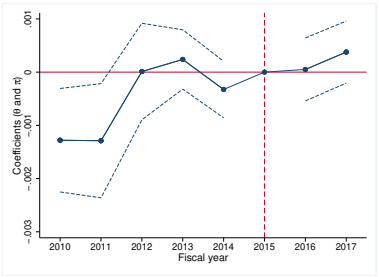
Panel F: Percentile 35



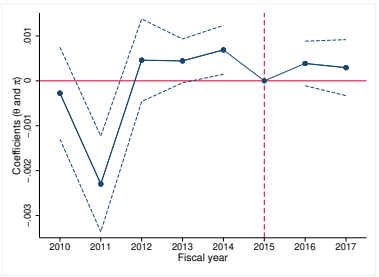
Panel G: Percentile 34



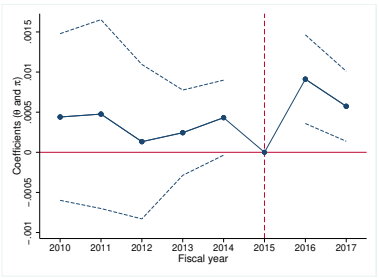
Panel H: Percentile 33



Panel I: Percentile 32



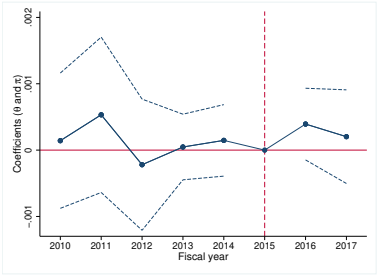
Panel J: Percentile 31



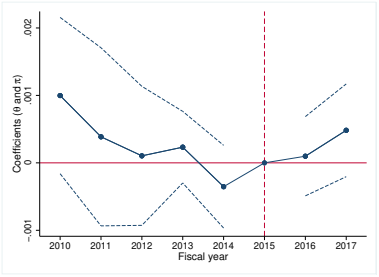
Notes: The figure displays the coefficients θ and π from Equation (2.2) that represent the differences in reported net income between self-employed and and wage earners (the solid-dotted line). The x-axis represents the fiscal years that correspond to annual period of taxpayers' bookkeping and financial statements. The vertical solid-dashed line indicates one fiscal year before (2015) the amnesty implementation where the coefficient is normalized to zero. The solid-dashed lines plot the 95 percent condifence interval.

Figure K.8: The Impact of Amnesty on Reported Income in Percentile 21-30

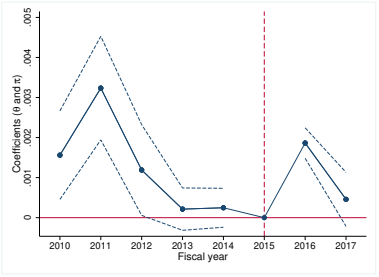
Panel A: Percentile 30



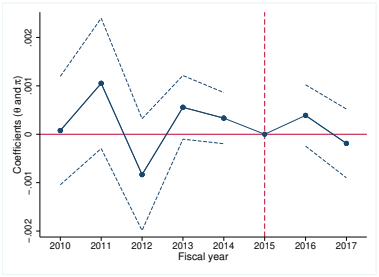
Panel B: Percentile 29



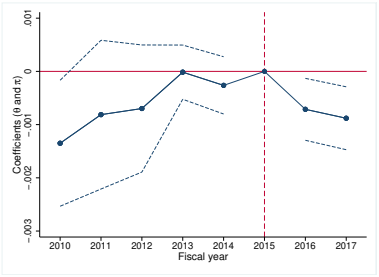
Panel C: Percentile 28



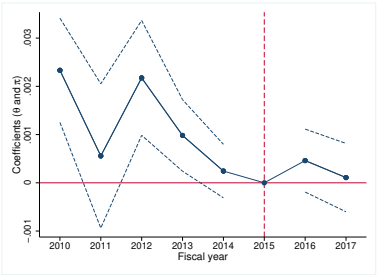
Panel D: Percentile 27



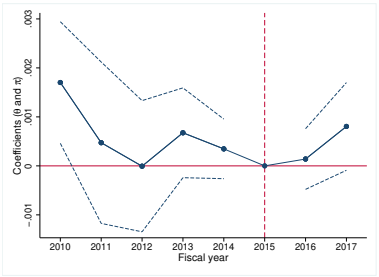
Panel E: Percentile 26



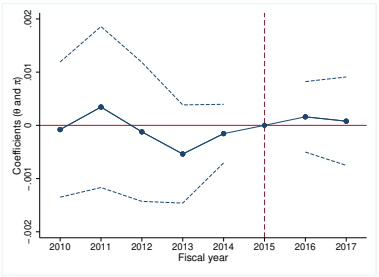
Panel F: Percentile 25



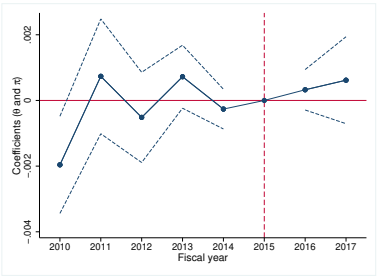
Panel G: Percentile 24



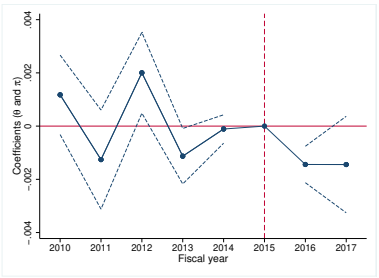
Panel H: Percentile 23



Panel I: Percentile 22



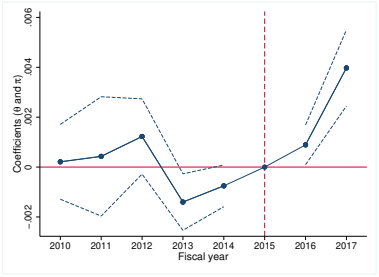
Panel J: Percentile 21



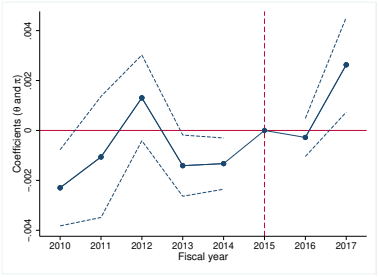
Notes: The figure displays the coefficients θ and π from Equation (2.2) that represent the differences in reported net income between self-employed and and wage earners (the solid-dotted line). The x-axis represents the fiscal years that correspond to annual period of taxpayers' bookkeping and financial statements. The vertical solid-dashed line indicates one fiscal year before (2015) the amnesty implementation where the coefficient is normalized to zero. The solid-dashed lines plot the 95 percent condifence interval.

Figure K.9: The Impact of Amnesty on Reported Income in Percentile 11-20

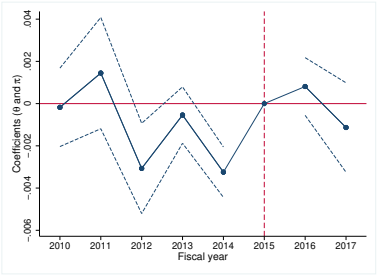
Panel A: Percentile 20



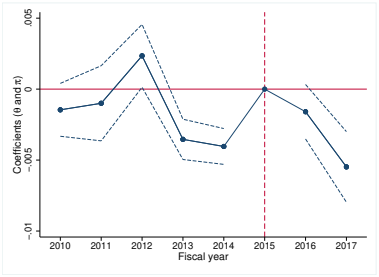
Panel B: Percentile 19



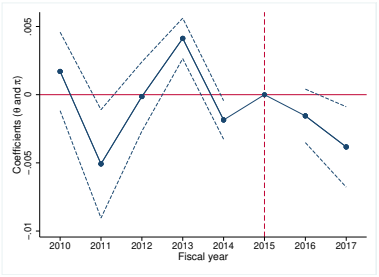
Panel C: Percentile 18



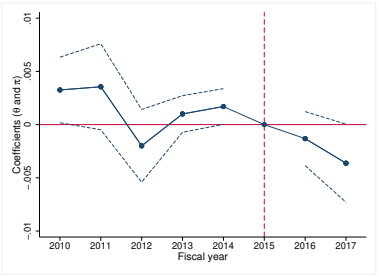
Panel D: Percentile 17



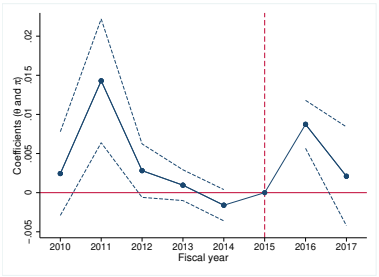
Panel E: Percentile 16



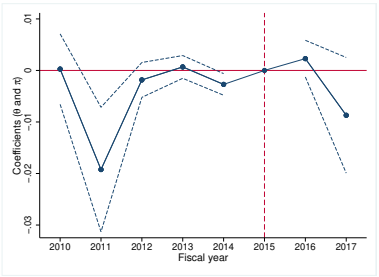
Panel F: Percentile 15



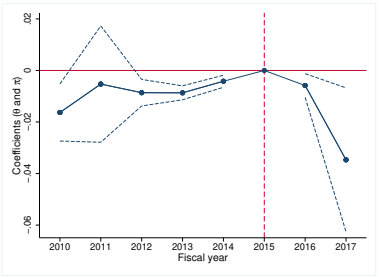
Panel G: Percentile 14



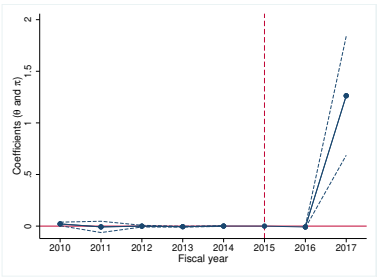
Panel H: Percentile 13



Panel I: Percentile 12



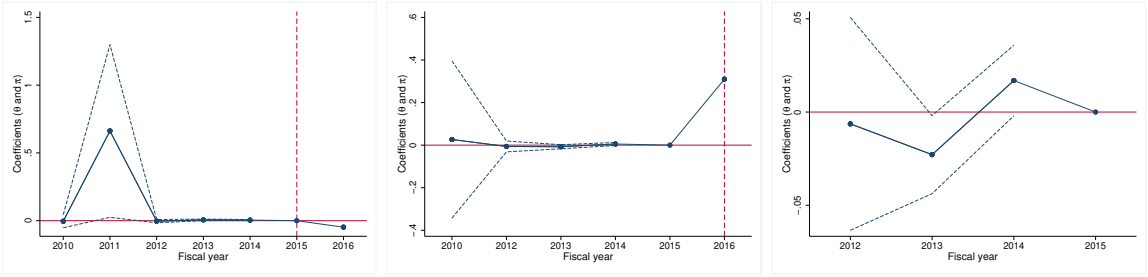
Panel J: Percentile 11



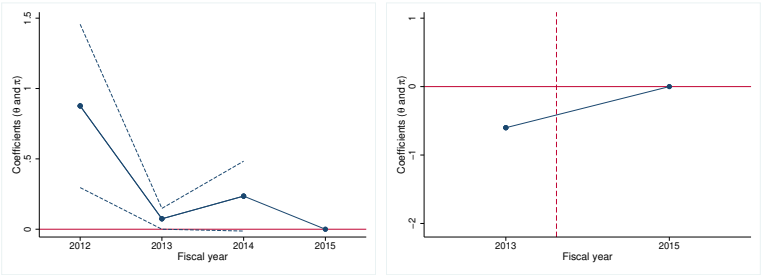
Notes: The figure displays the coefficients θ and π from Equation (2.2) that represent the differences in reported net income between self-employed and and wage earners (the solid-dotted line). The x-axis represents the fiscal years that correspond to annual period of taxpayers' bookkeping and financial statements. The vertical solid-dashed line indicates one fiscal year before (2015) the amnesty implementation where the coefficient is normalized to zero. The solid-dashed lines plot the 95 percent condifence interval.

Figure K.10: The Impact of Amnesty on Reported Income in Percentile 1-10

Panel A: Percentile 10 Panel B: Percentile 9 Panel C: Percentile 8



Panel D: Percentile 7 Panel E: Percentile 6



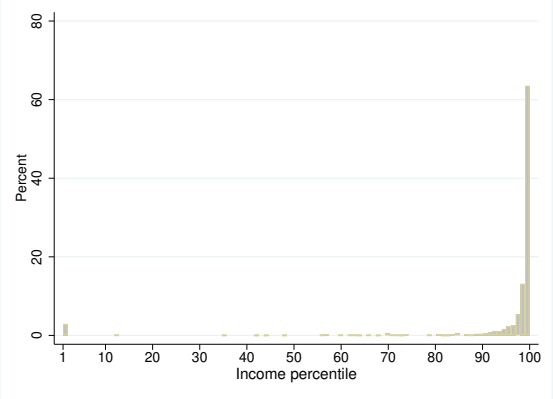
Notes: The figure displays the coefficients θ and π from Equation (2.2) that represent the differences in reported net income between self-employed and and wage earners (the solid-dotted line). The x-axis represents the fiscal years that correspond to annual period of taxpayers' bookkeping and financial statements. The vertical solid-dashed line indicates one fiscal year before (2015) the amnesty implementation where the coefficient is normalized to zero. The solid-dashed lines plot the 95 percent condifence interval.

Appendix L

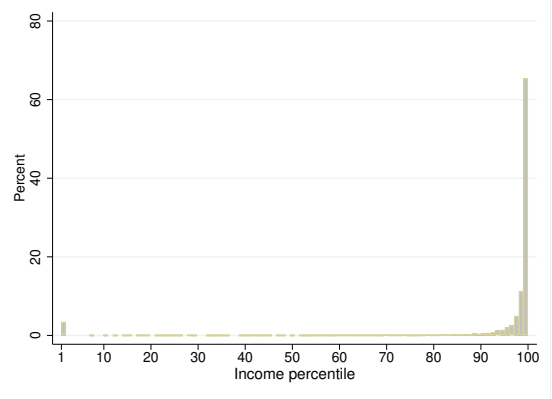
HWIs Income and Assets

Figure L.1: Income Distribution of HWIs Administered by HWI Office

Panel A: 2007-2008



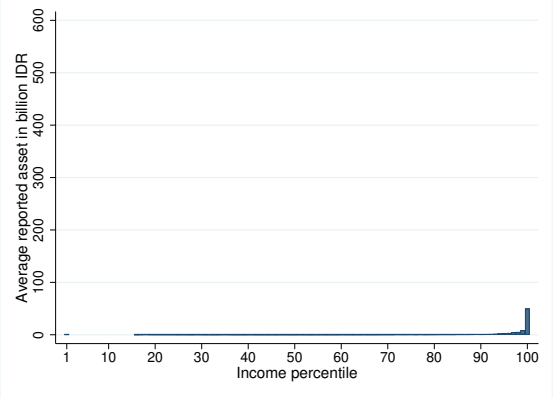
Panel B: 2009-2015



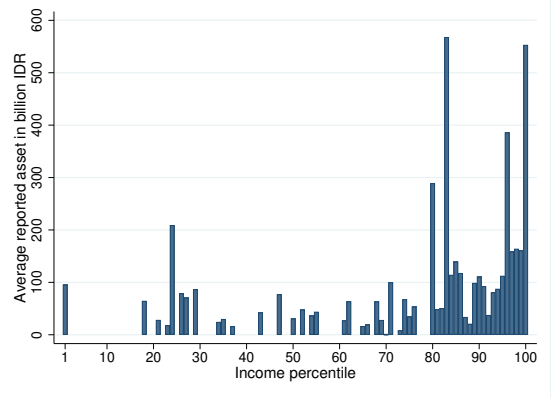
Notes: Panel A and B show the percentage distribution of reported net income of wealthy individuals administered by the HWI office before (2007-2008) as well as after (2009-2015) the operation of the unit, respectively.

Figure L.2: Average Reported Asset

Panel A: All Offices



Panel B: HWI Office



Notes: Panel A and B show the average reported asset by reported net income percentile during the 2014-2015 period for all ordinary tax offices as well as the HWI office, respectively.

Table L.1: Share of HWIs Assets (Percent)

	Top 5 Percent (P95.1-100)			Top 1 Percent (P99.1-100)		
Types of Asset	HWI	Jakarta	Other Cities	HWI	Jakarta	Other Cities
Stock	41.67	27.01	19.81	41.59	30.79	25.48
Deposit	10.44	9.49	9.46	10.63	12.71	13.02
Land and/or building for shelter	9.84	20.82	29.02	10.22	19.03	24.25
Stock held for sale	4.54	2.76	2.18	4.48	2.66	2.62

Notes: The table shows the average share of major assets owned by HWIs as a percentage of total assets over the 2014-2015 period.

Appendix M

Further Evidence on The Compliance Impacts of HWI Office

M.1 Robustness Checks

Table M.1: HWI Office Impacts on Reported Net Income (Assets > 150 billion IDR)

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	Top 5 Percent	Top 1 Percent	Top 5 Percent	Top 1 Percent
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.029	0.014	0.024	0.032
	(0.045)	(0.053)	(0.039)	(0.075)
After Reform				
(2009 to 2014) x HWI Unit	-0.452***	-0.392***	-0.412***	-0.339***
	(0.041)	(0.072)	(0.044)	(0.093)
R^2	0.859	0.811	0.870	0.810
N Obs.	4,743	3,027	5,724	3,459

Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

Table M.2: HWI Office Impacts on Reported Net Income (Assets > 200 billion IDR)

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	Top 5 Percent	Top 1 Percent	Top 5 Percent	Top 1 Percent
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.031	0.040	0.042	0.046
	(0.051)	(0.071)	(0.047)	(0.078)
After Reform				
(2009 to 2014) x HWI Unit	-0.485***	-0.396***	-0.398***	-0.320***
	(0.051)	(0.088)	(0.044)	(0.078)
R^2	0.860	0.815	0.870	0.819
N Obs.	3,705	2,390	4,613	2,923

Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

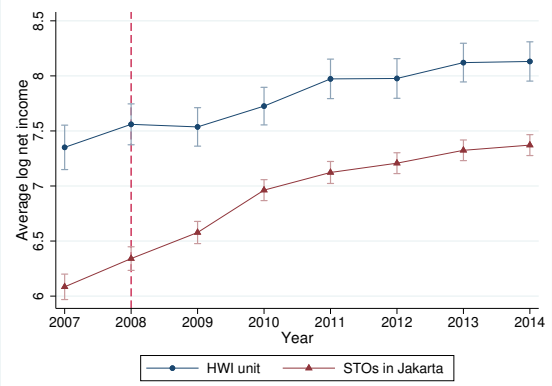
Table M.3: HWI Office Impacts on Reported Net Income (Assets > 500 billion IDR)

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	Top 5 Percent	Top 1 Percent	Top 5 Percent	Top 1 Percent
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	-0.002	0.055	-0.019	-0.097
	(0.096)	(0.132)	(0.059)	(0.080)
After Reform				
(2009 to 2014) x HWI Unit	-0.583***	-0.566***	-0.347***	-0.309***
	(0.051)	(0.088)	(0.044)	(0.071)
R^2	0.853	0.793	0.862	0.802
N Obs.	1,728	1,192	2,176	1,555

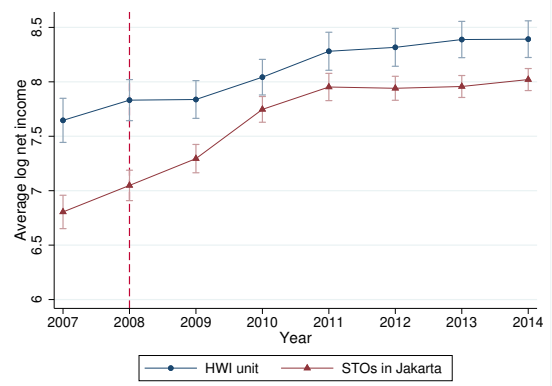
Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

Figure M.1: The Evolution of Reported Net Income (Balanced Panel)

Panel A: HWI vs Jakarta (Top 5% Earners)

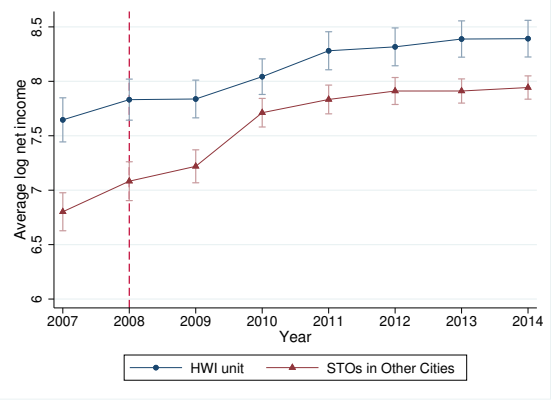


Panel B: HWI vs Jakarta (Top 1% Earners)



Panel C: HWI vs Other Cities (Top 5% Earners)

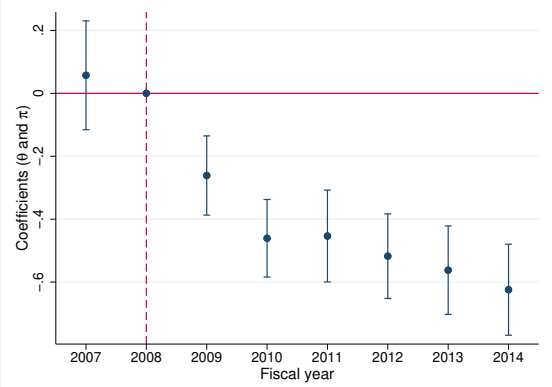
Panel D: HWI vs Other Cities (Top 1% Earners)



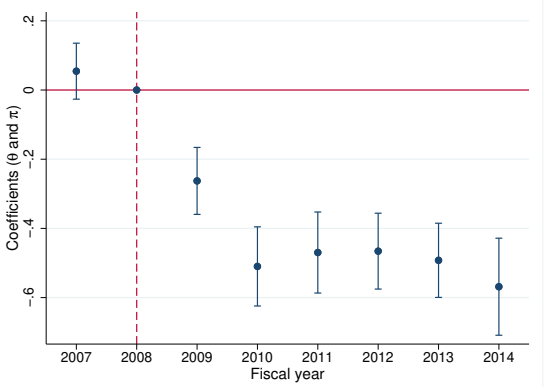
Notes: The figure shows the evolution of average log reported net income as well as standard deviation for high-wealth individuals administered by HWI unit (solid-dotted line) and STOs (solid-triangled line) before (2007-2008) and after (2009-2014) the establishment of HWI unit. The vertical solid-dashed lines represent the fiscal year when the unit was started. Panel A and B show the comparison between HWI unit and STOs in Jakarta. Panel C and D show the comparison between HWI unit and STOs in other cities.

Figure M.2: The Impact of HWI Unit on Reported Net Income (Balanced Panel)

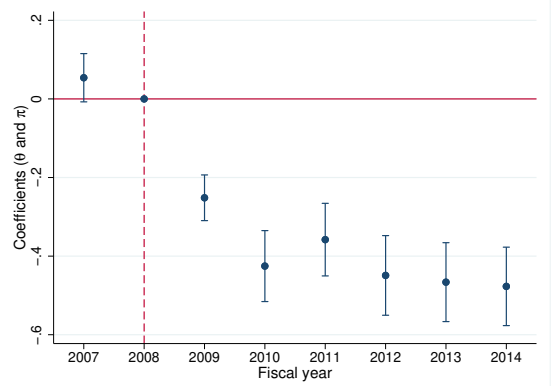
Panel A: HWI vs Jakarta (Top 5% Earners)



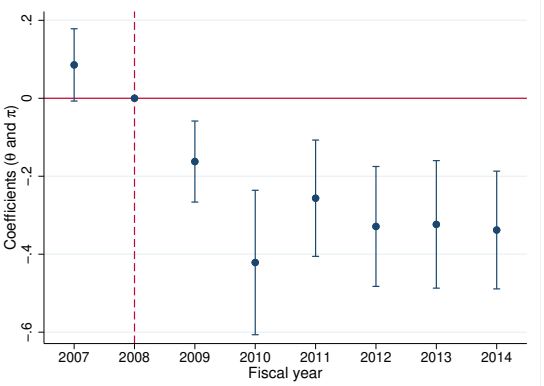
Panel B: HWI vs Jakarta (Top 1% Earners)



Panel C: HWI vs Other Cities (Top 5% Earners)



Panel D: HWI vs Other Cities (Top 1% Earners)



Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on reported net income between 2007 and 2014. Standard errors are clustered at the tax office level.

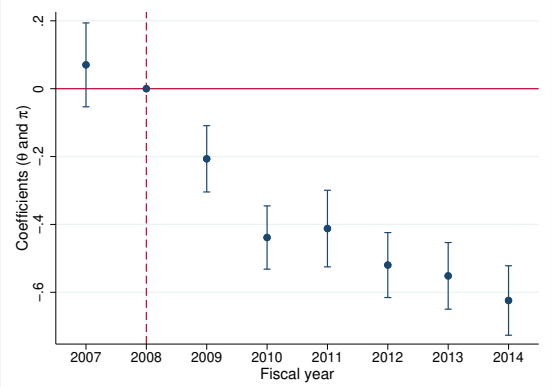
Table M.4: HWI Office Impacts on Taxable Income

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	Top 5 Percent	Top 1 Percent	Top 5 Percent	Top 1 Percent
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.071	0.063	0.024	-0.016
	(0.063)	(0.036)	(0.032)	(0.053)
After Reform				
(2009 to 2014) x HWI Unit	-0.459***	-0.416***	-0.463***	-0.423***
	(0.042)	(0.043)	(0.034)	(0.056)
R^2	0.847	0.801	0.859	0.804
N Obs.	9,513	6,075	11,007	6,307

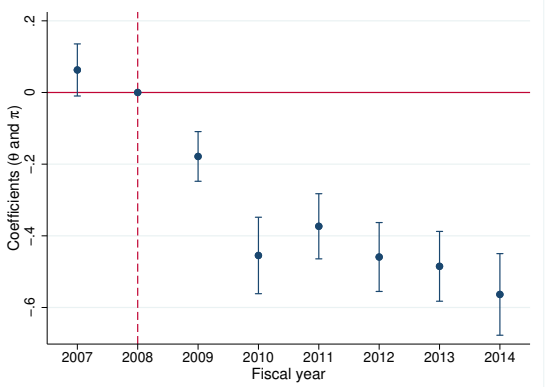
Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

Figure M.3: The Impact of HWI Unit on Taxable Income (Unbalanced Panel)

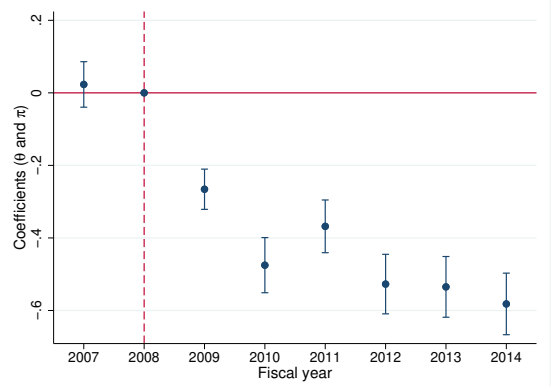
Panel A: HWI vs Jakarta (Top 5% Earners)



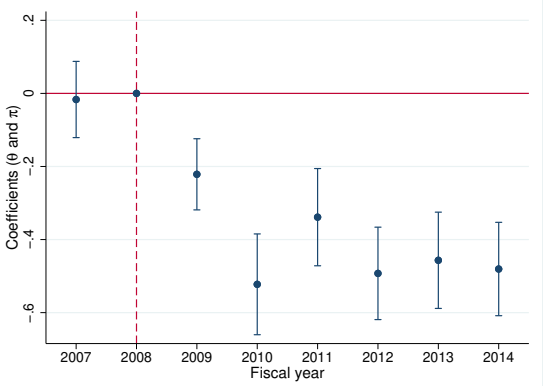
Panel B: HWI vs Jakarta (Top 1% Earners)



Panel C: HWI vs Other Cities (Top 5% Earners)



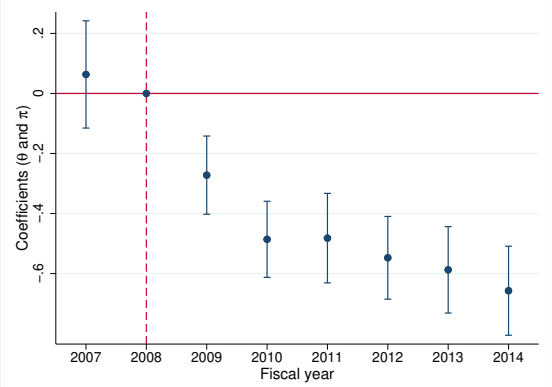
Panel D: HWI vs Other Cities (Top 1% Earners)



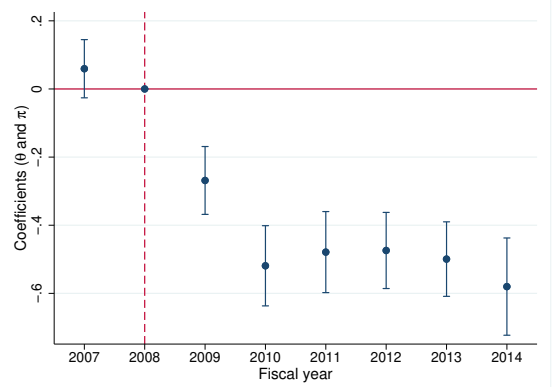
Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on taxable income between 2007 and 2014. Standard errors are clustered at the tax office level.

Figure M.4: The Impact of HWI Unit on Taxable Income (Balanced Panel)

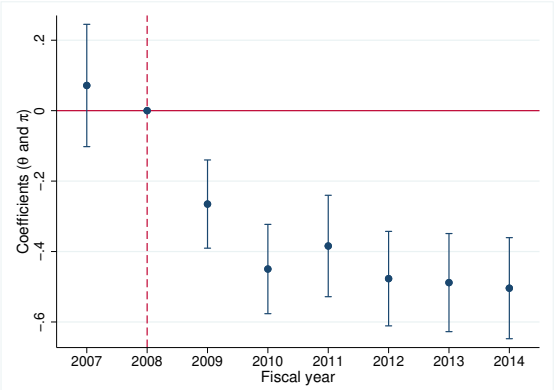
Panel A: HWI vs Jakarta (Top 5% Earners)



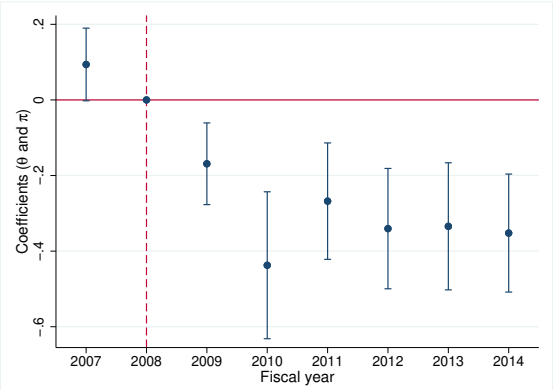
Panel B: HWI vs Jakarta (Top 1% Earners)



Panel C: HWI vs Other Cities (Top 5% Earners)



Panel D: HWI vs Other Cities (Top 1% Earners)

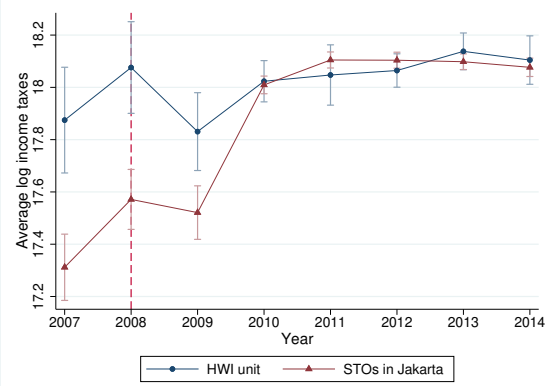


Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on taxable income between 2007 and 2014. Standard errors are clustered at the tax office level.

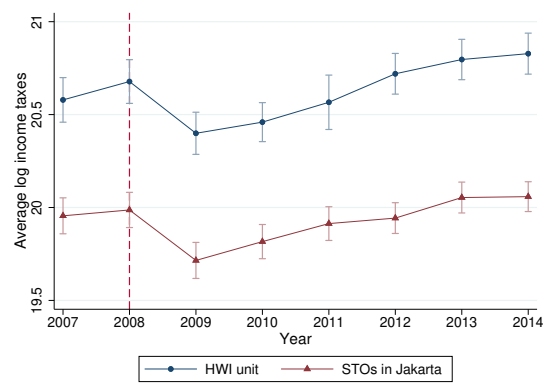
M.2 Heterogeneity of the Compliance Impact of the HWI office

Figure M.5: The Evolution of Reported Net Income by Tax Bracket

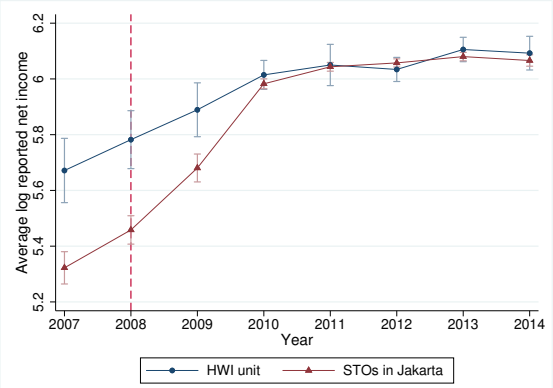
Panel A: HWI vs Jakarta (TI≤500 M IDR)



Panel B: HWI vs Jakarta (TI>500 M IDR)



Panel C: HWI vs Other Cities (TI≤500 M IDR)



Panel D: HWI vs Other Cities (TI>500 M IDR)

Notes: The figure shows the evolution of average log reported net income as well as standard deviation for high-wealth individuals administered by HWI unit (solid-dotted line) and STOs (solid-triangled line) before (2007-2008) and after (2009-2014) the establishment of HWI unit. The vertical solid-dashed lines represent the fiscal year when the unit was started. Panel A and B show the comparison between wealthies individuals with taxable income below 500 million IDR at HWI unit and STOs. Panel C and D show the comparison between wealthies individuals with taxable income above 500 million IDR HWI unit and STOs in other cities.

Table M.5: HWI Office Impacts on Reported Net Income by Tax Bracket

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	TI≤500M	TI>500M	TI≤500M	TI>500M
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.059	0.031	0.055	-0.048
	(0.030)	(0.035)	(0.061)	(0.059)
After Reform				
(2009 to 2014) x HWI Unit	-0.191***	-0.212***	-0.223***	-0.131**
	(0.029)	(0.031)	(0.046)	(0.044)
R^2	0.759	0.833	0.792	0.846
N Obs.	1,753	7,525	2,492	8,168

Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

Table M.6: HWI Office Impacts on Reported Net Income by Taxable Income Group

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	TI≤1000M	TI>1000M	TI≤1000M	TI>1000M
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.050	0.051	0.019	-0.023
	(0.028)	(0.050)	(0.020)	(0.101)
After Reform				
(2009 to 2014) x HWI Unit	-0.302***	-0.213***	-0.316***	-0.092
	(0.034)	(0.043)	(0.023)	(0.057)
R^2	0.694	0.794	0.744	0.805
N Obs.	3,851	5,428	5,175	5,550

Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

Table M.7: HWI Office Impacts on Reported Net Income by Taxable Income Group

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	TI≤2000M	TI>2000M	TI≤2000M	TI>2000M
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.031	0.060	0.010	-0.052
	(0.025)	(0.057)	(0.021)	(0.118)
After Reform				
(2009 to 2014) x HWI Unit	-0.331***	-0.176***	-0.363***	-0.116
	(0.031)	(0.046)	(0.027)	(0.066)
R^2	0.741	0.744	0.766	0.757
N Obs.	5,755	3,538	7,349	3,420

Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

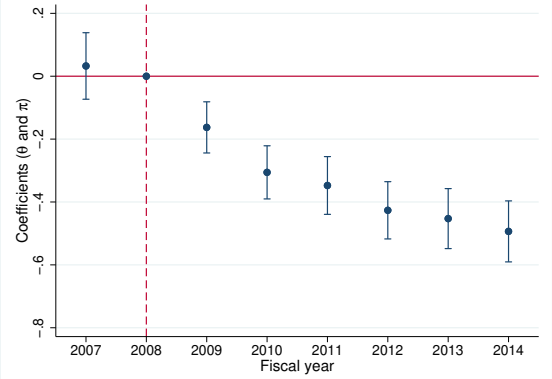
Table M.8: HWI Office Impacts on Reported Net Income by Taxable Income Group

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	TI≤5000M	TI>5000M	TI≤5000M	TI>5000M
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.061	-0.024	0.033	-0.034
	(0.055)	(0.085)	(0.023)	(0.213)
After Reform				
(2009 to 2014) x HWI Unit	-0.395***	-0.197**	-0.415***	-0.122
	(0.036)	(0.057)	(0.029)	(0.092)
R^2	0.797	0.695	0.807	0.717
N Obs.	7,708	1,648	9,200	1,651

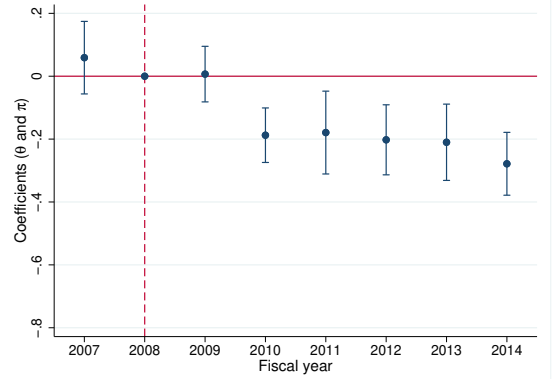
Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

Figure M.6: The Impact of HWI Office on Reported Net Income by Taxable Income Group

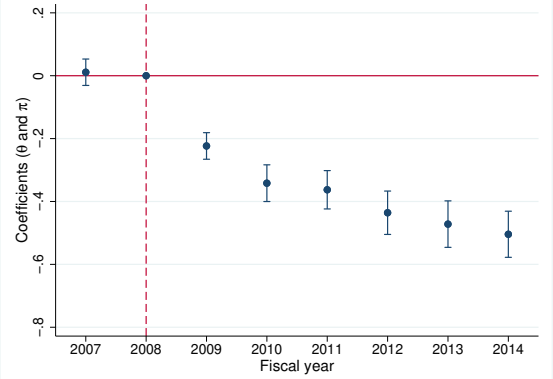
Panel A: HWI vs Jakarta (TI $\leq$ 2000 M IDR)



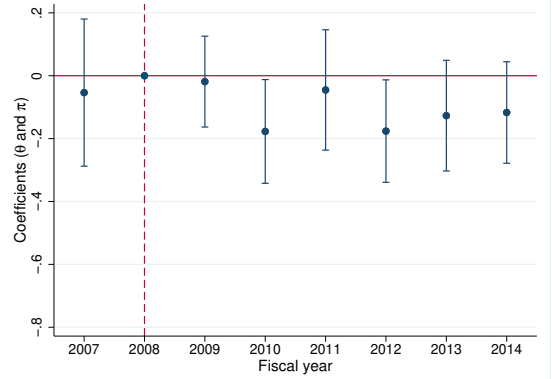
Panel B: HWI vs Jakarta (TI $>$ 2000 M IDR)



Panel C: HWI vs Other Cities (TI $\leq$ 2000 M IDR)



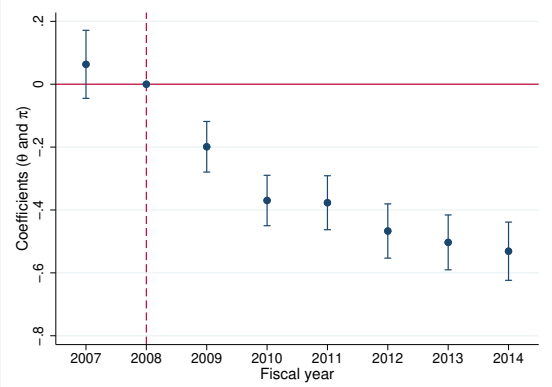
Panel D: HWI vs Other Cities (TI $>$ 2000 M IDR)



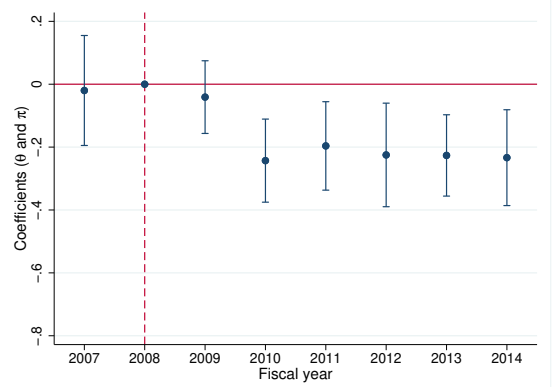
Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on reported income between 2007 and 2014. Standard errors are clustered clustered at the tax office level. The coefficients from the standard DD specification in Equation (3.8) are presented in Appendix Table M.7.

Figure M.7: The Impact of HWI Office on Reported Net Income by Taxable Income Group

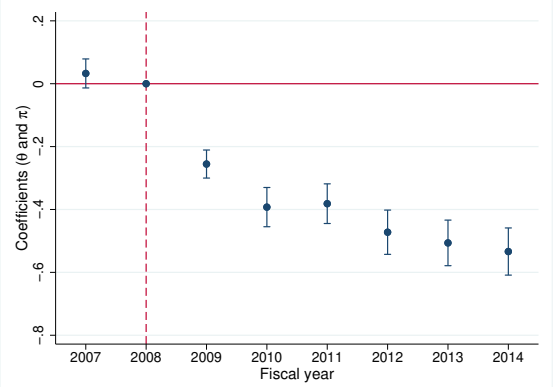
Panel A: HWI vs Jakarta (TI $\leq$ 5000 M IDR)



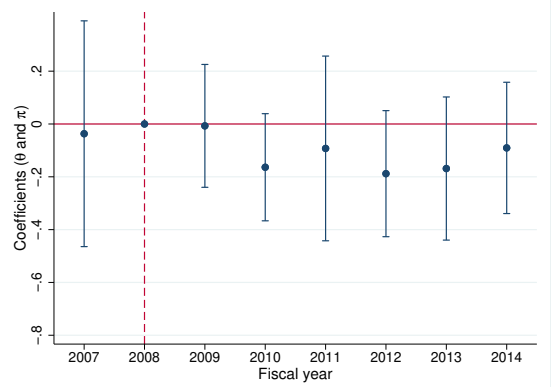
Panel B: HWI vs Jakarta (TI $>$ 5000 M IDR)



Panel C: HWI vs Other Cities (TI $\leq$ 5000 M IDR)



Panel D: HWI vs Other Cities (TI $>$ 5000 M IDR)



Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on reported income between 2007 and 2014. Standard errors are clustered clustered at the tax office level. The coefficients from the standard DD specification in Equation (3.8) are presented in Appendix Table M.8.

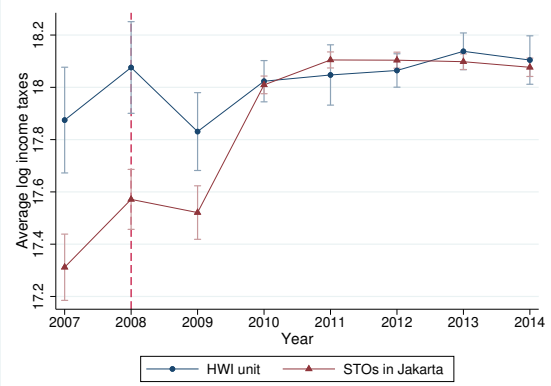
Appendix N

Additional Results on the Revenue Impact of HWI office

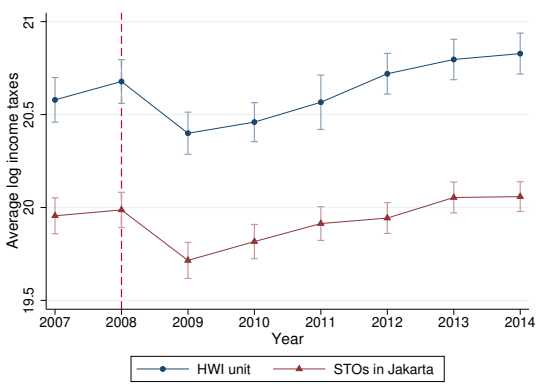
N.1 Descriptive Evidence on the Revenue Impact

Figure N.1: The Evolution of Income Taxes

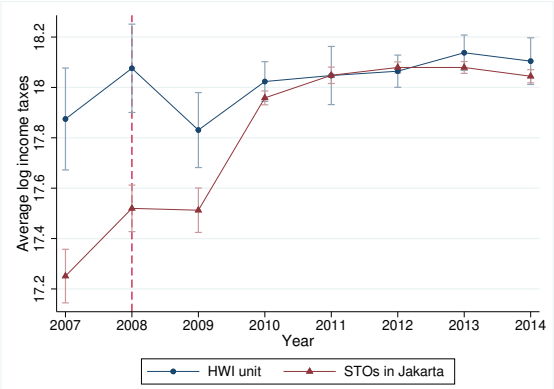
Panel A: HWI vs Jakarta (TI≤500 M IDR)



Panel B: HWI vs Jakarta (TI>500 M IDR)



Panel C: HWI vs Other Cities (TI≤500 M IDR)



Panel D: HWI vs Other Cities (TI>500 M IDR)

Notes: The figure shows the evolution of average log income taxes as well as standard deviation for high-wealth individuals administered by HWI unit (solid-dotted line) and STOs (solid-triangled line) before (2007-2008) and after (2009-2014) the establishment of HWI unit. The vertical solid-dashed lines represent the fiscal year when the unit was started. Panel A and B show the comparison between wealthies individuals with taxable income below 500 million IDR at HWI unit and STOs. Panel C and D show the comparison between wealthies individuals with taxable income above 500 million IDR HWI unit and STOs in other cities.

N.2 DD Estimates for the Revenue Impact

Table N.1: HWI Office Impacts on Income Taxes by Tax Bracket

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	TI≤500M	TI>500M	TI≤500M	TI>500M
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.099	0.034	0.106	-0.049
	(0.052)	(0.037)	(0.110)	(0.062)
After Reform				
(2009 to 2014) x HWI Unit	-0.332***	-0.213***	-0.405***	-0.120*
	(0.052)	(0.034)	(0.078)	(0.048)
R^2	0.683	0.833	0.724	0.846
N Obs.	1,752	7,517	2,502	8,163

Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

Table N.2: HWI Office Impacts on Income Taxes by Taxable Income Group

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	TI≤1000M	TI>1000M	TI≤1000M	TI>1000M
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.119	0.047	0.067	-0.023
	(0.091)	(0.053)	(0.084)	(0.103)
After Reform				
(2009 to 2014) x HWI Unit	-0.458***	-0.221***	-0.496***	-0.080
	(0.062)	(0.048)	(0.056)	(0.060)
R^2	0.628	0.794	0.679	0.803
N Obs.	3,847	5,422	5,185	5,545

Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

Table N.3: HWI Office Impacts on Income Taxes by Taxable Income Group

	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	TI≤2000M	TI>2000M	TI≤2000M	TI>2000M
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.102	0.043	0.069	-0.055
	(0.079)	(0.063)	(0.074)	(0.117)
After Reform				
(2009 to 2014) x HWI Unit	-0.477***	-0.191***	-0.537***	-0.112
	(0.052)	(0.055)	(0.048)	(0.069)
R^2	0.692	0.742	0.721	0.758
N Obs.	5,750	3,534	7,357	3,417

Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

Table N.4: HWI Office Impacts on Income Taxes by Taxable Income Group

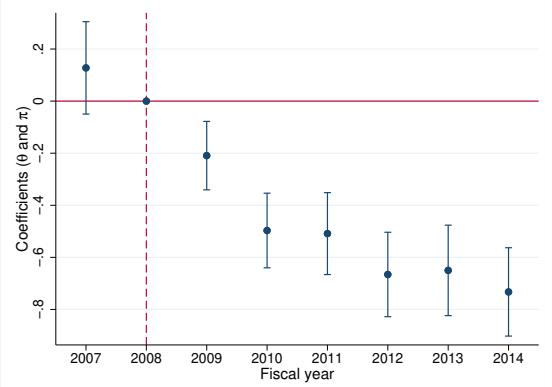
	HWI vs STOs in Jakarta		HWI vs STOs in Other Cities	
	TI≤5000M	TI>5000M	TI≤5000M	TI>5000M
	(1)	(2)	(3)	(4)
Before Reform				
(2007) x HWI Unit	0.143	-0.032	0.105	-0.025
	(0.075)	(0.085)	(0.071)	(0.212)
After Reform				
(2009 to 2014) x HWI Unit	-0.534***	-0.204***	-0.582***	-0.115
	(0.048)	(0.057)	(0.045)	(0.092)
R^2	0.763	0.694	0.772	0.719
N Obs.	7,699	1,646	9,205	1,651

Notes: Standard errors are clustered at the tax office level and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications are controlling for fiscal year, types of tax office, and individual fixed effects.

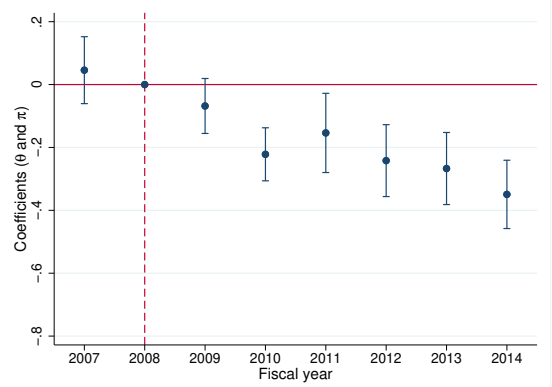
N.3 Event Study on the Revenue Impact

Figure N.2: The Impact of HWI Office on Income Taxes by Taxable Income Group

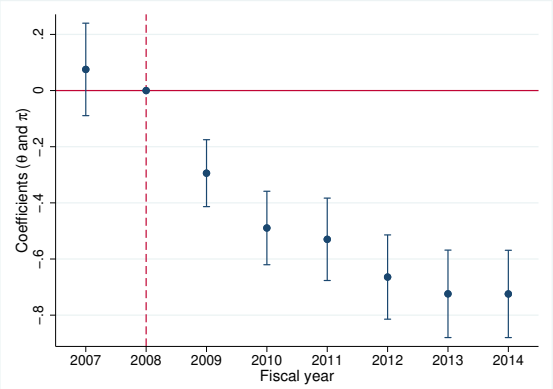
Panel A: HWI vs Jakarta (TI $\leq$ 1000 M IDR)



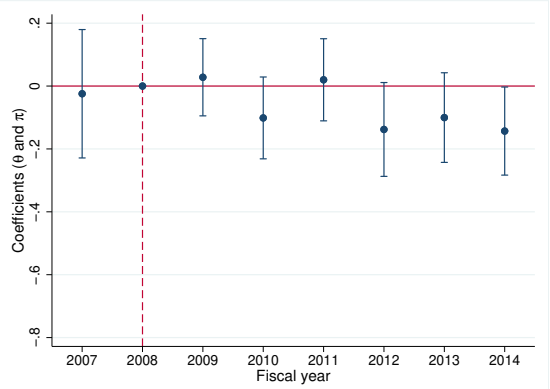
Panel B: HWI vs Jakarta (TI $>$ 1000 M IDR)



Panel C: HWI vs Other Cities (TI $\leq$ 1000 M IDR)



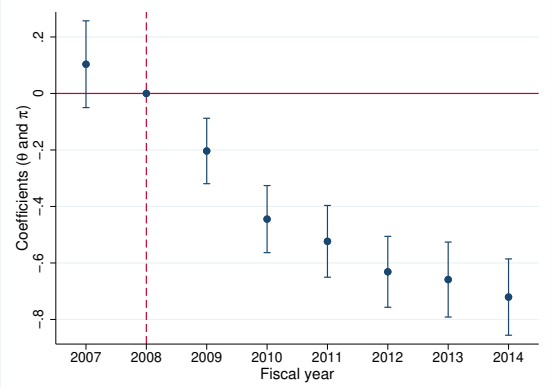
Panel D: HWI vs Other Cities (TI $>$ 1000 M IDR)



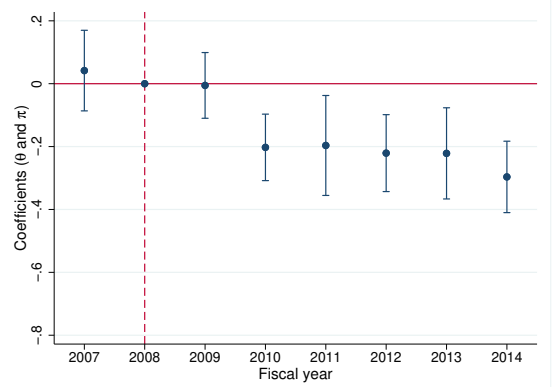
Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on income taxes between 2007 and 2014. Standard errors are clustered clustered at the tax office level. The coefficients from the standard DD specification in Equation (3.8) are presented in Appendix Table N.2.

Figure N.3: The Impact of HWI Office on Income Taxes by Taxable Income Group

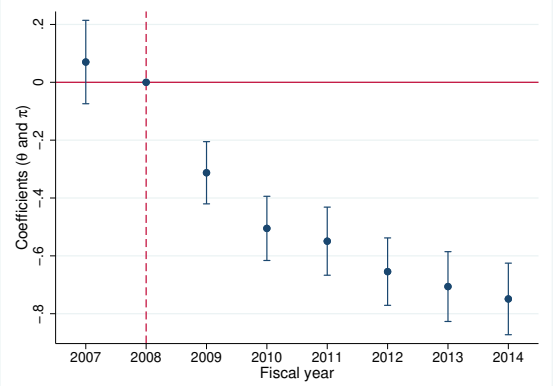
Panel A: HWI vs Jakarta (TI $\leq$ 2000 M IDR)



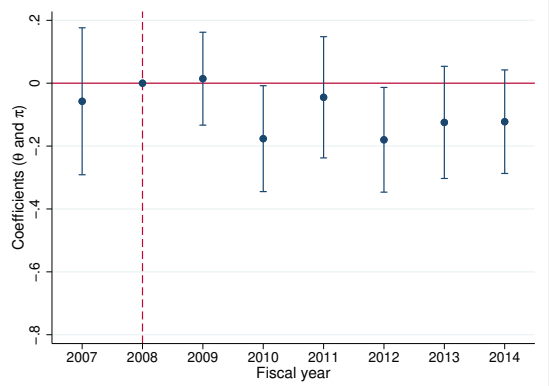
Panel B: HWI vs Jakarta (TI $>$ 2000 M IDR)



Panel C: HWI vs Other Cities (TI $\leq$ 2000 M IDR)



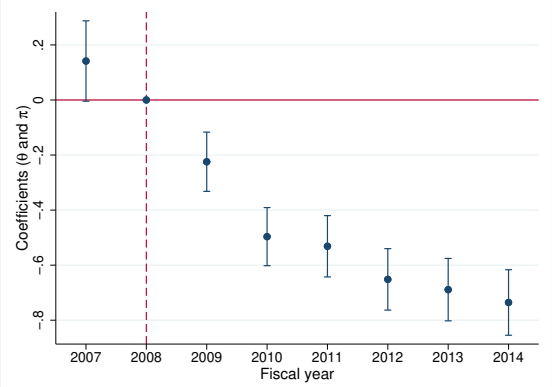
Panel D: HWI vs Other Cities (TI $>$ 2000 M IDR)



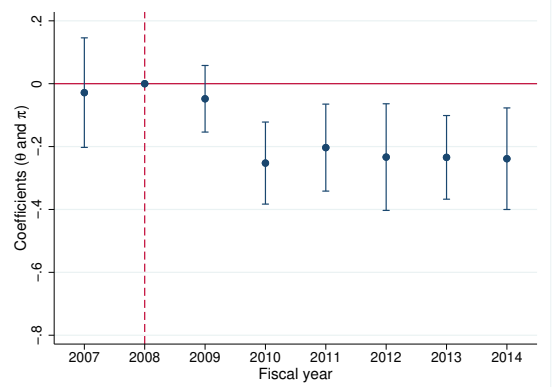
Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on income taxes between 2007 and 2014. Standard errors are clustered clustered at the tax office level. The coefficients from the standard DD specification in Equation (3.8) are presented in Appendix Table N.3.

Figure N.4: The Impact of HWI Office on Income Taxes by Taxable Income Group

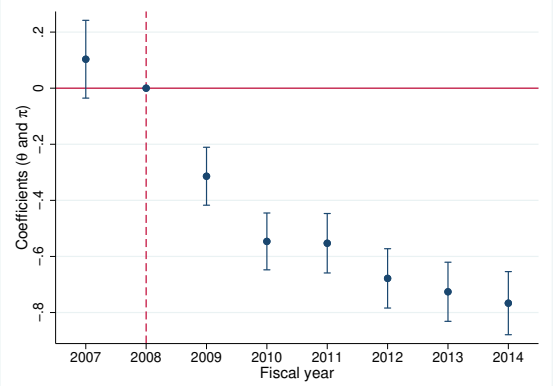
Panel A: HWI vs Jakarta (TI $\leq$ 5000 M IDR)



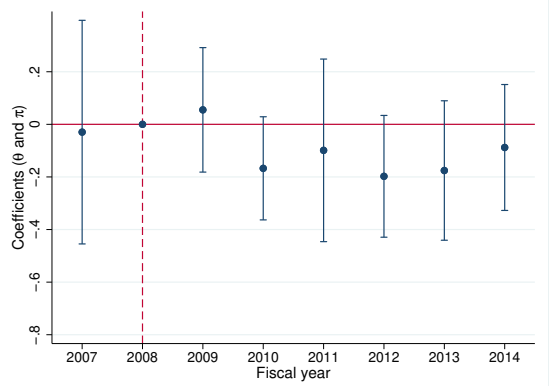
Panel B: HWI vs Jakarta (TI $>$ 5000 M IDR)



Panel C: HWI vs Other Cities (TI $\leq$ 5000 M IDR)



Panel D: HWI vs Other Cities (TI $>$ 5000 M IDR)



Notes: The figure plots the regression coefficients (θ and π) from the estimating specification (3.7) in Subsection 3.4.2, representing the impact of HWI unit on income taxes between 2007 and 2014. Standard errors are clustered clustered at the tax office level. The coefficients from the standard DD specification in Equation (3.8) are presented in Appendix Table N.4.

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VITA

Himawan Saputro

Education

Ph.D. in Public Policy and Administration, Martin School of Public Policy and Administration, University of Kentucky, expected 2021

M.I.D.P., Sanford School of Public Policy, Duke University, 2014

B.A.Sc. in Accounting, Indonesian State College of Accountancy, 2007

Diploma in Taxation, Indonesian State College of Accountancy, 2001

Employment

Staff, Sampit Tax Office, 2002-2004

Staff on Study Assignment, Secretariate of Directorate General of Taxes, 2004-2007

Account Representative, South Semarang Small Tax Office, 2007-2012

Staff on Study Assignment, Secretariate of Directorate General of Taxes, 2012-2014

Staff, Directorate of Tax Potency, Compliance, and Revenue, 2014-2016

Head of General Affairs and Internal Compliance, Pekanbaru Medium Tax Office, 2016-2017

Awards

Ministry of Finance of the Republic of Indonesia Scholarship Program for Strengthening the Reforming Institutions (SPIRIT), 2012-2014

Indonesia Endowment Fund for Education (LPDP) Doctoral Scholarship, 2017-2021