Taxman's Dilemma: Coercion or Persuasion? Evidence from a Randomized Field Experiment in Ethiopia*

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1 Introduction

In recent years there have been a proliferation of field experiments designed to study the impact of coercive measures, such as threat of audit, higher penalties and others to deter tax evasion (Hallsworth, 2014). However, much less is known about the relative importance of coercion or deterrence as compared to persuasion measures. This paper addresses this gap using a unique experiment design implemented in Ethiopia.

Three key research questions are addressed in this paper: how pervasive is tax evasion in Ethiopia? Does appeal to tax morale a viable approach to improve tax compliance? How responsive are businesses to threats as compared to persuasions? We used two duly signed letters from the Ethiopian Revenue and Customs Authority (ERCA) that had been hand-delivered to 3120 randomly selected businesses operating in Addis Ababa, the capital, a month before businesses filed their tax returns. One letter consisted of threats (coercion/deterrence) another letter tax morale (persuasion) and the control group received no letter. The corresponding tax information for the businesses in the experiment was obtained from administrative data supplied by the ERCA.

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Our findings suggest that there is a substantial degree of tax evasion. Businesses subject to threats increased their profit tax payable by 38 percent, while those that received persuasion letter increased by 32 percent in comparison to the control group. Our results are robust to different estimation strategies. The size and significance of the effects of the treatments are unique to this study. It is also our conjecture that the observed impact of the persuasion letter could have also picked up higher perceived risk of being 'detected' or 'identified' by the tax authority that may have led to filing higher than previous profit tax.

2 Theoretical Framework

We provide a simple theoretical framework to guide the experiment design and empirical analysis. We build on the classical model of Alingham and Sandmo (1972) and its extensions to account for non-pecuniary costs (Gordon, 1989), the psychic costs of evasion (Bosco and Mittone, 1997), moral and ethical sentiment (Erard and Feinstein, 1994; Recker et al, 1994).

The taxpayer's actual income, W, is exogenously given and it is known to the taxpayer but not to the tax collector. The taxpayer faces a flat profit tax rate t. The taxpayer faces two possibilities. She can report a fraction of her income and pay tax on the reported income in the event that she escapes detection. However, if the taxpayer decides to report a fraction of her income and ends up being audited, she will pay the full amount of the tax plus penalties on the evaded tax. The probability of detection, π, is constant. The full amount of the taxpayer's net income when she under-reports and is not detected is given by $Y = W(1 - t(1 - \beta))$ where β is the fraction of income evaded. If detected, the taxpayer pays the full amount- tW- plus penalty of $ft\beta W$, where f is the fine rate on the evaded tax, and net income is given as $Z = W(1 - t - ft\beta)$. The taxpayer maximizes her conditional expected utility by choosing optimal evasion levels, i.e., β.

Our tax experiment goes beyond detection probabilities and fines. One aspect of the experiment is to encourage taxpayers to pay their due by appealing to their patriotic duties.

Following Bosco and Mittone (1997), we introduce the moral constraints in the above tax evasion decision problem. Tax evasion involves moral costs. First, paying below what is perceived to be a fair tax ($\bar{t}W$) has a psychological cost and this cost is incurred irrespective of detection. Bosco and Mittone (1997) refers to this as a Kantian moral cost $K(\beta)$. Paying below the fair tax involves anxiety, guilt or a reduction in self-image. However, the moral cost arises only if the actual tax rate is at or below the fair tax level ($t \leq \bar{t}$). Tax rates higher than the fair tax level could erode the moral cost by instilling resentment. Second, tax evasion often involves non-pecuniary reputational costs[1] , $S(\beta)$, due to social stigma (Graham et. al., 2014). However, reputational cost due to social stigma arises only if tax evasion is not a norm in the society. Thus, the taxpayer compares her perceived degree of tax evasion, $\widehat{\mu}$, with that of her subjective 'acceptable' level of evasion, $\overline{\mu}$. For $\widehat{\mu} > \overline{\mu}$, reputational cost does not have any role as evasion is the norm. The decision with these moral cost considerations is given as:

$$\underset{\beta}{argmax} E(U) = (1-\pi)U(Y, M_y) + \pi U(Z, M_z) \tag{1}$$

where $M_y = (\bar{t} - t)K(\beta)$ and $M_z = (\bar{t} - t)K(\beta) + (\overline{\mu} - \widehat{\mu})S(\beta)$.Assuming $U_{YM} = U_{MY} = U_{ZM} = U_{MZ} = 0$; $U_M = -1$ (where M denotes M_y and M_z); and $K''(\beta) = S''(\beta) = 0$ for analytical tractability as in in Bosco and Mittone (1997) and Gordon (1989), the first order condition for interior optima is $tW(1-\pi)U_Y - ftW\pi U_Z - (\bar{t} - t)K - (\overline{\mu} - \widehat{\mu})S = 0$. The associated second order condition (s.o.c), $(tW)^2(1-\pi)U_{YY} + (ftW)^2\pi U_{ZZ}$, is negative by the concavity assumption of the utility function. From the first order condition, we obtain:

[1]There could also be a direct cost in terms of loss of firm's market valuation. For instance, Hanlon and Slemrod (2009) found that news about a firm's tax avoidance negatively affects its stock price and this is more pronounced in firms with high social exposure such as firms in the retail sector.

$$\frac{\partial \beta}{\partial \pi} = -\frac{-twU_Y - ftw\pi U_Z}{s.o.c} < 0 \quad [2] \qquad \frac{\partial \beta}{\partial f} = -\frac{-tw\pi U_Z}{s.o.c} < 0 \quad [3]$$

$$\frac{\partial \beta}{\partial K} = \frac{\bar{t} - t}{s.o.c} < 0 \text{ for } t < \bar{t} \quad [4] \qquad \frac{\partial \beta}{\partial S} = \frac{\overline{\mu} - \widehat{\mu}}{s.o.c} < 0 \text{ for } \widehat{\mu} < \overline{\mu} \quad [5]$$

From eq. 2 & 3, the effect of higher detection rate and fines on tax evasion is unambiguously negative. The effects of the moral costs in eq. 4 &5 depend on the gaps between the fair tax and the actual tax; and between the perceived evasion rate and the acceptable rate of evasion. The moral costs could reduce evasion only if the actual tax rate is less than the fair tax rate, and if the perceived proportion of tax evaders is less than the acceptable level. The moral constraint may work in the reverse if either taxes or the proportion of tax evaders in the society are perceived as too high.

3 Experiment Design

We hand-delivered two types of letters to 3120 randomly selected businesses[2] in Addis Ababa. The experiment included taxpayers that are required by law to keep book of accounts and submit profit and loss statements at the end of the year. We excluded businesses categorized as large taxpayers based on discussions with the tax authority[3] as well as state-owned businesses. We collected the tax return information for the tax reporting period 2013/14 from the tax office's administrative database in early 2015. The database includes profit tax declaration and payment, rental tax payment, and additional information on the legal type and the category of businesses.

The treatment letters were signed by the respective managers of the ERCA branches in which

[2] Stratified by district and broad business sector.

[3] According to ERCA, there are about 1000 large tax payers nationally that are very well known to the authority and hence there is no need to send letters randomly. Large tax payers have annual turnover of above 27 million birr or about US $1.25 million.

the taxpayers file their tax returns. The true purpose of the letters was kept confidential from the rest of the ERCA officials. Two types of letters were sent depending on the assignment of the businesses into the threats (coercion) and tax morale (persuasion) groups. Taxpayers assigned in the control group received no letter. The letters were hand delivered to the business managers a month before the declaration period for 2013/14 started (i.e., in June 2014). The coercion letter stated that the recipient could be audited in that particular fiscal year and warned businesses to pay their dues accurately. The letter also reminded taxpayers that failing to pay taxes accurately entails civil and criminal penalties under the income tax proclamation. Taxpayers were also provided with an abridged tax code that lists the penalties for tax evasion that ranged from a hefty monetary penalty to a fifteen-year prison term[4].

The persuasion letter appealed to the patriotic duties of businesses to pay taxes and included complementary statements that praised their loyalty and honesty in paying their taxes diligently. The letter listed flagship projects financed by the taxpayers' money and their developmental impact. The letter also described the various compliance based incentives and rewards the tax authority provides and invited taxpayers to benefit from these programs. Although the experiment involved 4920 businesses, we were left slightly over 4100 businesses for which we obtained tax return data for 2013/14.

4 Estimation Strategy and Key Results

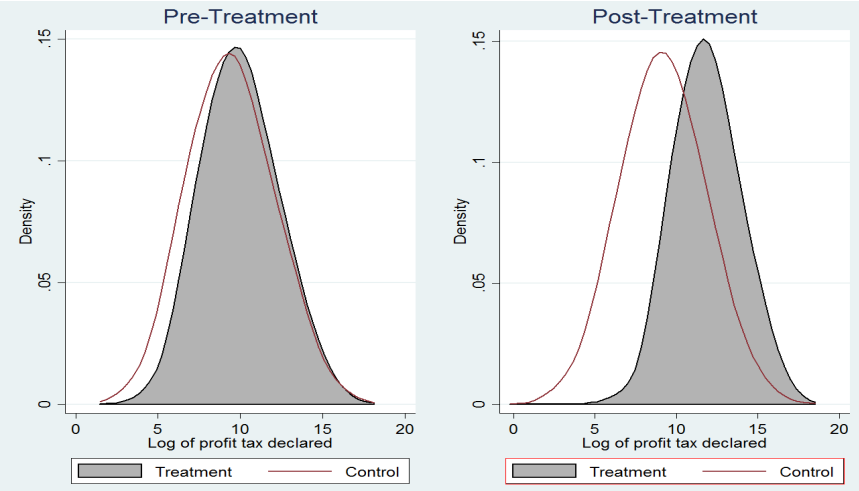
The random assignment of the treatment allows us to use OLS as a consistent estimate of the average treatment effect. It is expected that quasi-experimental methods, such as matching estimators, would converge to the OLS when selection bias, or other sources of endogeneity such as omitted variable problem or reverse causality are suspected not to exist by the very nature of the data generating process. To establish robustness, we report in the

[4]The letters are available in the Online Appendix

online appendix results from matching methods that compared treatment effects of similar businesses on observable characteristics such as sectors of activity, location, and legal status. It is also possible that unobserved time-varying factors that influence both control and treatment groups at the same time could affect our results. Therefore we exploited the panel nature of the data and report results from a difference-in-difference regression set up to control for such effects. Finally we also provide results from a linear probability regression that addresses the issue of zero tax declaration on our estimate. The results of the matching and linear probability regressions are reported in the Online Appendix.

Figure 1 presents a non-parametric Kernel density estimate of total profit tax liability declared by businesses before and after treatment. As expected, the distribution of profit tax paid pre-treatment was more or less identical between control and treatment groups. However we see significant shift in the whole distribution of profit tax paid by the treatment group to the right in comparison to the control group post-treatment. While the average profit tax paid in nominal terms slightly declined for the control group, it increased significantly for the treatment group. This summary statistics suggest that the experiment has had a large and significant effect on the tax compliance behavior of businesses.

Figure 1: Kernel Density Distribution of Post and Pretreatment Tax Payments



The OLS in Table 1 (panel A & B) report cross-sectional effects of the treatment, while the difference-in-difference regression exploits the panel nature of the data and controls for time-variant unobserved factors that could potentially affect tax payments of both the treatment and control groups (panel C to F). It can be seen that the OLS overestimated the effects of both letters of persuasion and coercion on profit tax in comparison to the difference-in-differences regression which is our preferred model. As reported in panel D, which controls for firm characteristics, the coercion letters increased profit tax payments on average by 38 percent and persuasion by 32 percent which are large compared to any other similar study undertaken so far[5].

Table 1: The Impact of Treatment on Profit Tax

	OLS Regression		Difference-in-Differences (DID)			
	Panel A	Panel B	Panel C	Panel D	Panel E	Panel F
Persuasion	0.38***	0.31***	-0.03	-0.01	0.01	-0.03
	(0.117)	(0.108)	(0.121)	(0.108)	(0.119)	(0.170)
Coercion	0.61***	0.48***	0.13	0.10	0.06	0.37**
	(0.108)	(0.097)	(0.114)	(0.100)	(0.110)	(0.155)
Persuasion- DID	-	-	0.41**	0.32**	0.40**	0.54**
			(0.168)	(0.149)	(0.161)	(0.224)
Coercion- DID	-	-	0.48**	0.38**	0.40**	0.57**
			(0.157)	(0.136)	(0.150)	(0.200)
Constant	9.10***	8.40***	9.40***	8.47***	8.28***	8.35***
	(0.073)	(0.400)	(0.078)	(0.275)	(0.094)	(0.417)
Control	No	Yes	No	Yes	Yes	Yes
Time Dummy	-	-	Yes	Yes	Yes	Yes
Observations	2255	2255	4368	4368	3582	1517
R^2	0.014	0.237	0.008	0.239	0.145	0.25

**** and ** significant at 1% and 5% respectively; robust standard errors in paranthesis*

Note*: Panel A & B are the cross-sectional OLS regression of log profit tax payable, conditional on positive tax payable declaration with and without firm specific characteristics (location, sector and legal status). Panel C to F are difference in difference regressions for the full sample with and without controls (panel. C&D), incorporated firms (panel E), and firms in agro processing and manufacturing sector (panel F).*

As a measure of robustness, panel E restricts the regression to individual businesses that are not incorporated (sole proprietorship) and panel F restricts the regression to agro-processing

[5] Ariel (2012) for Israel reported very low or no effect of threat letters and a reverse result in the case of tax morale.

and manufacturing sector, which rely heavily on locally supplied intermediate inputs from small farmers. Hence there is significant room for manipulating costs as such businesses are not required to submit certified receipts .Given the heavy cost of exiting their current business, and the implied severity of penalty of tax evasion, it is not surprising that they responded vigorously to threats of audits in comparison to other businesses. Even the letter of persuasion may be interpreted as ominous signal of being watched by the feared tax authority so that part of the strong response among those who had received the persuasion letter could be picking up that effect. It is also conceivable to argue that businesses engaged in the agricultural and manufacturing sector receive significant incentives from the government such as duty free imports of machineries, tax holidays and other support, that some of them may incline to respond positively to the complementary letters sent by the tax authorities on the belief that actual tax rates were not higher than perceived one as argued in the theoretical model. However, it is difficult to separate the two effects.

5 Conclusions

This paper used an innovative field experiment to gauge the magnitude of tax evasion in Ethiopia. Unlike previous studies it incorporated the carrot-stick approaches to tax compliance offering fresh evidence on the ongoing debate whether coercion/deterrence is an effective tool in dealing with tax evasion as compared to persuasion that includes incentives.

Our result suggests a widespread tax evasion among Ethiopian businesses. Those that received coercive letters responded by increasing their profit tax payable by about 38 percent while those that received complimentary letters increased by 32 percent. Compared to previous results, this is the first result where the magnitude of the experiment was large and significant. Our discussion with the tax authorities revealed that the large increase in profit tax recorded among those who received the persuasion letter could potentially pick up 'the perception of being shadowed" by the revenue authority rather than a genuine belief in the

content of the letter. Therefore some of the complimentary letters might be picking up perceived risk of being "targeted" for future audit and it is hard to isolate this effect. Nevertheless, even with this potential confounding, the role of persuasion and appeal to civic duty seem to resonate well with Ethiopian businesses.

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