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RESEARCH ARTICLE

Tax compliance and social desirability bias of taxpayers: experimental evidence from Indonesia

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Abstract

Identifying taxpayers who engage in noncompliant behaviour is crucial for tax authorities to determine appropriate taxation schemes. However, because taxpayers have an incentive to conceal their true income, it is difficult for tax authorities to uncover such behaviour (social desirability bias). Our study mitigates the bias in responses to sensitive questions by employing the list experiment technique, which allows us to identify the characteristics of taxpayers who engage in tax evasion. Using a dataset obtained from a tax office in Jakarta, Indonesia, we conducted a computer-assisted telephone interviewing survey in 2019. Our results revealed that 13% of the taxpayers, old, male, corporate employees, and members of a certain ethnic group had reported lower income than their true income on their tax returns. These findings suggest that our research design can be a useful tool for understanding tax evasion and for developing effective taxation schemes that promote tax compliance.

Keywords: list experiment; social desirability bias; survey; tax compliance; tax evasion

Introduction

Effective tax collection is an important issue in government finance because taxes comprise a significant portion of a government's revenue. Tax evasion is an illegal behaviour that reduces the government's revenue and can damage the fiscal balance, hindering economic growth especially in developing countries. Crivelli et al. (2016) estimate that worldwide revenue losses to tax evasion amount to around $650 billion per year and that developing countries experience one-third of those losses, whereas high-income countries experience much smaller revenue losses.[1] The revenue losses resulting from tax evasion attract public attention, which prompts governments to pursue effective taxation policies. Identifying the characteristics of taxpayers who

[1]Cobham and Jansky (2018) also indicate that the great intensity of revenue losses occurs in low-income countries.

are reluctant to comply with tax laws is the first step towards establishing effective tax enforcement schemes (Slemrod 2008).

Since the seminal work of Allingham and Sandmo (1972), many scholars have examined factors that affect taxpayers' compliance behaviour. Some studies have explored psychological factors by conducting laboratory experiments (Christian and Alm 2014; Fochmann and Kroll 2016) or field experiments (Hasseldine and Hite 2003; Dunn et al. 2018). However, because taxpayers have incentives to conceal their tax evasion, it is very difficult to identify which kinds of individuals engage in this behaviour (Alm 2012; Korndörfer et al. 2014; Mascagni 2018). When taxpayers are asked directly if they comply with the tax payment rules, they may falsefully report socially desirable or acceptable answers. This response bias is said to occur when the research question involves socially sensitive issues, including politics, religion, and taxation. In the context of taxation, tax evasion is more severe in developing countries than in developed countries because the latter have advanced tax systems (Pomeranz 2015).

Our study aims to identify the characteristics of taxpayers who do not comply with tax payment rules. To avoid social desirability bias from field surveys and to elicit sensitive information about taxation, we use a list experiment. This is a questionnaire design technique that allows us to minimize the social desirability bias in responses to sensitive questions. List experiments have been used to control for the bias associated with sensitive topics in various fields of social science, particularly in political science. These studies have dealt with topics such as support for a female president (Burden et al. 2017), voter turnout (Holbrook and Krosnick 2010), same-sex marriage (Lax et al. 2016), conservation crime (Nuno and John, 2015), and animal disease (Randrianantoandro et al. 2015). Despite the popularity of this experimental method, it has not so far been applied in research on taxation to our knowledge. Our study is the first attempt to use the list experiment technique in a developing country to identify which taxpayers comply when filing returns.

For our research, we collaborated with the Directorate General of Taxes (DGT), which is the tax authority in Indonesia. Using the list of taxpayers provided by the DGT, we implemented a computer-assisted telephone interviewing (CATI) survey of taxpayers who had filed their income tax forms in Jatinegara District, Jakarta Province, Indonesia. The survey was conducted between January and March in 2019, and 879 taxpayers participated in our phone interviews.

To preview the results of our list experiment, we found that around 13% of taxpayers had reported lower income on their tax returns than they actually earned. In particular, taxpayers who were old, male, Sundanese, or corporate employees showed low tax compliance behaviour. We believe that these results can help the tax authority design audit programs targeting specific groups of taxpayers to improve tax compliance. Based on our findings, the tax authority could design an effective taxation policy to increase tax revenues, including targeted groups of taxpayers that should be audited closely and continuously.

This article consists of five sections. In the next section, we review the previous literature on tax compliance. The third section explains Indonesia's tax structure. The fourth section discusses the empirical analysis, including the survey design, data, and results of the study. In the final section, we summarize our findings and provide our conclusions.

Taxpayers and their compliance behaviour

Conventional studies of tax compliance have focused on efforts by tax authorities to deter noncompliance by taxpayers. Most of these studies investigate how taxpayers change their behaviour in response to changes in the probability of being detected and the levels of potential sanctions and penalties. From a theoretical perspective, Allingham and Sandmo (1972) argue that tax compliance improves as the probability of detection increases and the punishments become more severe. However, recent studies criticize the traditional approach, emphasizing that other motivations play important roles behind tax compliance behaviour (Alm et al. 1992). People pay taxes out of a recognition of the social benefits of public services and public goods provided by the government. Some studies point out that intrinsic motivation, including tax morale, also promotes tax compliance (Lubian and Zarri 2011; Torgler 2012).

Taxpayers cannot be described as a single identical group because of the diversity in their behaviours (Alm 2012). The heterogeneity among them must be acknowledged in explaining individuals' tax compliance behaviours. Indeed, many empirical studies show that tax compliance behaviour varies across citizens depending on their demographic attributes and socioeconomic characteristics, including age, gender, income, and education (Kastlunger et al. 2010; Lago-Penas and Lago-Penas 2010; Russo 2013; Brockmann et al. 2016; Hofmann et al. 2017), culture (Alm and Torgler 2006; Kountouris and Remoundou 2013), employment status and religion (Lago-Penas and Lago-Penas 2010), and trust in and perceptions of government (Kirchler et al. 2008; Kogler et al. 2013; Jimenez and Lyer 2016; Batrancea et al. 2019; D'Attoma 2020).

Regarding the link between age and tax compliance behaviour, the existing literature gives mixed results. Several works argue that older generations have different social values and behaviour towards the state and regulation from younger ones. For instance, Hofmann et al. (2017) claim that old generations, who need social security and health care benefits, treasure the benefit of taxes and thus become more compliant than young generations do. Kirchler (2007) also argues that older people tend to have a better financial situation as well as fewer budgetary constraints, which make them become tax compliant. In contrast, however, some studies show the opposite, that older people are less tax compliant. Russo (2013) argues that older people exhibit lower tax compliance behaviour because they are dissatisfied with public services.

Concerning the relationship between gender and tax compliance, most studies show that women are more likely to be compliant than men (Betz et al., 1989; White 1999). Hofmann et al. (2017) claim that women are generally more ethical and have stronger morals than men, so that they are more tax compliant. Hasseldine (1999) also suggests that women tend to perceive sanctions for misbehaviour or noncompliant behaviour as more severe and threatening than men.

People with different income levels may also behave differently in tax compliance, but again the literature shows mixed results on the relationship between income level and tax compliance behaviour. Some studies show that lower-income people are less compliant because they are more sensitive to their after-tax income (Hofmann et al. 2017). In contrast, other studies demonstrate

that higher-income people exhibit lower compliance because progressive tax schemes affect higher-income earners more substantially (Andreoni et al. 1998; Chung and Trivedi 2003; Hofmann et al. 2017). The relationship between educational attainment and tax compliance is also unclear. Some studies show that highly educated people tend to be less compliant because they have an incentive to avoid taxes by utilizing their knowledge and understanding of financial transactions (Hofmann et al. 2017) and because they are more critical of the state's actions (Torgler and Schneider 2007). However, less educated people are also said to have an incentive to cheat on their taxes because they have a limited understanding of their tax duties or lack financial literacy (Hofmann et al. 2017).

Several studies show a strong relationship among culture, religiosity, and tax compliance. Culture can significantly affect one's tax compliance behaviour by shaping the intrinsic motivation to comply (tax morale) as the moral principle or value (Kountouris and Remoundou 2013). Alm and Torgler (2006) suggest that differences in tax compliance behaviour observed across countries is due to differences in citizens' tax morale. Religiosity can be one potential factor that shapes tax morale because people tend to follow a particular religion's guidance in forming their preferences (Mueller 2001; Torgler 2006). In addition, religion encourages moral commitments and the internal enforcement of social norms (Anderson and Tollison 1992; Torgler 2007).

Tax compliance is also likely to be associated with employment status, because employees generally pay income tax through the withholding system, which minimizes their tax evasion opportunities (Yaniv 1988). Citizens' perceptions of the government are also important. Trusted government institutions are likely to encourage many citizens to engage in social cooperation (Kreps 1990) and thus improve their tax compliance behaviour (Scholz and Lubel 1998; Torgler 2007). The level of government institutional quality and trustworthiness certainly explains the variation in tax compliance across countries (D'Attoma 2020).

To identify which demographic attributes and socioeconomic characteristics relate to tax evasion or tax noncompliance behaviour, empirical studies have used various methodologies. Torgler (2007) notes that these methods have mainly consisted of surveys, laboratory experiments, and field experiments. Because tax data are confidential, surveys are popular among researchers (Torgler 2007). Kountouris and Remoundou (2013) examine tax morale in Europe using data drawn from the European Social Survey (ESS). Ali et al. (2014) utilize data from the Afrobarometer survey for five countries in Africa. Although these surveys enable researchers to analyse tax compliance behaviour empirically in numerous countries, they suffer from issues such as low-response rates and the inaccuracy of the responses due to the sensitive nature of tax compliance, which demotivates people from participating in the surveys (Torgler 2007). Respondents may alter their answers to conform to the acceptable norms in society (Hallsworth 2014).

Although laboratory experiments could be used to avoid the bias associated with the sensitive issue of tax compliance, there are concerns about the external validity of this methodology. In the real world, a lot of crucial factors other than those manipulated in experiments might also affect an individual's decision to comply (Torgler 2007; Hallsworth 2014; Mascagni 2018). Moreover, when respondents are drawn from some specific groups, such as students (Durham et al. 2014;

Alm et al. 2017), their decisions are not representative of the overall population of taxpayers (Hallsworth 2014). To avoid these issues, recent studies have conducted field experiments to investigate how tax compliance behaviour is influenced by a government's actions, such as social norm letters (Biddle et al. 2018), third-party information (Carrillo et al. 2017), field inspections (Rincke and Traxler 2011), deterrence letters (Shimeles et al. 2017), and audit paper trails (Pomeranz 2015). Field experiments could mitigate the problems encountered in surveys and laboratory experiments, as they use data from real taxpayers, reflecting the decisions they actually make in real life.

To create effective taxation policy, including audit schemes, the government also needs enough information about the characteristics of individuals who engage in tax evasion. Nevertheless, taxation is a sensitive issue for taxpayers, making it generally difficult for the government to obtain precise information about their behaviour, because they may provide false answers or even refuse to answer any questions from the government. To address these problems, we conducted a field survey with an experimental component, a list experiment or an item count technique (ICT), which is an indirect question technique. The list experiment technique protects respondents' privacy by not requesting that they disclose their answers on sensitive issues. The list experiment questions are designed such that the results show only the number of affirmative answers rather than answers to sensitive questions which are socially undesirable (Corstange 2009; Blair and Imai 2012; Gonzalez-Ocantos et al. 2012). Because of this advantage, list experiments have grown in popularity in the social sciences.

Individual taxation in Indonesia

This study employs Indonesia as the subject country. Indonesia is classified by the World Bank as a lower-middle income country (LMIC), and the country shares common tax-related problems with other LMICs. In fact, Indonesia's tax-to-Gross Domestic Product (GDP) ratio is relatively small, reaching only 10.3% in 2016. Among the Association of Southeast Asian Nations (ASEAN) member countries, Indonesia is ranked the second lowest, following Myanmar.[2] Given this situation, the government has set its target for the tax-to-GDP ratio at around 13%–16% during the period of 2031–2035 as a part of the Medium-Term Fiscal Macro Strategy 2020–2024.

This study focuses on taxes on individuals, particularly income tax, among various forms of taxes in Indonesia. Income tax is collected using a self-assessment system. There are two types of individual taxpayers: self-employed individuals and employees. Self-employed individual taxpayers calculate the amount of their own taxes and report it to the tax office. On the other hand, for employees, income tax is calculated and paid by their employers from their salary or wage, using the withholding tax system. At the same time, employees often receive additional income from their own business activities in addition to their salaries or wages. Thus, all employees need to report incomes from their employers, as well as their additional income to calculate the total amount of income tax they owe on their tax

[2]The average of tax-to-GDP ratio over the ASEAN member countries is 12.6% in 2016.

Table 1. The proportion of individual income tax to total income tax (billion rupiah)

	Amount (Billion Rupiah)	Percentage of Total Income Tax	Percentage of Total Central Tax
Income Tax			
Individual	7,806	1.21%	0.58%
Corporate	206,550	31.93%	15.37%
Other Income Tax	432,437	66.86%	32.19%
Total Income Tax	646,793	100.00%	48.14%
Total Central Tax	1,343,529		100.00%

Note: Other income tax includes oil and gas income tax, income tax article 21, 22, 22 import, 23, 26, final income tax, fiscal income tax, and income tax borne by the government.
Source: Central Government Financial Report-Audited.

returns. However, due to the lack of third party reporting to capture additional incomes from their business activities, taxpayers might not report all of their income on their tax returns, making honesty and willingness to pay taxes crucial for individual tax collection.

Concerning the administrative structure of the tax authority in Indonesia, the DGT consists of more than 340 tax offices in 34 provinces, which are responsible for collecting central taxes, such as income taxes, value-added taxes, and land and building taxes in four sectors (forestry, plantation, oil and gas, and mining).[3] According to a report from the government of Indonesia in 2018, individual and corporate income tax revenues represented 1% and 32%, respectively, of total tax revenue in 2017 (see Table 1). The low level of individual income tax revenue has encouraged the tax authority to increase individual tax compliance.

According to Central Bureau of Statistics of Indonesia, Jakarta is the largest political and commercial city in Indonesia. It also has the highest density of any city in Indonesia, with more than 15,000 people per square kilometre. The population includes a variety of social, ethnic, and religious groups (BPS-Statistics Indonesia 2018). The amount of tax revenue collected in Jakarta is much larger than in other provinces. According to the DGT, 18.5% of total central tax revenue in 2017 was collected from taxpayers located in this city. Jakarta consists of six regencies and 44 subdistricts, and 54 tax offices cover these areas. Our study area is the Jatinegara subdistrict of Jakarta province. According to BPS-Statistics of Jakarta Timur, Jatinegara subdistrict consists of eight villages with 310,494 people living in a 10.25 square kilometre area. The land-use is mainly for housing, which occupies 71.12% of the area, and the land-use for industry is around 5.19% of total land-use. This means that few industries operate in this subdistrict. On the other hand, there are 116 markets, including traditional markets and restaurants, indicating that trade in goods and services is the main business activity in this subdistrict.

[3]In addition to usual tax offices, there are two types of special offices, large tax offices (LTOs) and special tax offices (STOs) in Jakarta. The LTOs' responsibility is to serve and monitor large taxpayers in Indonesia, while the STOs are responsible for handling special cases of corporations, such as state-owned enterprises and foreign multinational corporations. The former consists of four offices and one regional office, and the latter consists of nine offices and one regional office.

Empirical analysis

List experiment

This study employed a list experiment or ICT to mitigate respondents' social desirability bias when eliciting information about sensitive issues. To conduct a list experiment, respondents were randomly separated into two groups: the control group and the treatment group. Respondents were presented a list of statements and then asked to report how many statements on the list pertain to them. The list of statements shown to the respondents in the control group consisted of four statements (we call them "control statements") that are not directly related to our research interest.[4] The list of statements shown to the respondents in the treatment group composed of five statements, adding one statement (we call it a "treatment statement") that directly related to our research interest. The treatment statement might invite a social desirability bias, but with a large enough sample size, this design enabled us to estimate the proportion of respondents to whom the treatment statement of interest pertained. It is calculated by subtracting the average number of statements reported by the respondents in the control group from the average number of statements reported by the respondents in the treatment group. Arranging the statements in this way ensured a level of privacy for the respondents in the treatment group because whether or not the treatment statement pertained to them cannot be inferred by the researchers, unless they chose either all of the statements or none of them.

To reiterate, the objective of our study was to elicit taxpayers' attitudes towards tax compliance. By conducting a list experiment, we attempted to estimate the proportion of taxpayers who had reported an amount for their income on their income tax forms lower than their actual income. There were four control statements and one treatment statement. The treatment statement was the item directly related to the respondent's tax compliance behaviour. We randomly separated our respondents into two groups: a treatment group and a control group. Only the first four control statements were presented to respondents in the control group, and all five statements were presented to respondents in the treatment group. The order in which statements were presented was completely randomized across respondents to minimize the possibility of any order effect. After presenting a list of these four

[4]We considered three issues when designing the control statements. First, there is a possibility that the respondents report all of the statements (or none of the statements) pertain to them. This creates a ceiling and floor effect problem (Blair and Imai 2012). A major concern over these effects is the lack of privacy protection for the respondents. To mitigate this issue, the four control statements were designed so that few respondents in the control group would answer affirmatively or negatively to all of them (see Blair and Imai 2012; Glynn 2013). Second, the list experiment needs to satisfy a no-design effect assumption that responses to the control statements are not affected by the additional treatment statement (Blair and Imai 2012). To avoid this issue, as suggested by prior works, we carefully chose four control statements about which respondents were likely to have strong opinions. Third, other potential problems include respondents rushing to complete the survey or misinterpreting it, and administrators making coding errors (Ahlquist 2018). To avoid these problems, we trained the interviewers by conducting a pilot survey in advance and confirmed the validity of our experimental design.

or five statements, we specifically asked each respondent to identify how many statements apply to her/him.[5] The exact wordings of these statements are as follows:

Control statements

- I have more than one sister.
- I have paid a bribe to a police officer to get away with violation.
- I went to a private high school.
- I talked about politics with other people during the previous election.

Treatment statement

- I have reported an amount lower than my actual income in my tax report.

We used the unique list of all taxpayers obtained from the tax office in the Jatinegara subdistrict of Jakarta province to conduct our list experiment.[6] This list includes 121,330 individual taxpayers in the district. Among those taxpayers, we excluded noneffective taxpayers, nonfiling taxpayers, and taxpayers without the information of their phone numbers.[7] This leaves us a total of 14,428 taxpayers who have submitted their tax returns from 2013 to 2017. Using the final list of the taxpayers, we implemented a survey including our list experiment question using CATI from January 2019 to March 2019, and we collected responses from a total of 879 taxpayers (the response rate is 6%).[8] In the survey, we also asked for additional information about respondents' demographics and socioeconomic status, such as age, gender, income, ethnicity, religion, educational level, and employment status.

Results

Table 2 presents the results of the univariate analysis of the list experiment. We found a statistically significant difference between the treatment and control

[5]It should be noted that, unlike traditional social surveys that directly ask respondents to answer which statement(s) apply to them, the list experiment asks respondents to state only the number of statements that apply to them. This may cause some respondents to become suspicious about the objective of our survey and discourage their cooperation. To minimize this possibility, we followed the suggestions of Tsuchiya et al. (2007), and chose a control statement that has a similar degree of social desirability bias to the treatment statement. This control statement is "I have paid a bribe to a police officer to get away with a violation," which occurs relatively frequently in Indonesia but is socially sensitive. By doing so, we encouraged our respondents to cooperate with our survey without revealing the true purpose of our study.

[6]We obtained the approval of the Head office of Jatinegara Tax Office to access to the taxpayers list.

[7]Non-effective taxpayers are those who do not need to file tax returns and pay taxes, due to factors such as unknown addresses or having gone out of business. However, these taxpayers' statuses can be switched into effective taxpayers if those factors change, either by the taxpayer's requests or by tax officers' request. Non-filing taxpayers are those who have not filed tax returns in the past two years consecutively.

[8]We collaborated with an Indonesia-based research company (PT. Kresna Abadi Dinamika (KAD)) to conduct the interviews in our survey. About 86% of respondents did not complete the survey, and about 8% of respondents simply refused to take part in the survey.

Table 2. Difference-in-means results by various subgroups

Variable	Number of Observations	Control	Treatment	Difference
All respondents	879	1.653	1.787	13.42%**
		(0.053)	(0.056)	(0.077)
Age				
<30 years old	421	1.717	1.713	−0.40%
		(0.074)	(0.072)	(0.104)
Between 30 and 40	208	1.626	1.780	15.36%
		(0.115)	(0.111)	(0.160)
Between 40 and 50	134	1.639	1.952	31.27%*
		(0.136)	(0.160)	(0.209)
> 50 years old	116	1.484	1.889	40.50%*
		(0.145)	(0.202)	(0.245)
Gender				
Female	312	1.457	1.511	5.41%
		(0.076)	(0.088)	(0.116)
Male	567	1.774	1.920	14.59%*
		(0.070)	(0.071)	(0.099)
Income				
<4.5 million	373	1.378	1.617	23.84%**
		(0.078)	(0.089)	(0.118)
between 4.5 and 15 million	421	1.905	1.925	1.92%
		(0.075)	(0.079)	(0.109)
> 15 million	85	1.568	1.854	28.66%
		(0.167)	(0.174)	(0.246)
Ethnicity				
Jawa	339	1.727	1.577	−15.06%
		(0.084)	(0.079)	(0.116)
Sunda	106	1.104	1.810	70.62%***
		(0.131)	(0.185)	(0.235)
Betawi	197	1.600	1.908	30.80%**
		(0.107)	(0.133)	(0.169)
Other ethnic groups	237	1.814	1.975	16.12%
		(0.105)	(0.104)	(0.148)
Religion				
Islam	680	1.572	1.703	13.11%*
		(0.059)	(0.066)	(0.088)
Other religious groups	199	1.939	2.060	12.06%
		(0.112)	(0.103)	(0.152)
Education				
High school or below	365	1.505	1.585	7.96%
		(0.083)	(0.094)	(0.125)
College	514	1.764	1.922	15.83%**
		(0.067)	(0.068)	(0.096)
Employment status				
Employee	591	1.662	1.842	18.03%**
		(0.062)	(0.066)	(0.091)
Self-employed	172	1.864	1.786	−7.79%
		(0.128)	(0.128)	(0.181)
Unemployed	116	1.323	1.471	14.75%
		(0.139)	(0.184)	(0.226)
Perception of corruption				
Low	196	1.663	1.707	4.31%
		(0.117)	(0.124)	(0.171)
Medium	347	1.634	1.738	10.41%
		(0.080)	(0.088)	(0.119)
High	336	1.665	1.883	21.87%**
		(0.086)	(0.091)	(0.125)

(*Continued*)

Table 2. (*Continued*)

Variable	Number of Observations	Control	Treatment	Difference
Payment status				
With payment	110	1.879	2.269	38.99%**
		(0.160)	(0.167)	(0.231)
Without payment	769	1.619	1.720	10.07%
		(0.055)	(0.059)	(0.081)

Notes: Standard errors are in parentheses.
***p < 0.01, **p < 0.05, *p < 0.10.

groups in their responses at the 5% level.[9] The results show that 13.42% of taxpayers have reported lower income than their actual income to the tax office.[10] Concerning individual characteristics, our univariate analysis indicates several results. First, attitudes towards tax compliance differ across generations. Older people tend to exhibit lower tax compliance behaviour, with 31.3% of respondents aged 40–50 years and 40.5% of respondents aged 50 or above having engaged in tax evasion. These results are consistent with the findings of Russo (2013) in Italy that people aged 60 or above exhibit low-compliance behaviour, partly due to their dissatisfaction with public services. Second, tax compliance behaviour also differs between men and women, with 14.6% of male respondents having engaged in tax evasion, whereas only 5.41% of female respondents did so. Men tend to exhibit lower compliance than women, as suggested in multiple studies, including Barber and Odean (2001), Batrancea et al. (2019), Brockmann et al. (2016), and Hofmann et al. (2017). Third, low-income respondents tend to engage in tax evasion. Among respondents whose income was below 4.5 million rupiahs, 23.8% underreported their income on their tax returns. One possible reason may be that low-income people can more easily cheat on their taxes because they suffer financially more than rich people do (Hofmann et al. 2017).

[9]In the spirit of transparency, we provided information about the randomization. We checked the effectiveness of randomization by conducting a balance test. We employed logistic regression analysis to estimate the effect of various covariates on the likelihood of being in the treatment group. The results are shown in Table A1. Only gender has a coefficient that is significantly different from zero ($p = 0.1$). This means that *males* were more likely to be assigned to the treatment group unintentionally.

[10]The issue of whether our sample accurately represents the target population of taxpayers is obviously a crucial concern. To clarify this, we compared our sample with the target population of taxpayers in the list of taxpayers, which was obtained from the Indonesian tax office, and confirmed that our sample is consistent with the target population in terms of at least two categories: employment status and tax payment history. Regarding the employment status category, the proportion of taxpayers in our sample who are employees is 67%, and that in the target population is 64%. Regarding the tax payment history category, the proportion of taxpayers in our sample who had paid taxes in the last five years is 12%, and that in the target population is 11%. These comparisons show the similarity between our sample and the target population in terms of these two categories. Since the list of taxpayers provided by the Indonesian tax office does not include reliable information on other categories, such as age, gender, ethnicity, religion, and education, we could not confirm whether or not our sample is consistent with the target population in terms of these other categories. While we recognize that this latter issue is problematic, the consistency in terms of the two key categories mentioned at least partially justifies our claim that our sample is representative of the target population of taxpayers; this significantly mitigates the possibility of sample bias, and we feel confident that our results are valid.

Fourth, a significant negative correlation exists between educational attainment and tax compliance behaviour. Among respondents with college education, 15.8% disclosed that they had cheated on their taxes. These people may be able to utilize their knowledge to minimize or avoid their tax liability (Hofmann et al. 2017). Fifth, 18.0% of employees who were working in private and public organizations engaged in tax evasion. Employees are generally under the tax withholding system in which their tax is deducted from their salaries. Our results imply that some employees have additional income from other sources, but they do not report it to the tax office. Sixth, we examined the roles of respondents' culture and religion, because they are expected to be correlated to tax compliance behaviour (Lago-Penas and Lago-Penas 2010; Kountouris and Remoundou 2013; Russo 2013). Specifically, we considered four ethnic groups (Jawa, Sunda, Betawi, and a category specified as "other ethnic groups" in the survey) and two religious groups (Islam and a category specified as "other religious groups").[11] The results show that Sundanese and Muslims tend to engage in low-tax compliance behaviour.

Seventh, Kirchler et al. (2008) and Torgler (2007) examine the effects of people's trust in government on their tax compliance behaviour, because the perception of corruption in government institutions discourages them from paying tax. Consistent with these studies, our analysis reveals that respondents who perceive a higher level of corruption in government (i.e. they have lower levels of trust in government) are more likely to cheat on their income tax. Finally, our survey sample was drawn from the population of those who have filed tax returns at least once in the past five years. This implies that it includes people who have no actual income to report on their tax returns and those who have never had an opportunity to cheat on their tax reports due to tax withholding by their employers. These people are less likely to select the sensitive item indicating tax evasion in their responses to our list experiment question. The results show that only 10.1% of people revealed that they have engaged in tax evasion among those who have no tax payments on their reports, whereas among those who have paid some amount of tax at least once in the past five years (not through the withholding scheme but directly to the tax office), 39.0% of people have engaged in noncompliance.

Multivariate analysis

The univariate analysis captures the difference-in-means for each group separately without considering overlap in the group memberships. This analysis uses data inefficiently. To overcome these issues, we conduct a multivariate analysis, which basically generalizes the difference-in means approach by modelling the joint distribution efficiently to allow for control for multiple variables concurrently. We apply maximum-likelihood models with the constrained version of the estimator, assuming that the addition of the sensitive item does not influence the answers

[11]We categorize minority ethnic and religious groups as "*other ethnic groups*" and "*other religious groups*", respectively.

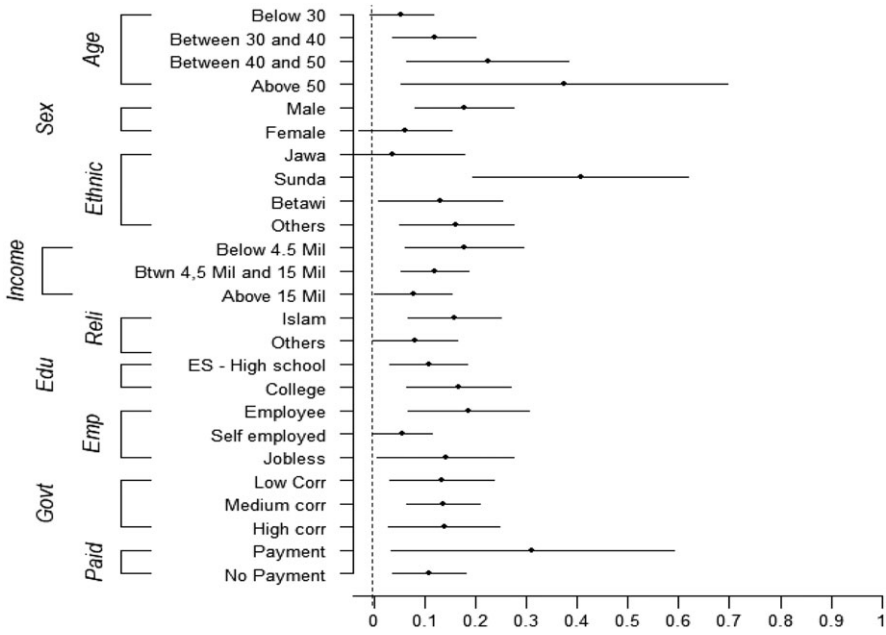

Figure 1. Multivariate estimates of tax noncompliance.
Notes: The dots estimated proportions of respondents engage in tax noncompliance, and the lines show the 95% confidence intervals from the regression model in Table A2. The vertical axis shows respondents' attributes.

concerning the control items (Imai 2011; Blair and Imai 2012).[12] The estimated coefficients together with standard errors are shown in Table A2.[13]

Figure 1 illustrates the estimated proportions of respondents cheating on their taxes by reporting less income than they actually earned. The coefficients for several variables are consistent with the findings in our univariate analysis discussed in the previous subsection. First, we continue to find a tendency that older people,

[12]We used statistical method for the item count technique and list experiment that can be found at http://CRAN.R-project.org/package=list. (Blair G, Imai K, Park B, and Coppock A 2018). We also checked for the existence of floor and ceiling effects as a result of our design, following Blair and Imai (2012). Figure A1 presents the percentage of respondents for each possible answer. The results show that the responses are distributed normally. The extreme cases have relatively few responses in both the control group and the treatment group. Blair and Imai (2012) proposed a test to detect the existence of a design effect in which the addition of the one treatment statement would affect the answers to the control items. Our test result shows that the Bonferroni-corrected p-value is 1.000. Therefore, we cannot reject the null hypothesis that there is no design effect.

[13]We use several individual characteristics in the model. To measure the variables, we reconstruct the data as follows: *age* (*below 30* = 1; *between 30 and 40* = 2; *between 40 and 50* = 3; *above50* = 4), *gender* (*male* = 1; *female* = 0), *ethnic* groups [*Jawa* (*Jawa* = 1; non-Jawa = 0), *Sunda* (*Sunda* = 1; non-Sunda = 0), *Betawi* (*Betawi* = 1; non-Betawi = 0)], *income* (*below 4.5 mil* = 1; *between 4.5 mil and 15 mil* = 2; *above 15 mil* = 3), *religion* (*Islam* = 1; *other religious groups* = 0), *education* (*elementary school-high school* = 1; *college* = 2), *employment status* [*employee* (*employee* = 1; non-employee = 0), *self-employed* (*self-employed* = 1; non-self-employed = 0)], and *perception of corruption* (*low corruption* = 1; *medium corruption* = 2; *high corruption* = 3).

especially respondents in the age group between 40 and 50 years old, engage in tax evasion more than do those in the age group below 30 years old. The difference between these age groups is statistically significant at the 5% level. Second, our multivariate findings on gender are consistent with our univariate findings. Men engage more in tax evasion than women do, with an estimated difference of 11.6% points, which is marginally significant at the 10% level. Third, there are significant differences between ethnic groups in tax evasion. The proportion of Sundanese engaging in tax evasion is higher than those of Jawa and Betawi respondents, with estimated differences of 36.9% and 27.5% points, respectively. These differences are statistically significant at the 5% level. Fourth, we also find that employees engage in more tax evasion than self-employed individuals do, with an estimated difference of 12.9% points. It is also statistically significant at the 5% level.

On the other hand, some results in the multivariate analysis are less clear compared to those in the univariate results. The univariate analysis suggests that the group of respondents with income below 4.5 million rupiahs engage in more tax evasion than the group of higher income respondents. However, the estimated differences across income levels disappear in the multivariate results. In addition, although the univariate analysis also shows that Muslims and people with college education or higher tend to engage more frequently in tax evasion, the multivariate results indicate no clear evidence of differences across religious groups or education levels. Moreover, the univariate analysis shows that people with a perception of high corruption tend to engage more frequently in tax evasion, but the multivariate analysis does not confirm that tax evasion behaviour depends on the perception of corruption. Furthermore, the univariate analysis shows that people who have paid some amount of tax directly to the tax office at least once in the past five years tend to engage more frequently in tax evasion than do those who have never done so, but the difference between the two groups is not statistically significant in the multivariate analysis, partly due to the small sample size of the former group of people.

Conclusion

Tax evasion is a sensitive problem at the individual level. Because taxpayers have a motivation to hide their tax evasion behaviour, identifying their true behaviour can be a crucial challenge for researchers as well as tax regulators. This is related to social desirability bias, in which respondents attempt to answer survey questions in a socially desirable or acceptable manner, instead of revealing their actual opinions or behaviour. In the context of taxation, this bias emerges when taxpayers pretend to meet their own obligations by underreporting their incomes to the tax office. To identify the characteristics of taxpayers who engage in tax evasion behaviour, this study mitigated the influence of social desirability bias by conducting a list experiment in Jakarta, Indonesia. The univariate analysis revealed that 13.4% of taxpayers have cheated on their taxes by underreporting their income on their tax returns. The results also uncovered clear evidence that tax evasion behaviour varies depending on individual characteristics, such as age, gender, ethnicity, and employment status. The multivariate analysis generally confirmed the findings from the univariate analysis, though some differences found in the univariate analysis (such as those

between religious groups and education levels) disappeared in the multivariate analysis.

In a developing country like Indonesia, the percentage of taxpayers who actually cheated on their taxes may be larger than estimated in this study because of weak auditing capacity and legal system.

Our list experiment outcomes may still underestimate the proportion of taxpayers who have engaged in tax evasion behaviour. In a developing country like Indonesia, the percentage of taxpayers who actually cheated on their taxes could be larger than estimated in this study because of weak auditing capacity and legal system. However, we believe that our study has important implications for taxation policy because our results help identify potential targets for tax auditing to overcome the issue of a government's limited institutional capacities. For instance, in Indonesia, tax offices identify potential targets of auditing mostly on an *ad hoc*, not a systematic, manner by merely comparing a particular tax return to others from a similar business environment. Because such an *ad hoc* monitoring scheme does not take into account the characteristics of individual taxpayers, tax offices are likely to fail to detect many taxpayers engaging in tax evasion behaviour.

The Indonesia State Budget 2019 emphasizes that the tax authority (DGT) needs to raise tax revenue by broadening the tax bases and also by improving tax compliance sustainability. The Minister of Finance points out the importance of effective tax auditing to increase tax revenue to the required level for supporting the country's development.[14] It is important for tax offices to identify what types of taxpayers are more likely to engage in tax evasion and to establish appropriate measures to tackle tax evasion through tax auditing. Given that our results indicate that taxpayers who are old, male, corporate employees, and members of a certain ethnic group tend to exhibit relatively low tax compliance, one possible tax policy could be for the DGT to cluster these groups of taxpayers as potential targets for tax auditing. However, the DGT currently does not have all the necessary information on individual taxpayers due to constraints on its taxpayer database and administrative capacities. To address this practical limitation, the DGT needs to collect the necessary information on individual taxpayers by changing its taxpayer database structure and administrative management while at the same time carefully protecting taxpayers' privacy.

We believe that the relationship between tax evasion and individual characteristics found in our study would be useful information for both researchers and tax authorities who are interested in designing effective tax policies and auditing schemes to improve governance and revenue collection. At the same time, the ethical issues involved in targeting specific groups in the tax auditing process are also a matter of concern. The government and tax authorities need to be aware of these and set clear rules for the implementation of auditing and the appropriate handling of personal data.

Data Availability Statement. Replication materials are available in the Journal of Public Policy Dataverse at https://doi.org/10.7910/DVN/QW1JXG.

[14]This speech was delivered to the parliament on July 27, 2017.

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APPENDIX

Table A.1. Logit model test of balance in randomization

Variable	Coefficient	S.E.
Age	−0.027	0.075
Male	0.260*	0.149
Jawa	−0.065	0.180
Sunda	0.248	0.247
Betawi	−0.202	0.202
Income	0.032	0.119
Islam	−0.087	0.181
Education	0.098	0.155
Employee	0.078	0.244
Self-employed	0.034	0.266
Government	0.011	0.090
Payment	−0.110	0.224
Constant	−0.343	0.479
Log likelihood	−604.619	
Chi-squared	8.60	
Number of observations	879.000	

Notes: The dependent variable is the indicator of whether the respondent was assigned to the treatment group.
*$p < 0.1$.

Table A.2. Multivariate regression results (maximum likelihood constrained model)

	Est.	S.E.		Est.	S.E.
Sensitive item			Control items		
(Intercept)	−7.401	3.068	(Intercept)	−0.935	0.247
Age	1.157	0.512	Age	−0.052	0.043
Male	1.895	1.316	Male	0.290	0.081
Jawa	−2.199	2.510	Jawa	−0.031	0.099
Sunda	1.952	0.983	Sunda	−0.416	0.143
Betawi	−0.369	1.011	Betawi	0.017	0.110
Income	−0.795	0.614	Income	0.132	0.064
Islam	1.269	1.056	Islam	−0.247	0.096
Education	0.882	0.821	Education	0.148	0.085
Employee	0.595	1.328	Employee	0.199	0.138
Self-employed	−1.750	1.502	Self-employed	0.252	0.145
Government	0.028	0.566	Government	0.033	0.049
Payment	2.183	1.296	Payment	0.161	0.124
Log-likelihood	−1293.46				

Note: The outcome variable is whether a respondent reports income lower than actual one.

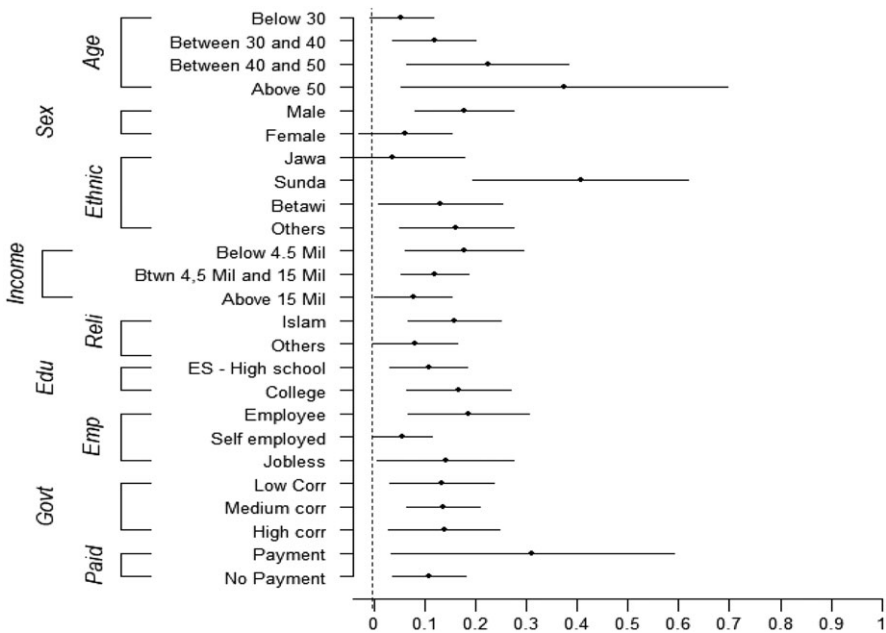

Figure A.1. Percentage of respondents for each answer category in the list experiment.
Note: Respondents were asked to report the number of statements that apply to them in the range of zero to four (in the case of control group shown in gray) or zero to five (in the case of treatment group shown in black).

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