

Voluntary and enforced tax compliance determinants and impact among agrochemical businesses in Ghana

Tax
compliance &
agrochemical
traders

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Received 2 April 2023

Revised 9 May 2023

18 June 2023

Accepted 8 July 2023

Abstract

Purpose – This paper examined tax compliance and its impact on agrochemical traders in Ghana.

Design/methodology/approach – Based on the registered agrochemical lists obtained from the Plant Protection and Regulatory Service Department, 92 agrochemical traders were sampled for data collection. Probit regression was used to estimate determinants of tax compliance, whereas the Inverse Probability Weighted Regression Adjustment Model was employed to evaluate the impact of tax compliance on business performance.

Findings – The results revealed that age and gender relate positively to enforced tax compliance, while education positively impacts voluntary tax compliance. Nonetheless, tax rate, trust and monthly sales positively affect voluntary tax compliance but negatively impact enforced tax compliance. Inversely, while authorities' power negatively impacted voluntary compliance, it positively influenced enforced tax compliance confirming the Slippery Slope Framework.

Originality/value – To the best knowledge of the authors, this paper is the first to investigate tax compliance determinants and impact among agrochemical traders, despite the tremendous growth of the agrochemical sub-sector in Africa and Ghana. Therefore, this study makes a modest contribution to empirical studies that validate the Slippery Slope Framework in promoting tax compliance in the agricultural and agribusiness sectors of a developing country. Similarly, it also unearths the impact of tax compliance on agribusiness growth which has yet to be highlighted in the extant literature.

Keywords Voluntary compliance, Enforced compliance, Business performance, Tax compliance, Agrochemical traders

Paper type Research paper

1. Introduction

Taxation is a major tool by which governments worldwide generate resources to discharge their duties. Tax which is a compulsory levy to be honoured by those (taxable persons) upon whom they are charged, with or without returns from the Government (Abdu & Adem, 2023),

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Funding: This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Competing interests: The authors declare that they have no competing interests.



Arab Gulf Journal of Scientific
Research
Emerald Publishing Limited
e-ISSN: 2536-0051
p-ISSN: 1985-9899

DOI 10.1108/AGJR-03-2023-0133

provides funds to benchmark government expenditure in an economy (Armah-Attoh & Awal, 2013; Yew, Milanov, & McGee, 2015). However, taxpayers find it difficult to comply (Maseko, 2014; Masarirambi, 2013; Seidu, Abdul, & Sebil, 2015). Given this, the issue of tax compliance has been a global concern for many years (Ritsatos, 2014; Yusof, Ling, & Wah, 2014). To reduce non-compliance among Chinese taxpayers, Noked and Xu (2020) proposed a voluntary disclosure practice policy and how tax authorities should administer this practice policy. There have been extensive studies on compliance and non-compliance with tax in developed and developing countries (Saad, 2014; Ali, Fjeldstad, & Sjursen, 2014; Lee, 2017; Nagel, Huber, Van Praag, & Goslinga, 2019; Taing & Chang, 2021). Strategies including but not limited to audits and imposition of fines and penalties have improved based on research findings (Gangl, Torgler, Kirchler, & Hofmann, 2014). Tax compliance is when taxpayers file all their tax returns by disclosing all income truthfully and settling the tax obligation due per tax laws and regulations (Palil & Mustapha, 2011). Tax compliance has also been defined as the point at which tax rules of a country are being complied with by taxpayers as they declare income, file returns and pay tax liability on time (OECD, 2016; Vikneswaran *et al.*, 2016). McBarnet (2019) asserted that tax compliance should be viewed under three dimensions consisting of committed compliance (the willingness to pay taxes with no complaints), capitulated compliance (to give in and pay taxes reluctantly) and creative compliance (reducing taxes by lawfully redefining income and deducting expenditure). Comparatively, tax compliance is better among advanced countries than in emerging countries (Mas'ud *et al.*, 2014). Oladipo, Iyoha, Fakile, Asaley, and Eluyela (2019) attributed this to the tax system (available institutes and instruments enabling tax authorities to discharge their work economically, effectively and efficiently) employed in developed countries. Eluyela *et al.* (2019) revealed that the revenue generated is likely to be affected should the institute and instrument of taxation (the tax system) encourage mismanagement, leakages and corruption.

Prior studies (Carroll, 2011; Terkper, 2013; World Bank, 2017) on tax compliance revealed low compliance in the informal sector compared to the formal sector. To unravel low tax revenue generation performance, Cyan, Koumpias, and Martinez-Vazquez (2017) revealed that the timely use of mass media campaigns could enhance tax compliance to improve tax revenue generation in Pakistan. Grounded on the Ghana Statistical Service report of 2016, Adei, Braimah, Mensah, Acquah Mensah, and Agyemang-Duah (2021) revealed that 90% of active Ghanaians are in the informal sector. Therefore, the drivers of tax compliance should be given much attention to defray high tax evasion (Annan, Bekoe, and Nketiah-Amponsah, 2014), hence, this study. Meanwhile, most emerging economies have their informal sector dominated by agriculture (World Bank, 2017), with the majority being smallholder farmers (in Ghana's case) (Peprah, Koomson, Sebu, & Bukari, 2020). Given these, governments' revenues are likely to increase should agricultural actors (upstream and downstream) comply with taxation regimes.

However, FAO (2004) reported that out of 13,628,000 hectares of tillable land in Ghana (Africa), only 6,331,000 hectares are cultivated due to infertility. This has led to the high usage of agrochemical products (Diarra & Tasie, 2017). It has been found that fertilisers and pesticides are the agrochemical products commonly used by farmers. Also, agrochemical usage among farmers is highly concentrated in the Upper West and Upper East regions in Ghana, followed by the Ashanti, Brong Ahafo (present-day Bono, Bono East and Ahafo) and Western regions (present-day Western North and Western regions) (Fianko, Donkor, Lowor, & Yeboah, 2011). Consequently, the trade flow pattern of agrochemicals in Ghana revealed that 3,854,126 kg of pesticides were traded in the country in the year 1992; 21,741,000 kg of insecticides, 1,548,000 kg of fungicides and 316,218,000 kg of herbicides were imported into Ghana for trading purposes (Diarra & Tasie, 2017; Fianko, Donkor, Lowor, & Yeboah, 2011).

Given this, some agricultural value chains and related jobs in African countries like Ghana are not exempted from tax. A tax provision is made in the Ghana Revenue Act 2015 (Act 896), explaining the tax implications on agricultural-related jobs such as agrochemical trading. Under the Ghana Revenue Act 2015 (Act 896), agrochemical trading income is treated as income from the business. As specified by Act 896 (Ghana Revenue Act, 2015), a graduated tax rate is used for firms registered under sole proprietorship, while a flat rate (depending on the location) is applied to firms registered under the Company's code (1963). However, the investigation into tax compliance among agrochemical traders has not received much attention. Previous studies have focused on a review of agrochemicals usage and the Ghanaian Environment (Fianko *et al.*, 2011), an examination of the regional policies governing pesticide application in the nation (Ghana precisely) (Diarra and Tasié, 2017), tax policy and farm capital investment (Williamson & Stutzman, 2016), the impact of the threat on tax compliance (Mohdali, Isa, & Yusoff, 2014), SMEs' attitudes towards tax compliance in Zimbabwe (Nyamwanza, Mavhiki, Mapetere, & Nyamwanza, 2014), To Pay or Not to Pay? Citizens' Attitude Towards Taxation in Kenya, Tanzania, Uganda and South Africa (Ali, Fjeldstad, & Sjursena, 2014), underreporting of income among the self-employed in Europe (Kukk, Paulus, & Staehr, 2020), and job performance, knowledge and perceived power of tax officers on tax morale of agrochemical traders in Ghana (Kumi & Kwasi Bannor, 2023). Hence, this study fills the gap by touching on the determinants of voluntary and enforced tax compliance among agrochemical traders. Further, the study employed the Slippery Slope Framework (based on the Economic Theory of Crime) in examining voluntary and enforced tax compliance determinants among agrochemical traders, which has not been used in the literature on tax compliance studies in agribusinesses. Moreover, since tax incentives affect agricultural investment (Hadrich, Larsen, & Olson, 2013), however, as Kumi and Kwasi Bannor (2023) recommended, there is a lacuna of studies of the impact of voluntary tax compliance on the performance of agrochemical traders' businesses; therefore, this study also contributes modestly to the agribusiness literature on taxing.

2. Literature review

2.1 Voluntary and enforced tax compliance

Tax compliance refers to preparing and reporting taxpayers' tax returns accurately, on time and in line with tax rules and regulations (Mustapha, 2010). It involves filling out a tax return, reporting non-exempt income, including all tax liabilities and paying tax liabilities on time (Bello, 2014). Nonetheless, taxpayers and tax collectors define tax compliance as complying with tax laws that diverge from one country to another (Chepkurui, Namusonge, Oteki, & Ezekiel, 2014).

Following prior literature (Inasius, 2019), determinants of tax compliance are presented under five categories. They are economic determinant factors (tax rates, tax audits and perception of government expenditure), institutional factors (the role of tax authorities, the simplicity of tax returns and administration, and the probability of detection), social determinant factors (ethics and attitude, equity and fairness, changes in government policy and referral groups), individual determinant factors (personal issues of the individual concerning personal financial constraints and tax awareness) (Taing and Chang, 2021), and other factors which refer to non-economic, social, institutional or individual factors. However, they are demographic (control) variables employed by numerous researchers (Taing and Chang, 2021). Researchers have used these factors in studies relating to tax compliance and non-compliance. For example, the study conducted by Deen-Swarray, Moyo, and Stork (2013) in Kenya, South Africa, Tanzania and Uganda revealed that tax-compliant attitude is high among individuals who receive satisfaction from government service. Slemrod (2016) revealed that the probability of audit, referral groups, tax knowledge, and the perception of equity and fairness significantly affect tax compliance in Indonesia. Before this study, it had

been discovered in other studies, including [Kamleitner, Korunka, & Kirchler \(2012\)](#), that tax compliance is influenced by economic factors such as tax rate, the probability of being audited and the perception of government spending.

However, tax compliance is highly influenced by power and trust measures ([Kasper, Kogler, & Kirchler, 2015](#)). Also, [Muehlbacher and Kirchler \(2010\)](#) revealed that the credibility of tax authorities is assured based on the levels of audits and penalties (power execution). A field experiment by [Castro and Scartascini \(2015\)](#) revealed that deterrence messages were likely to affect tax compliance positively. [Eichfelder and Kegels \(2014\)](#) found that tax authorities' behaviour significantly affects taxpayers' compliance. [Ali, Fjeldstad, and Sjursena \(2014\)](#) found that citizens in Kenya, Tanzania, Uganda and South Africa likely see evading as wrong and punishable when they perceive no room for evading. Moreover, in Geru (Zimbabwe), [Nyamwanza, Mavhiki, Mapetere, and Nyamwanza \(2014\)](#) discovered enforcement as a factor that significantly influences tax compliance positively. Also, [Alm et al. \(2012\)](#) argued that mutual trust (between tax authorities and citizens) positively influences tax compliance.

Separating tax compliance into voluntary and enforced compliance, [Inasius \(2019\)](#) averred that voluntary compliance is a partnership between taxpayers and tax authorities which leads to tax compliance by taxpayers without tax authorities' intervention (action). Furthermore, [da Silva, Guerreiro, and Flores \(2019\)](#) stressed that trust in governance (authorities) is the bedrock of voluntary compliance, proving enforced compliance irrelevant. In previous literature ([Mendoza, Wielhouwer, & Kirchler, 2017](#)), voluntary compliance emerges due to factors including but not limited to trust in the authorities. However, most of the studies on voluntary tax compliance ([Prinz, Muehlbacher, & Kirchler, 2014](#); [Gangl et al., 2014](#); [da Silva, Guerreiro, & Flores, 2019](#)) relied on the Slippery Slope Framework introduced by [Kirchler, Hoelzl, and Wahl \(2008\)](#). [Kirchler et al. \(2008\)](#) stressed that trust is premised in an environment where taxpayers and authorities demonstrate mutual respect to enhance voluntary compliance. Almost all the works of literature ([Alm et al., 2012](#); [Prinz et al., 2014](#); [Gangl et al., 2014](#)) on voluntary tax compliance confirm that trust (in authorities or Government) positively impacts voluntary compliance. Based on the earlier studies' results, the authors hypothesised this below.

H1. Trust in authorities influence voluntary tax compliance among agrochemical traders.

On the other hand, enforced tax compliance is seen as the condition on which taxpayers pay taxes based on "a must-do thing" and not "I want to" ([Slemrod, 2016](#)). According to [Muehlbacher, Kirchler, and Schwarzenberger \(2011\)](#), enforced tax compliance emerges when taxpayers pay taxes due to the perceived power of tax authorities. Similarly, [Mendoza, Wielhouwer, and Kirchler \(2017\)](#) explained that deterrence and enforcement actions lead to enforced compliance. [Muehlbacher et al. \(2011\)](#) employed stepwise regression analysis to investigate the influence of trust and power on voluntary and enforced tax compliance. Using a large data size across taxpayers in three countries (United Kingdom, Austria and Czech Republic), they confirmed that the power of tax authorities positively influences enforced tax compliance. Moreover, their result was found to be statistically significant. In consistency, it was revealed in the study "Cooperative tax compliance: From deterrence to deference" that enforced compliance is strongly and positively impacted by authorities' power ([Kirchler, Kogler, & Muehlbacher, 2014](#)). Also, it is confirmed in the study "Tax compliance as a system: Mapping the field" ([Randlane, 2016](#)) that power of tax authorities encourages enforced tax compliance. Furthermore, [da Silva et al. \(2019\)](#) affirmed that tax authorities' power influences tax compliance in Brazil. Therefore, the authors hypothesised this below.

H2. Power of authorities influences enforce tax compliance among agrochemical traders.

2.2 Impact of tax compliance on business performance

Tax compliance is accompanied by its relevant costs. These costs refer to the costs incurred by the taxpayer for complying with tax regulations and procedures (Evans *et al.*, 2014). They include costs incurred on records keeping and professionals hired or employed to extract financial statements for tax purposes. Matarirano, Makina, and Chilokane-Tsoka (2019) argued that tax compliance costs increase as the business performs better. Prior literature (Hadrich *et al.*, 2013) revealed that tax incentive (policy) affects investment significantly if it minimises profit. Evans *et al.* (2014) found that tax compliance positively impacts business performance; the plausible reason is that business owners can keep proper financial records and prepare proper financial statements that provide good financial insight about the business for economical, effective and efficient decision-making. Moreover, tax compliance promotes better business management, ensuring higher revenue against associated costs (Matarirano *et al.*, 2019). Smulders (2013) argued that tax compliance significantly associates with managerial benefits among small businesses in South Africa. Given this, it was hypothesised that

H3. Voluntary tax compliance influences agrochemical business performance.

2.3 Theory of economic model of crime and Slippery Slope Framework

Two approaches (economic and behavioural) account for tax compliance (James, Hasseldine, Hite, & Toumi, 2001). The economic approach regards taxpayers as rational beings; hence, they are bound to make rational decisions, while the behavioural approach recognises taxpayers' decision to pay tax as being influenced by sociological and psychological determinants. The theory behind the economic approach is the Economic Theory of Crime proposed by Becker (1968). According to Becker (1968), compliance with tax is a decision taxpayers rationally make by taking either a safe option (reporting honestly) or a risky option (underreporting or evading). Alm and Torgler (2011) consistently revealed that taxpayers compare the utility derived from cheating and the result detected when cheating (underreporting) to justify compliance. In Nigeria, Atawodi and Ojeka (2012) confirm this finding among North Central Nigerians. However, these decisions are underpinned by four parameters, namely, income (sales), tax rate, audit probabilities (detection) and penalty rate (sanction) (Muehlbacher, Kirchler, & Schwarzenberger, 2011). The basic assumption is that taxpayers pay tax voluntarily or otherwise, based on personal gains. For this course, we assumed that taxpayer's decision to pay tax is based on personal interest associated with sales, tax rate and sanction, which are parameters proposed under the economic theory of crime.

Kirchler (2007) developed the Slippery Slope Framework, which has been applied in studies such as Wahl, Kastlunger, and Kirchler (2010), Muehlbacher *et al.* (2011) and Inasius (2019). The Slippery Slope Framework explains the interrelationships between tax authorities and taxpayers. These interrelationships likely affect tax compliance, which could be through mutual trust between the taxpayer and the authorities or the exhibition of tax authorities' power. Therefore, the Slippery Slope Framework is grounded on two approaches (Kirchler, 2007). Firstly, the usage of authorities' power (enforcement) in tax collection results from an environment characterised by mistrust due to a lack of cooperation. The second approach is centred on an environment characterised by trust and respect between authorities and taxpayers, which causes taxpayers to pay tax voluntarily.

2.4 Conceptual framework

The concept underpinning this study was derived from the Economic Model of Crime theory and the Slippery Slope Framework. The framework emphasises compliance through trust and power (in other words, voluntary and enforced). It is predicted that taxpayers'

compliance is either voluntary or enforced. Therefore, the study estimated that tax rate and monthly sales (economic characteristics) could influence voluntary and enforced tax compliance. Again, trust in authorities (respect, honesty and trustworthiness) and power of authorities (expertise and sanction) were included in the factors predicted to impact voluntary and enforced tax compliances, respectively. Age, gender and educational level (demographic factors) were control variables. The study proceeded to assess the impact of voluntary compliance on business performance. For this cause, sales per year, the volume of credit supply, contract in Planting for Food and Job (PFJ) and the number of employees were estimated to be impacted by voluntary compliance. Figure 1 presents the conceptual framework.

3. Methodology

3.1 Study area

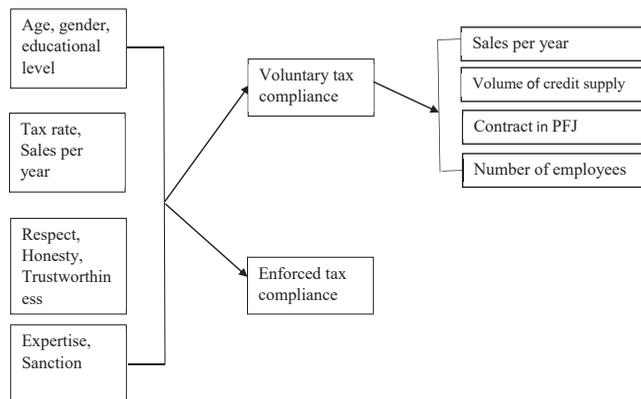
The study sought to investigate tax compliance among agrochemical traders in Ghana's three regions (Bono, Ahafo and Bono East). These regions were chosen for being noticed among Ghana's top agrochemical users (Danso-Abbeam & Baiyegunhi, 2017) and trading (Osafo-Acquaah and Frimpong, 1997) regions. Figure 2 provides a detailed view of the selected regions' geographical location and capitals.

3.2 Sampling

Multiple-stage sampling was employed in this study. Firstly, the three regions – Bono, Ahafo and Bono East – were purposively selected for being part of the high-trading regions and users of agrochemicals. Secondly, four districts each were selected from the chosen regions. Moreover, based on the agrochemical traders' register obtained from the Plant Protection and Regulatory Service Department, 119 traders were found and contacted. However, responses from 92 respondents out of the 119 were considered in the study. The reason is that 8 registered traders were out of service while 19 had just started operating, with less than a year of experience.

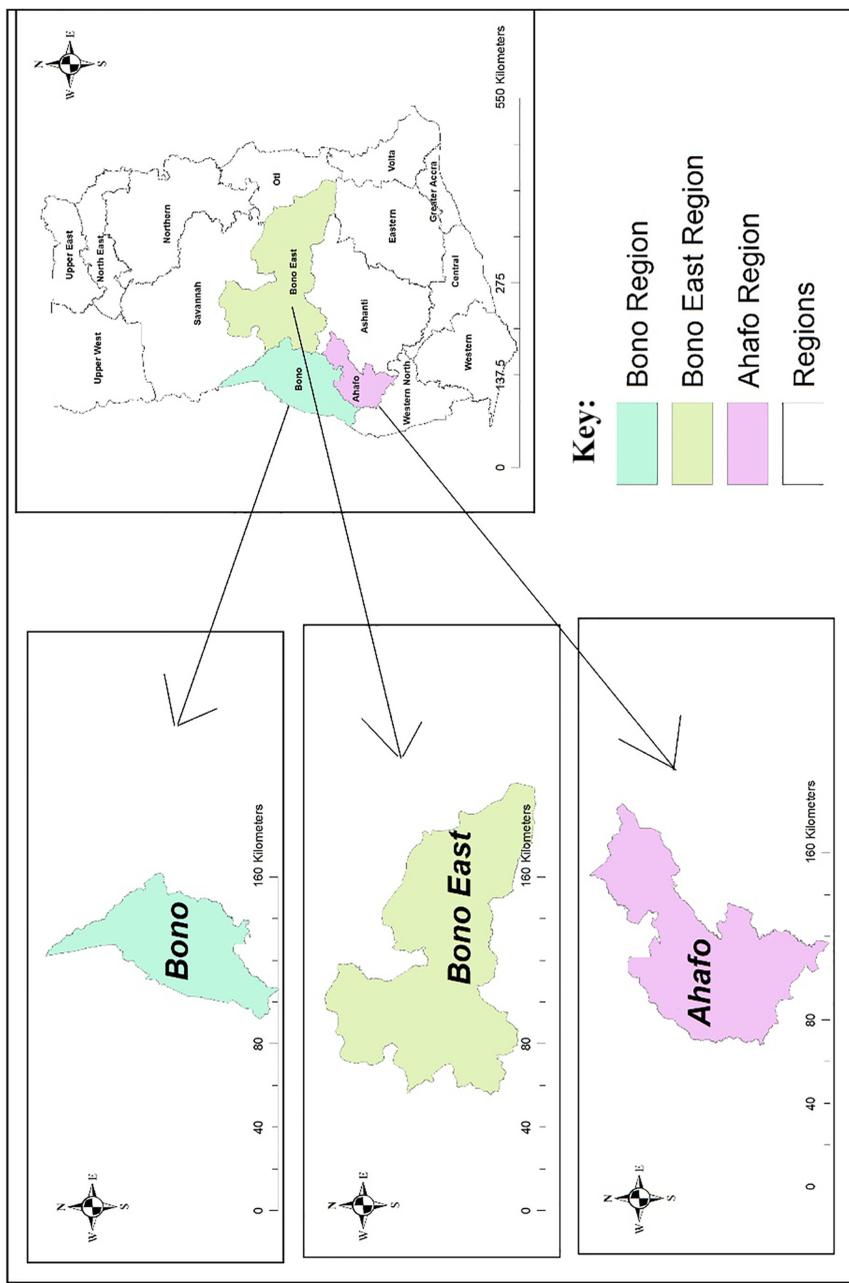
3.3 Method of data analysis

3.3.1 *Determinants of compliance model.* The probit model was used to model the factors influencing agrochemical traders' voluntary and enforced compliance. This is because the



Source(s): Authors' own construct

Figure 1. Conceptual framework



Source(s): Authors' own construct

Figure 2. Study area map

study assumed that traders are subject to two options: to comply voluntarily or to be enforced. It was observed that there exist mutually exclusive alternatives between the two choices. So, the probit regression model was used to ascertain the determinants of voluntary compliance, while the Ordinary Least Squares (OLS) regression was used for a robust check. The expected utility obtained from complying voluntarily is enhanced by regressors such as demographic characteristics (age, gender and educational level), economic factors (tax rate and monthly sales), trust in authorities (respect, honesty and trustworthiness) and power of authorities (expertise knowledge for detection of tax evasion and sanction). Therefore, it was expected that a trader faced with paying tax voluntarily or being forced to pay would go for the alternative with the best satisfaction. Voluntary compliance was measured by statements centred on the trustworthiness of tax authorities, which are “Tax office respectfully treats taxpayers”, “The tax office is fair in collecting tax” and “The tax office is trustworthy in accounting for tax collected”.

The respondents were asked to indicate the degree to which they agree with three statements on each scale (scale 1 = Totally disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree and 5 = Totally agree). The total scores for the respondent on three questions were used in the OLS modelling whereas under the probit regression, the respondents’ scores were recoded into a binary value (scores from 12 and above = 1 “voluntary compliance” and below 12 = 0 “otherwise”).

Similarly, the power scale was measured using three statements that revolved around the efficiency of tax authorities’ work. The statements are as follows: “Tax office is extensively empowered to force taxpayers to be honest about tax”; “Tax office is empowered to audit taxpayers as and when necessary to uncover more or less tax evasion that occurs through expertise knowledge” and “The tax office is empowered to fight tax criminality efficiently”. Again, the total scores for the respondent on three questions were used in the OLS modelling whereas under the probit regression, the respondents’ scores were based on the recoded binary values (scores from 12 and above = 1 “enforced compliance” and below 12 = 0 “otherwise”).

Following [Bannor et al. \(2020\)](#), the utility function of a trader, k , encounters two choices of complying either voluntarily or by enforcement, e and f , with utilities Q_e and Q_f expressed as follows:

$$Q_e = X_{e1}W_{e1} + X_{e2}W_{e2} + \varepsilon_e \quad (1)$$

$$Q_f = X_{f1}W_{f1} + X_{f2}W_{f2} + \varepsilon_f \quad (2)$$

where W_e and W_f represent the characteristics of each trader, concerning voluntary and enforced compliances, respectively. X represents the regression coefficients, ε_e and ε_f denote the trader’s unmeasured features of the random terms. If $Y = 1$ stands for trader’s choice of alternative e , then $S_e > S_f$, as follows:

$$Prob = [Y = 1 : W_{e1}, W_{e2}, W_{f1}, W_{f2}] = Prob [S_e > S_f] \quad (3)$$

$$Prob [x'\beta + \varepsilon > 0 : X] \quad (4)$$

where $x'\beta$ denotes calculated elements of variation of the roles of the two utilities and ε represents the variance between the two random elements.

3.2.2 Impact of tax compliance on business performance. The impact of tax compliance on business performance was analysed using Inverse Probability Weighted Regression Adjustment (IPWRA) and Inverse probability Weighting (IPW) models. IPWRA was proposed by [Wooldridge \(2010\)](#), which is well known as a double robust estimator. The model (IPWRA) has been employed in many studies ([Rahman, Norton, & Rashid, 2018](#); [Israel, Amikuzuno, & Danso-Abbeam, 2020](#); [Lu, Addai, & Ng’ombe, 2021](#); [Bannor, Amfo, & Oppong-Kyeremeh, 2022](#)) involving impact analysis. According to [Lu, Addai, and Ng’ombe \(2021\)](#), the

average treatment effects on the possible average outcomes are estimated by applying joint regression adjustment and reweighting methodologies when using IPWRA. Therefore, plausible biased estimates are resolved with the aid of the double-robust property of the IPWRA (Israel *et al.*, 2020). In like manner, Manda, Gardebroek, Kuntashula, and Alene (2018) revealed that IPWRA remains consistent should one of the treatments or outcomes be misspecified. Following Bannor, Amfo, and Oppong-Kyeremeh (2022), the probability of obtaining treatment is specified as follows:

$$p(N) = \Pr\left(B_i = \frac{1}{N}\right) = Y\{z(N)\} = H\left(\frac{B_i}{N}\right) \quad (5)$$

where N stands for pre-treatment covariants' multidimensional vector from observable attributes; $Y\{z(N)\}$ represents cumulative distribution function; and the sales per year, volume supply credit, contract under PFJ and number of employees employed to attain treatment effects were represented by vector N . The propensity scores achieved were artificially and independently sampled from treatment allocations. Implying that a treatment having an inverse weight of 1 and $\frac{P(N)}{(1-P(N))}$ for non-treatment, the weight is stated as follows:

$$g = W_a + (1 - W_a) \frac{\hat{P}(N)}{(1 - P(N))} \quad (6)$$

where \hat{P} represents the projected scores for propensity. Meanwhile, a linear regression model was used to analyse the IPW and Regression Adjustment (RA) for voluntary and enforced compliance. Subsequently, the predicted results of variables (sales per year, volume supply credit, contract under PFJ and the number of employees) were reached. RA was meant for obtaining the results, while IPW focused on the treatment effects. Following Bannor *et al.* (2022), the RA model used for the Average Treatment Effects on the Treated (ATT) was specified as follows:

$$ATT_R = j_d^{-1} \sum_{a=1}^s W_a [r_d(N, \varpi_d) - r_L(N, \varpi_L)] \quad (7)$$

where J_d is the number of respondents who comply voluntarily to tax, $r(N)$ denotes the regression model for voluntary compliance attached to the covariates, N is the observed and constraints $\varpi_L = (\delta_a, v_a)$. Therefore, the weighting and RA of Equations (6) and (7) were joined to establish the IPWRA estimator. To attain reliable treatment effects estimates, depending on the covariates specified, either RA or IPW model is expected to be specified accurately. Thus, consistent estimates are produced from the outcome variable should the treatment model be correctly specified, even when the outcome model is wrongly specified (Lu *et al.*, 2021). The ATT of IPWRA estimator is stated as :

$$ATT_{IPWRA} = j_d^{-1} \sum_{a=1}^s W_a [r_d^*(N^*, \varpi_d^*) - r_L^*(N, \varpi_L^*)] \quad (8)$$

$\varpi_d^* = (\delta_d^*, v_d^*)$ is produced from the weighted regression estimator.

$$\min_{\varpi_d^*, v_d^*} \sum_{a=1}^s \frac{W_a (X_a - \varpi_d^* - N v_d^*)^2}{\hat{p}(N, \hat{\beta})} \quad (9)$$

$$\min_{\varpi_L^*, v_L^*} \sum_{a=1}^s \frac{(1 - W)_a (X_a - \varpi_d^* - Nv_d^*)^2}{\hat{p}(N, \hat{\beta})} \quad (10)$$

According to [Wooldridge \(2010\)](#), an analogous ATT for IPWRA exists aside from the valuation of the weighted unit implemented in the regression parameters while linking RAs created by ATT.

4. Results and discussions

4.1 Summary characteristics of traders

Descriptive statistics such as percentages, frequencies, mean and standard deviation were used in analysing respondents' demographic information.

[Table 1](#) shows that the mean score of respondents' educational level was 2.196, with a standard deviation of 1.008. The outcome suggests that the agrochemical traders have at least gone through high school education. However, the average educational level of respondents does not affect the preparation of their financial statements for tax purposes. The reason disclosed by most of the respondents was that they employ tax official's assistance together with hired financial and tax consultants when preparing their financial statements (records). On average, respondents have approximately nine years' worth of working experience. All the traders interviewed have their firms registered under the Ghanaian business registration legal status. However, most of the respondents, representing 71, registered their businesses under sole proprietorship. In every shop where employees are more than one, one employee serves as a cashier and records keeper, while the remaining employees perform shop attendant roles. Meanwhile, where one employee exists, they do everything (cashier, records keeping and shop attendant). The traders mentioned that they operate from six o'clock in the morning to five o'clock in the evening. However, sales are predominantly in the morning and evening sessions. The plausible cause, as explained by respondents, was that farmers usually buy early in the morning on their way to their farms, while others buy them in the evening and use them the following day.

4.2 Factors influencing voluntary and enforced tax compliance

[Table 2](#) presents agrochemical traders' voluntary tax compliance (VTC) and enforced tax compliance (ETC) determinants. The presentation shows the results of probit regression values together with OLS estimates. However, the OLS estimates are presented for the sake of robustness.

Based on the Probit and the Ordinary Least Square regression results presented in [Table 2](#), age positively influences ETC. The result confirms the findings of [da Silva et al. \(2019\)](#). Besides, age was statistically significant at 1% and 5% for VTC and ETC, respectively. Similarly, gender was found to have a positive influence on enforced tax compliance. This result confirms the study of [Inasius \(2019\)](#). Also, there was no significant influence or relationship shown by the results. Educational level is likely to influence VTC positively but negatively influence ETC across both probit and OLS models. This revelation is consistent with the findings of [Muehlbacher et al. \(2011\)](#). [Ali et al. \(2014\)](#) confirmed that citizens in Kenya, Uganda, Tanzania and South Africa will likely have positive attitudes towards tax compliance as their educational level increases. Nonetheless, based on the probit model, educational level was only significant at VTC.

Under economic characteristics, tax rate was found to have a negative influence on ETC under the two (probit and OLS) estimators. The implication is that individuals are likely to pay taxes on their own when the tax rate increases but are less likely to honour tax obligations when they are coerced at the point the tax rate is high. The plausible reason could

Item	Frequency	Percentage (%)	Mean	Std. dev.
<i>Age</i>			36.804	11.813
<31	36	39.13		
31–50	42	45.65		
>50	14	15.22		
<i>Gender</i>			0.261	0.442
Male	68	73.91		
Female	24	26.09		
<i>Marital status</i>			1.391	0.554
Married	59	64.13		
Single	30	32.61		
Divorced	3	3.26		
<i>Level of education</i>			2.196	1.008
Junior High	24	26.09		
Senior High	40	43.48		
Diploma	15	16.30		
First Degree	12	13.04		
Master's/Ph.D.	1	1.09		
<i>Job position</i>			1.967	0.999
Owner	1	1.09		
Owner and Manager	44	47.83		
<i>Main work</i>			0.674	0.471
Agrochemical only	30	32.61		
Not Agrochemical only	62	67.39		
<i>Work experience</i>			8.576	7.456
1–5	49	53.26		
6–10	17	18.48		
Above 10	26	28.26		
<i>Number of employees</i>			2.130	1.286
1	35	38.04		
2–3	52	56.52		
4–7	5	5.43		
<i>Legal status</i>			1.446	0.830
Sole Proprietorship	71	77.17		
Partnership	1	1.09		
Private company	20	21.74		
<i>Tax administration</i>			1	0
Small Tax Office	92	100		
<i>Religion</i>			2.620	1.047
Christianity	82	75.44		
Islam	9	8.28		

Source(s): Authors' own from field data

Table 1. Demographic information of respondents

be that taxpayers perceive such conduct to be negative interaction behaviour on the side of the tax authority. From Pakistan, [Naeem and Gulzar \(2021\)](#) revealed that a negative relationship is established between tax rate and compliance when there exists interaction as tax rate increases. In Ethiopia, [Abdu and Adem \(2023\)](#) confirmed that negative behaviour among tax authorities demoralised taxpayers' willingness to comply. In a prior study, [Hai and See \(2011\)](#) explained that a high tax rate leads to taxpayers' non-compliance among Malaysian (Asian) citizens. Nevertheless, other studies revealed that tax rate does not positively or negatively influence tax compliance ([Modugu, Eragbhe, & Izedonmi, 2012](#)). It is

Variables	Probit regression		OLS regression	
	Voluntary tax Compliance	Enforced tax Compliance	Voluntary tax Compliance	Enforced tax Compliance
<i>Demographic characteristics</i>				
Age	-0.065*** (0.018)	0.128** (0.965)	-0.016*** (0.004)	0.004* (0.002)
Gender (Female = 1)	-0.340 (0.368)	0.749 (1.170)	-0.111 (0.108)	-0.006 (0.060)
Educational level (years in school)	0.257* (0.175)	-0.385 (0.383)	0.062 (0.051)	-0.022 (0.028)
<i>Economic characteristics</i>				
Tax rate	0.066 (0.073)	-0.467* (0.246)	0.0156 (0.022)	-0.034*** (0.012)
Sales per year	8.220* (2.910)	-4.950* (3.390)	1.340*** (4.190)	-3.250 (2.330)
<i>Trust in authorities</i>				
Respect	-0.149 (0.172)	0.431 (0.383)	-0.024 (0.051)	0.038 (0.028)
Honesty	-0.542* (0.293)	1.504* (0.389)	-0.151* (0.083)	0.134*** (0.046)
Trustworthiness	0.458* (0.262)	-1.286* (0.714)	0.098 (0.075)	-0.101** (0.042)
<i>Power of authorities</i>				
Expertise	0.095 (0.159)	0.166 (0.274)	0.035 (0.048)	0.045* (0.027)
Sanction	-0.133 (0.114)	1.390*** (0.460)	-0.032 (0.344)	0.155*** (0.019)
Constant	1.903* (0.074)	-6.220** (3.150)	1.040*** (0.310)	-0.137 (0.172)
Prob > F	0.000	0.000		
R-Squared	0.329	0.7069		
Prop > chi	0.000	0.000		
Pseudo R ²	0.314	0.817		
Wald X2	(10) = 39.87	(10) = 80.74		
Log pseudolikelihood	-43.639	-9.049		

Note(s): NB: A dummy variable based on scores from 12 and above = 1 "voluntary compliance" and below 12 = 0 "otherwise". A dummy variable based on scores from 12 and above = 1 "enforced compliance" and below 12 = 0 "otherwise". The OLS model dependent variable is the addition of respondents' scores from three questions relating to enforced compliance and voluntary compliance. Magnitude of agreement on sanction, expertise, respect, honesty and trustworthiness was measured on interval scale from 1 = total disagree to 5 = total agree

Source(s): Authors' own from field data

Table 2.
The determinants of agrochemical traders' voluntary and enforced tax compliance

due to this reason that [Freire-Serén and Panadés \(2013\)](#) posit that the effect of the tax rate (positive or negative) needs thoughtful investigation.

Sales per year have a strong positive influence on VTC but a negative influence on ETC, as revealed by the probit and OLS regressions. However, the values were statistically significant at 10% each (VTC and ETC) under the probit model and 5% (VTC) based on the OLS.

Considering trust in authorities, respect from the authorities – which is an element of trust in authorities – revealed a negative likelihood relationship with VTC but a positive relationship with ETC. In like manner, honest behaviour of authorities revealed a negative likelihood impact on VTC but was positive on ETC. This was significant at 10% each for VTC and ETC. The

plausible reason could be unfavourable social representation (understanding tax laws, favourable tax mentality, social and societal, fairness in tax distribution procedures, benefits and burden) (Kirchler, 2007). Meanwhile, the trustworthiness of authorities revealed an inverse result, positively influencing VTC. This implies that taxpayers voluntarily pay taxes when they have increased trust in the authorities. The result is consistent with Muehlbacher *et al.* (2011). Yet, Muehlbacher *et al.* (2011) used respect, honest behaviour of authorities and trustworthiness of authorities as elements of trust; instead of separating them, they summed up their results to get one value for “trust”. This result confirms previous literature (Lemoine & Roland-Lévy, 2012; Kastlunger, Lozza, Kirchler, & Schabmann, 2013). This notwithstanding, it confirms the Slippery Slope Framework. In prior studies, da Silva *et al.* (2019) discovered that trust in authorities increases taxpayers’ willingness to comply with tax in Brazil.

Under power vested in tax authorities, expertise and knowledge of authorities positively relates to ETC. Similarly, a sanction is found to impact positively on ETC. The result revealed that power increases ETC. Chepkurui *et al.* (2014) consistently found that sanctions such as fines and penalties improve tax compliance among small and medium enterprises in Kenya. However, from the results, power decreases VTC. The result was broadly consistent with Batrancea *et al.* (2019).

4.3 The impact of tax compliance on business performance

Average Treatment Effect (ATE) by IPWRA outcomes relating to the impacts of tax compliance on sales per year, volume supply credit, a contract under PFJ and the number of employees are presented in Table 3. However, charts are presented (Figures A1–A4 in Appendix) in addition to Table 3 to show the overlapping results of the IPWRA analysis. Table 3 shows that tax compliance causes sales to be increased by GH¢ 61,362 annually from the average of approximately GH¢ 35,618 if traders fail to comply voluntarily. Percentage-wise, voluntary tax compliance increases sales annually by an average of 172%.

The result is consistent with Evans *et al.* (2014). Evans *et al.* (2014) asserted that tax compliance relates positively to managerial benefits, resulting from better financial information management and decision-making. Some respondents revealed in a dialogue that tax authorities lock the shops of traders who do not comply voluntarily; sometimes, such traders lock their shops to avoid detection by the patrol team of tax authorities. As a result, they lose customers, thereby losing sales. Others also stated that complying to tax willingly is supported by proper records keeping, which helps them manage the cost of sales and expenses, thereby pricing products in such a manner that attracts consumers. Also, the

Outcome variable	ATE	Outcome mean		IPW percentage increase
		Voluntary tax compliance	Non-voluntary tax compliance	
Sales per year	61362.71*** (25002.66)	96980.77*** (23875.16)	35618*** (7835.41)	1.72** (0.89)
Volume of supply on credit	37413.9 (33492.93)	96980.77*** (23875.16)	35618*** (7835.41)	1.13 (1.50)
Contract in PFJ	0.07 (0.10)	0.65*** (0.07)	0.57*** (0.07)	0.13 (0.19)
Number of employees	0.62*** (0.25)	2.43*** (0.20)	1.80*** (0.15)	0.35** (0.16)

Note(s): *, ** and *** denote statistical significance at 10, 5 and 1%, respectively. The figures in parentheses are robust standard errors. n.a. denotes not applicable

Source(s): Authors’ own from field data

Table 3. Results of IPWRA for the impacts of voluntary tax compliance

results show that traders who pay taxes voluntarily have more contracts in the PFJ programme. The plausible reason is that the programme (PFJ) is government-initiated, hence, traders who pay taxes willingly will be considered. The number of employees is positively impacted by approximately one employee, implying that traders who voluntarily comply with tax will likely increase the number of employees by one more than traders who do not comply voluntarily. The logic is that sales are likely to increase when demand increases, thus, the need for more hands (employees) to assist as the shop also arises.

Based on the results, it is concluded that tax compliance, despite its associated costs, positively influences business performance. Similarly, In South Africa, [Matarirano et al. \(2019\)](#) revealed that tax compliance cost positively influences business performance.

5. Conclusion and recommendations

This study analysed tax compliance among agrochemical traders by examining voluntary and enforced tax compliance among traders and the influence of tax compliance on business performance. The results revealed that age and gender relate positively with enforced tax compliance while education positively impacts voluntary tax compliance. Nonetheless, tax rate, trust (trustworthiness) and monthly sales positively relate to voluntary tax compliance but negatively influence enforced tax compliance. Unexpectedly, the honest behaviour of tax authorities negatively impacted voluntary tax compliance. However, authorities' power negatively and positively impacts voluntary and enforced tax compliance, respectively. The study confirmed and validated the Slippery Slope Framework and its relevance in the agricultural sector of Africa, precisely, the booming agrochemical sub-sector. The study makes two modest contributions to literature; first, it empirically tested and validated the Slippery Slope Framework in prospering agrochemical sub-sector of Ghana. Second, it applies the IPWRA model, which corrects possible bias estimates of impact of tax compliance on business growth to estimate the effect of tax compliance on business performance.

5.1 Policy implication

Trustworthiness among tax authorities encourages voluntary tax compliance, hence, it is recommended that the Government develop a recruitment policy that focuses on employing qualified applicants who have trustworthy track records.

5.2 Practical implication

Practically, the exercise of authorities' power encourages enforced tax compliance but discourages voluntary tax compliance (from the findings). It, therefore, seems that tax administration strategies grounded on cops and robbers (enforcement) fall short in the light of voluntary compliance. Hence, it is recommended that the Ghana Revenue Authority focuses on enhancing trust-building strategies such as trustworthiness and communicating effectively to taxpayers on matters relating to tax (revenue generation and accountability) to promote voluntary tax compliance, which is more cost-effective than enforced compliance.

Complying with tax boosts business performance (from the results); in this light, it is recommended that taxpayers should precondition their minds towards voluntary compliance and endure to do so.

5.3 Academic implication

Past studies ([Muehlbacher et al., 2011](#); [Prinz et al., 2014](#); [Kogler, Muehlbacher, & Kirchler, 2015](#); [Inasius, 2019](#); [da Silva et al., 2019](#)) employed the Slippery Slope Framework focused on advanced economic countries or developing countries in Asia. In this light, applying the

framework in Africa (Ghana) provides evidence that the impact trust has on tax compliance in advanced countries is similar in Africa, thereby expatiating the knowledge of the framework. Again, the findings endorse the Slippery Slope Framework as it suggests that trust positively induces voluntary compliance while the power of authority impacts positively enforced compliance.

5.4 Limitations

The amounts of monthly sales the agrochemical traders gave were based on their best-estimated sales. The reason is that some of them did not want to disclose the exact sales amount. Therefore, future studies should employ the best means of getting the actual monthly sales of respondents in their studies.

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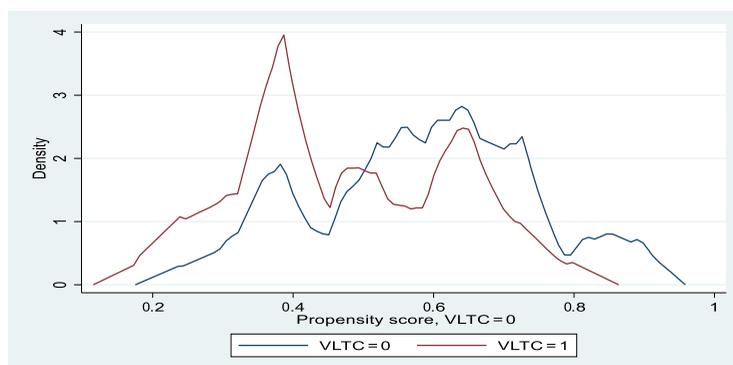
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Appendix



Source(s): Authors' own construct

Figure A1.
Sales per month

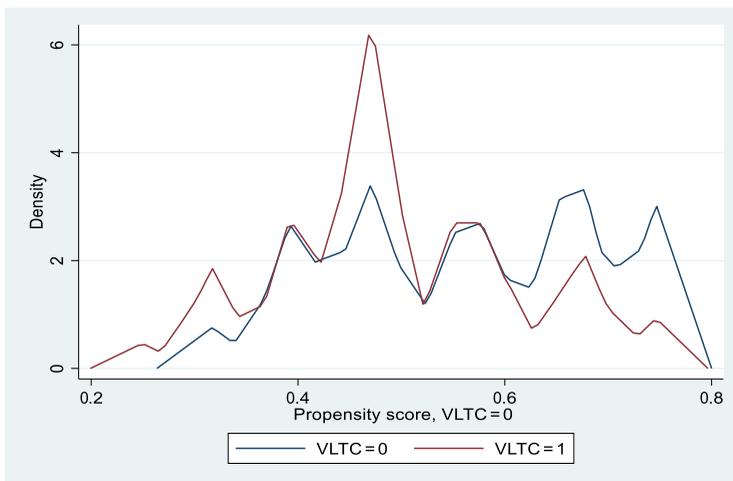


Figure A2.
Volume of supply on credit

Source(s): Authors' own construct

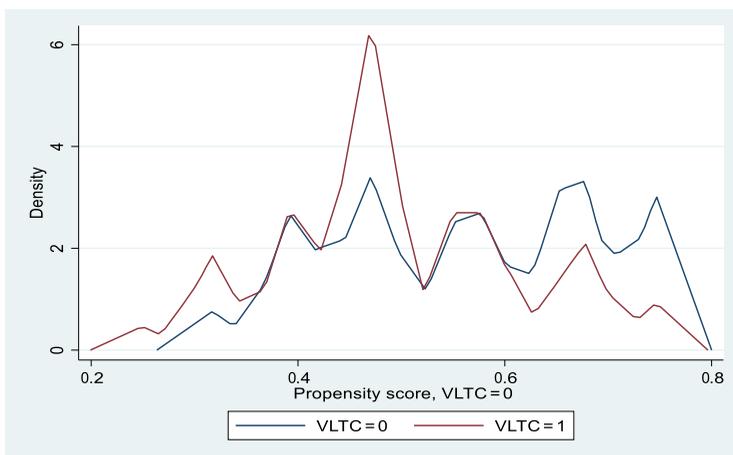
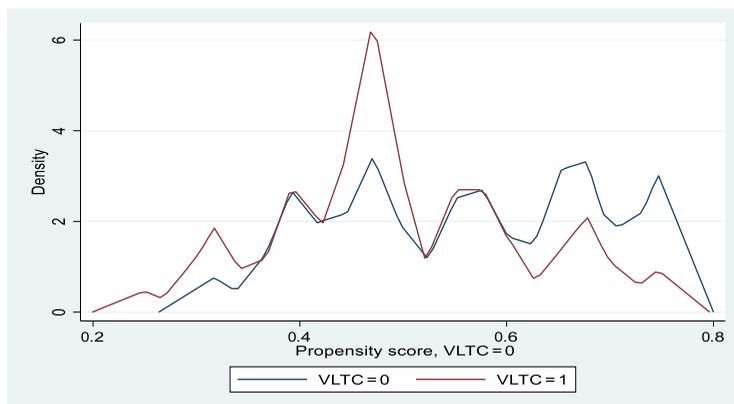


Figure A3.
Contract in PFJ

Source(s): Authors' own construct



Source(s): Authors' own construct

Figure A4.
Number of employees

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