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A test of behavioural changes to electronic levy: Evidence from mobile money transactions in a developing country

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Abstract: Even before its introduction, the electronic levy in Ghana stirred up different behavioural reactions from the public, despite the intention to use its proceeds to provide better public services. As a result, this study examines some of these behavioural changes using pre-tax survey data on the proposed electronic levy. Using a sample size of 2,810 individuals with mobile money accounts, we estimate a multivariate logit model with its marginal effects to determine the associated drivers of individuals' behavioural changes to the proposed tax. The results show that the electronic levy is likely to have an immediate impact on an individual's behaviour in positive and negative ways. Thus, while about 88% of the respondents indicated that they are likely to stop using mobile money or reduce their transactions, approximately 12% of the respondents rather reaffirmed their willingness to keep using mobile money or perhaps increase their mobile-money transactions. Furthermore, we find evidence that income, marital status, objective knowledge, trust in government, and the implementation timeframe are the statistically significant determinants of behavioural changes to the electronic tax in Ghana. The results suggest varying behavioural responses to the electronic levy in Ghana, which threaten the realization of expected revenues. We recommend proper education and advocacy at all levels and a keen consideration to implement the levy later, perhaps, when there is more trust in the government's ability to use tax revenues prudently.

Subjects: Econometrics; Public Finance

Keywords: electronic levy; electronic tax; mobile money; behavioural changes; survey

1. Introduction

Taxes or levies are not meant to be "devilish". Without the income generated by taxes and other fees collected by governments, it is nearly impossible to fund public investments in human capital and provide infrastructure and important public services to individuals and businesses. So, governments must also raise funds to meet these obligations (World Bank, 2022).

Nonetheless, the conversation on the importance of tax revenue for developing countries like Ghana has recently begun to include the behavioural responses of citizens. This is because people

get tired of being taxed by the state, especially when the state is unable to clearly show fruitful evidence of its use of resources after several years of collecting tax revenue. This aspect, however, has not been examined in the literature looking at the growth dynamics of tax revenue in Ghana. Instead, existing studies on Ghana have focused on the growth dynamics of the 1995 Value Added Tax (VAT) (Andoh et al., 2019), tax revenue, structure, economic growth, and tax evasion (Annan et al., 2014; Bekoe et al., 2016; Egbunike et al., 2018) as well as the optimal growth-maximizing tax rate (Ofori-Abebrese et al., 2021). After citizens have become fatigued from paying several taxes, the success of any new tax may depend on behavioral responses to its acceptance by the population—something which is yet to be empirically examined in the academic literature. Hence, the absence of empirical evidence analysing behavioural responses to consumption-based taxes in Ghana leaves a knowledge gap in the academic literature, which this paper contributes to filling.

This paper examines behavioural responses to a proposed electronic levy (e-levy) in Ghana. This e-levy is controversial because it is to be introduced on all electronic transactions, with special reference to mobile money transactions, as part of efforts to widen the tax net and raise more revenue. A new tax on mobile money—a service that allows users to send and receive funds through digital wallets located on telecommunication networks—is concerning because mobile money has become widely used by the informal sector as a convenient means of payment and a means to improve financial inclusion in low-income African countries like Ghana (Adaba et al., 2019). Unfortunately, unfavourable behavioural responses to the e-levy may lower revenues and worsen the country's fiscal position.

The paper adopts a quantitative research design and an econometric strategy to address its research objective. Through a pre-tax survey conducted from February 9 to 16, 2022, this study uses data from 2,810 respondents. Our motivation to use pre-tax survey data is driven by the importance and value of empirical evidence in engagement with policymakers, especially prior to the introduction of a major tax for the informal economy in low-income countries like Ghana. Thus, pre-tax survey data is useful to generate sound empirical conclusions for engagement with policymakers and the paper's findings are discussed in this light. After conducting basic descriptive analysis, a multivariate logit model is estimated, with its marginal effects, to empirically determine the associated drivers of individuals' behavioural changes to the proposed e-levy.

The findings show that the proposed electronic levy will almost certainly have both positive and negative effects on people's behaviour right away. Thus, while roughly 88% of respondents are likely to stop using mobile money or reduce their transactions, roughly 12% of respondents are saying they may keep using mobile money or increase their mobile-money transactions. In addition, the data reveals that the electronic tax in Ghana is significantly affected by factors like income, marital status, objective knowledge, trust in government, and the length of time since implementation. Based on these findings, we recommend that policymakers reconsider the implementation of the e-levy and rather focus on building trust with its people.

Empirical studies examining behavioural responses to consumption-based taxes are not new in the literature, yet none have examined behavioural responses to an e-levy in an African country. A few studies have looked at the extent of behavioural changes resulting from the introduction of consumption-based taxes in the literature in African countries. For instance, Essman et al. (2021) examine behavioural responses to South Africa's sugar-content-based beverage tax, and Muralidharan and Sheehan (2016), examines behavioural responses to the United States' plastic bag tax. Hence, to the best of our knowledge, there's yet to be any concrete empirical evidence analysing behavioural responses to e-levy in Ghana.

Aside from contributing to the literature on the growth potential of tax revenue in Ghana, this paper's findings contribute to this growing body of knowledge on the usefulness of digital technologies such as mobile money, which is widely recognized as a tool for increasing financial

inclusion, particularly among the informal sectors. Indeed, the rapid advancement of mobile technology and innovation in the twenty-first century has enhanced consumers' ability to pursue cashless transactions (Maurer, 2012). These trends have extended globally, with notable successes occurring in Africa, particularly in Ghana, where mobile money is widespread (Amoah et al., 2020; Ozyurt & Beck, 2019). As a result, evaluating behavioural responses to the imposition of a tax on mobile money transactions raises concerns about the behaviour of consumers in an economy pursuing a "cash-lite" agenda and whether the Ghana government's interest is aligned with this agenda.

The rest of the paper is structured as follows: Section two presents related theoretical and empirical literature. Section three describes the research approach and design, while Section four analyses and discusses the results. Section five concludes and presents recommendations for policymakers.

2. Literature

The literature is replete with studies analysing the relationship between demographic factors and tax behaviour. These studies are in line with the comparative treatment theory, which posits that individuals who perceive that they and their cohorts or groups (i.e., defined by their demographic or socio-economic characteristics such as wealth, education, age, etc.) are fairly treated by the government are more likely to be tax compliant (Ali et al., 2014). That is, based on perceptions of the government tax burden, individuals with similar demographic factors and their cohorts may either be tax compliant or defiant.

Previous studies have examined how sociodemographic factors contribute to the behavioural response of individuals to tax. (Aladejebi, 2018; Amponsah & Adu, 2017; Beeri et al., 2022; James et al., 2019; McGee & Rossi, 2006; Richardson & Sawyer, 2001; Seidu & Asante, 2011; Zhao et al., 2021). Although the outcomes of these studies are not unanimous, some demographic factors have been identified as key determinants of tax-related behaviour, such as age, gender, marital status, education, knowledge, and income level. We discuss findings for some of these demographic factors in the paragraphs that follow.

First, various studies have examined the effect of age on tax behavioural responses (Amponsah & Adu, 2017; Beeri et al., 2022; James et al., 2019; Seidu & Asante, 2011; Zhao et al., 2021). There is ample empirical evidence that older people are more tax compliant than young taxpayers (Amponsah & Adu, 2017; James et al., 2019; Zhao et al., 2021). This could be attributed to the fact that young people are more risk-loving and less responsive to sanctions and punishment. On the other hand, older people have higher respect for the law, are more risk averse and sensitive to punishment, and therefore tend to demonstrate less tax non-compliance behaviour. It could also be argued that older, financially sound taxpayers may appear insensitive to tax obligations as compared to younger taxpayers who are more aggressive in acquiring wealth and may have the tendency to underreport and/or exaggerate deductions.

Other key demographic factors that influence tax compliance behaviour are gender and marital status. Scores of studies have examined the relationship between gender, marital status, and tax compliance behaviour (Agyeiwaa et al., 2019; Aladejebi, 2018; Alm & Torgler, 2004; Amponsah & Adu, 2017; Asante & Baba, 2011; Chatterjee & Barbhuiya, 2021; McGee & Benk, 2011; Richardson & Sawyer, 2001). The conclusion from most of these studies is that women are less likely to evade tax compared to their male counterparts (Aladejebi, 2018; Alm & Torgler, 2004; Amponsah & Adu, 2017; Chatterjee & Barbhuiya, 2021; Zhao et al., 2021). For instance, Seidu and Asante (2011) examined the effect of demographic characteristics on the tax compliance behaviour of self-employed individuals in Ghana. Using a survey method and a sample of 350 self-employed respondents in the Tema metropolis, the authors revealed that females are more tax compliant compared to their male counterparts. In light of the literature, we posit that women are more morally upright, conservative, and risk-averse than men. In contrast, some studies have also found

that men are more tax compliant than women (McGee & Benk, 2011; McGee & Tusan, 2008), while others found no significant relationship between tax behaviour and gender (McGee & Rossi, 2006; McGee, 2006).

Concerning marital status and tax behaviour, some studies have revealed that taxpayers with spouses are less likely to evade tax than their unmarried counterparts (Richardson & Sawyer, 2001; Seidu & Asante, 2011). For instance, Seidu and Asante (2011) in an analysis of 350 self-employed individuals in Ghana indicated that unmarried self-employed taxpayers tend to evade tax more compared to those who are married. The reason is that, since women are more tax compliant, they could influence their male partners about their tax obligations (Richardson & Sawyer, 2001). It is also plausible that the financial burden that comes with increased household size could precipitate tax non-compliance behaviour for married couples.

Another critical demographic factor that influences tax compliance behaviour is education (Armah-Attoh & Awal, 2013; Seidu & Asante, 2011). Some studies have examined the effect of education on tax behaviour (Amponsah & Adu, 2017; Armah-Attoh & Awal, 2013; Baporikar, 2022; Beeri et al., 2022; Zhao et al., 2021). Empirically, Armah-Attoh and Awal (2013) investigated the effect of knowledge, opinions, and attitudes on tax compliance in Ghana. Using fieldwork of Afro barometer surveys carried out between May 9 and 1 June 2012, with a sample size of 2400, the authors found that formal education exerts a positive and significant effect on tax compliance. Regarding the base category, that is, those with no or informal education, the authors revealed that the odds for individuals with primary education engaging in tax evasion are 0.636 times lower than those with no formal education. In the same vein, the odds of people with tertiary education engaging in tax invasion are 0.441 times lower than those with no or informal education. However, those with primary education were more tax compliant than those with tertiary education.

Amponsah and Adu (2017) also examined the effects of social and demographic factors on tax stamp compliance in Ghana using a cross-sectional design to sample 783 micro-taxpayers. Using a multistage sampling technique and an ordered logit regression model, the study revealed that education significantly drives tax behaviour. Similar results have been obtained by Seidu and Asante (2011); Zhao et al. (2021); Beeri et al. (2022); Baporikar (2022). In general, the level of education of the taxpayer may help him understand tax laws, the benefits, and the services the state provides for the citizens from tax-related revenues (Amponsah & Adu, 2017). Moreover, educated individuals are likely to earn more in both formal and informal sectors and are immune to crimes, which include tax evasion (Nwokoye et al., 2022; Yalama & Gumus, 2013).

Knowledge is another important component in forming attitudes and plays a key role in making decisions (Alba & Hutchinson, 1987; Brucks, 1985). Gamble and Blackwell (2001) have defined knowledge as an information substance in an individual's memory that affects the method used for a choice. Knowledge has been grouped into objective and subjective knowledge (Amoah & Addoah, 2021; Brucks, 1985; Dodd et al., 2005). Objective knowledge indicates accurate knowledge of a product, an object, or an issue, while subjective knowledge shows opinion, awareness, and perception about a product, an object, or an issue.

Some empirical investigations have been carried out to ascertain the effect of knowledge on tax behaviour (Agyeiwaa et al., 2019; Akinboade, 2015; Amin et al., 2022; Armah-Attoh & Awal, 2013; Kira, 2017; Nkwe, 2013). Armah-Attoh and Awal (2013) examined the knowledge of Ghanaians concerning their tax commitment to the state using Ghana's Round 5 Afro barometer survey data from 2012. Instruments that allow for system comparisons across countries were deployed to randomly draw a representative sample of citizens of voting age. The authors indicated that 79 percent of Ghanaians know of property tax obligations, 77 percent are aware of license fees, and 72 percent know of value-added tax. The study further showed that 56 percent of the respondents were aware that they were supposed to pay taxes on the earnings of their businesses. The authors also indicated that 48 percent of the respondents are aware of their income tax

obligations, while 24 percent indicated they do not know the law mandates them to pay tax. According to Nkwe (2013),, knowledge of tax is important in tax compliance. Several recent studies such as Agyeiwaa et al. (2019); Amin et al. (2022) and Nguyen (2022) corroborate the findings of Nkwe (2013). However, Akinboade (2015) indicated that if there were too many steps to complete, it would adversely affect tax compliance. The authors revealed that many SMEs are oblivious to tax regulations because of a lack of awareness or publicity.

Another major factor that affects tax compliance behaviour is income (Brett et al., 1995; Kirchler et al., 2010; McGee, 2012). Quite a few empirical studies have found evidence of the moderating effects of income on tax behaviour (Agyeiwaa et al., 2019; Beeri et al., 2022; Brett et al., 1995; Doran et al., 1991; Torgler, 2003; Zhao et al., 2021). Brett et al. (1995) indicated that when income is a moderator of individual commitment and performance, if the individual income is high, the relationship between commitment and performance is likely to be high and the opposite is true. Some studies have found that lower-income earners are more likely to evade tax compared to higher-income earners (Porcano, 1988). These studies reveal that individuals with lower incomes may be compelled by their meagre financial resources to evade tax because they are more susceptible to financial strain than high-income earners, and a lack of enough financial resources is the motivation for people to engage in criminal activities (Bloomquist, 2003; Carroll, 1986; Torgler, 2003). Thus, poor individuals may invade taxes due to their inability to satisfy their basic needs. Thus, the sensitivity of individuals toward tax is largely influenced by their income (McGee, 2012). High-income earners are more likely to be tax compliant since the tax on their incomes does not significantly affect their purchasing power. In contrast, other studies have revealed that individuals in higher income brackets are more likely to be non-tax compliant to avoid being overtaxed (Anderhub et al., 2001).

Furthermore, the literature has been extended to examine the roles of non-demographic factors (for example, trust in government, and policy implementation period) as determinants of behavioural changes to tax. Other non-demographic factors like trust in government and time, have been found to drive tax behaviour.

Theoretically, tax compliance behaviour is directly related to the perception of governments, especially tax authorities' trustworthiness (Kirchler et al., 2008). It has been argued that political legitimacy and national pride drive tax compliance behaviour (Armah-Attoh & Awal, 2013; Batrancea et al., 2022; Masud et al., 2021; Oladele et al., 2020; Picur & Riahi-Belkaoui, 2006). For example, Armah-Attoh and Awal (2013) in an analysis of tax behaviour in Ghana revealed that 50 percent of the respondents perceive some of the tax officials as corrupt and 41 percent consider most or all of them corrupt. The study indicated that 58 percent of the respondents have little or no trust at all in the Ghana Revenue Authority, and only 40 percent of the respondents trust institutions. In an analysis of 30 developing countries, Picur and Riahi-Belkaoui (2006) also revealed that tax compliance is higher in jurisdictions with low corruption and bureaucracy. Similarly, trust in the government and national pride have been found to drive tax behaviour in recent studies (Batrancea et al., 2022; Korgaonkar, 2022; Masud et al., 2021; Muhammad et al., 2022; Oladele et al., 2020).

Essentially, the review of the literature points out some key demographic factors that should be considered when analysing behavioural responses to taxes in developing countries like Ghana. We consider some of these factors in our conceptual framework below.

2.1. Conceptual framework

Conceptually, this study is based on the utility-maximizing behaviour of a typical rational decision-maker following Amoah et al. (2021). This theory assumes a rational decision maker with utility in the consumption of services X and Y. The utility function is simplified mathematically as

$$U(X, Y)$$

where X denotes electronic transaction services (i.e., mobile money transactions) and Y is any alternative means of mobile transaction (e.g., cash transactions, etc.). We assume that the consumer's objective is to maximize their utility, based on their consumption of services X and Y, presented in Equation (1) as

$$Max\ U = X^{\alpha}Y^{\beta} \tag{1}$$

where α and β are the elasticity of utility to consumption of services X and Y, respectively. Again, we assume equality of expenditure and income and the fixed price of the transaction in line with Sandmo (1976) which assumes income is not exogenous. Thus, the consumer's utility is subject to a budget constraint, presented in Equation (2) as

$$C_X X + C_Y Y = M \tag{2}$$

where C_X and C_Y denote the price of transaction X and Y, respectively, and M is the consumer income in Ghana cedis. To maximise the consumer's utility (Equation 1) subject to the constraint (Equation 2), we specify the Lagrangian equation as

$$L = X^{\alpha}Y^{\beta} + \lambda[M - C_X X - C_Y Y] \tag{3}$$

where λ is the Lagrangian multiplier and the other variables remain as earlier defined. Taking the derivatives, the first-order conditions are

$$\frac{\delta L}{\delta X} = \alpha X^{\alpha-1}Y^{\beta} - \lambda C_X = 0 \tag{4}$$

$$\frac{\delta L}{\delta Y} = \beta X^{\alpha}Y^{\beta-1} - \lambda C_Y = 0 \tag{5}$$

$$\frac{\delta L}{\delta \lambda} = M - C_X X - C_Y Y = 0 \tag{6}$$

From Equations (4) and (5), we obtain:

$$\frac{\alpha Y}{\beta X} = \frac{C_X}{C_Y} \tag{7}$$

Rewriting Equation (7) to express the marginal utility yields the following condition:

$$\frac{MU_X}{MU_Y} = \frac{C_X}{C_Y},\ \frac{MU_X}{C_X} = \frac{MU_Y}{C_Y},$$

suggesting that the ratio of the marginal utilities to the price of transactions X and Y are the same when the consumer is at the optimal level.

Holding all else constant, if the ratio of marginal utility to the price of transaction X is negative, that is $\frac{MU_X}{C_X}<0$, then the behavioural response to the proposed e-levy will be negative which implies users of mobile money will either reduce or stop mobile money transactions. Conversely, if the ratio is positive, so that $\frac{MU_X}{C_X}>0$, then the behavioural response to the proposed e-levy will be positive which implies users of mobile money will increase their mobile money transactions.

Given Equations (6) and (7), the solutions for the optimal demand functions of the behavioural responses to the e-levy are specified as equations 8a & 8b:

$$X^* = \frac{\alpha M}{(\alpha + \beta)C_X} \tag{8a}$$

$$Y^* = \frac{\beta M}{(\alpha + \beta)C_Y} \tag{8b}$$

By implication, as a result of the e-levy, the optimal behavioural response of the consumer (8a & 8b) is a function of income and prices. This implies that the consumer's behaviour is maximized provided $X^*>0$ and/or $Y^*>0$. Stated differently, if the optimal condition is satisfied, the consumer will have a positive behavioural response to the e-levy. From the optimal demand functions, we superimpose a constant price of e-levy per transaction, and re-write the transformed function as Equation (9):

$$Y^* = X^* = f(M) \tag{9}$$

We extend Equation (9) to include a **Z**, and set $\boldsymbol{Y^*}$ and $\boldsymbol{X^*}$ as $\boldsymbol{Q^*}$

$$Q^* = f(M, Z) \tag{10}$$

where Q^* is the optimal behavioural response, Z is a vector of other determinants of consumer's behaviour (i.e., marital status, objective knowledge, trust in government, and the implementation timeframe) and "M" is as already defined. Equation (10) is the conceptual model used to explain how behavioural responses to the e-levy and its determinants interact.

3. Research methodology

3.1. Data collection process

Although other low-income countries have introduced taxes on the informal economy (Anyidoho et al., 2022), engagement with the public on a policy like the electronic levy is important to legitimise this policy in Ghana. Our motivation to use pre-tax survey data is driven by the importance and value of empirical evidence in engagement with policy makers, especially prior to the introduction of a major tax for the informal economy in lower-middle-income countries like Ghana. Thus, pre-tax survey data is useful to generate sound empirical conclusions for engagement with policymakers and the paper's findings are discussed in this light. Nevertheless, the study is mindful of the limitations of the pre-tax data, given that behavioural changes may differ after the tax has been implemented.

The study gathered pre-tax data through an online survey of respondents. Specifically, Google online forms were the key instrument for the data collection. All respondents were automatically restricted to only one entry to inhibit multiple responses from respondents and avoid the duplication of entries. The email identities provided by the respondents helped to further avoid duplication of entries.

The respondents were voluntarily encouraged to complete the survey. Nonetheless, they reserved the right to withdraw or skip a question where necessary. Thus, not all variables received an equal number of responses. The questionnaire was structured to have two main parts namely Section A which had questions on subjective and objective knowledge of e-levy, trust in the arms of government, proposed implementation timeframe, and other relevant questions on the subject matter (e-levy) whiles Section B had questions on the socioeconomic or demographic

characteristics of the respondent. Ethically, this social science survey presents no threat to the respondents as most of the questions only probed into their views on E-levy and their demographics.

The survey commenced on February 9 and ended on 16 February 2022, after a pilot survey had been completed. The snowball sampling technique was used, and it yielded a sample size of 2,810 respondents. Relative to the 17.5 million active mobile money accounts in 2021, our sample represents 0.02% of active mobile money users in the entire country which is not nationally representative. Moreover, the sample exhibits representativeness because of its geographical spread across all regions in the country. The unit of analysis is all individuals with mobile money accounts in Ghana irrespective of network type. Snowball sampling is used as our sampling technique. Generally, snowball sampling is a chain-referral strategy for identifying research subjects in which the sample is enlarged by enrolled individuals who encourage others to join in the study, starting with a small sample from the target population (Amoah et al., 2020; Atkinson & Flint, 2001). In this study, the authors used their social media platforms as the starting point to share the survey instrument with respondents. Although not compulsory, respondents were encouraged to also share with their contacts until no more responses were recorded within the eighth day of the survey administration. Snowball sampling is advantageous since it's able to identify people in the population understudy, for example, mobile money users. However, the snowball sampling technique may be exposed to some limitations such as community bias where the first respondent may have strong impact on the sample. Another limitation is the non-randomness of selection which affects the representativeness of the sample to the population. Despite the limitations, we were motivated to use snowball sampling technique because it enables a researcher to get sampling units (in this case, mobile money users) that may be difficult to reach using other techniques.

Furthermore, moral hazard from respondents resulting from misreporting and politicisation of answers from respondents was minimised by dropping responses identifying particular parties or identities and cross-checking logic in responses using revised questions in different sections.

After data cleaning and the elimination of duplicates, 2741 responses were used for the analysis. The snowball sampling technique, though a non-probability form, can be generalised to obtain a larger sample, based on the "snowball" effect, given the diversity of responses from the descriptive statistics in the survey. The heterogeneity in responses also reduces any form of selection bias or cohort effect.

The researchers retrieved the data in excel and coded the various responses after which the dataset was cleaned for analysis using Stata 15. The question used to define behavioural response was "Assuming the E-levy bill is passed into law, which of the following will best fit your response to mobile money use?" and this was coded as 1 for responses as "I will reduce my transactions on mobile money (momo)", "I will rather increase my mobile money transactions", "I will continue to use mobile money as if nothing has changed (Keep status quo)" and coded 0 as "I will stop using mobile money (momo)". Also, the questions used to define subjective and objective knowledge are "Do you know about E-levy?" and "Mention anything you know that relates to the E-levy?". This was coded as 1 for a "Yes" response for the subjective knowledge and 0 otherwise. "Mention anything you know that relates to the E-levy?" was the question used to tease out the objective response. Any response which implies the respondent knows the e-levy was coded as 1 and otherwise 0.

3.2. Model specification

Given the binary nature of the regressand, we specify a logit model following Gujarati and Porter (2009), Amoah et al. (2020), and Amoah and Addoah (2021). Alternatively, this could have been estimated with a probit or a linear probability model. Given that they all yield statistically similar results, we use the logit model. Using the theoretical framework in Equation (10), we commence with a linear probability model which is shown in Equation (11):

$$P_i = E(Y = 1|X_i) = \beta_1 + \beta_2 X_i \tag{11}$$

Where X is a vector of cognitive and socioeconomic covariates and $Y = 1$ captures the expected probability that a respondent may have a positive behavioural response to the e-levy. Rewriting Equation (11) yields:

$$P_i = E(Y = 1|X_i) = \frac{1}{1 + e^{-(\beta_1 + \beta_2 X_i)}} \tag{12}$$

but $\alpha_i = \beta_1 + \beta_2 X_i$. Equation (12) is rewritten as:

$$P_i = E(Y = 1|X_i) = \frac{1}{1 + e^{-(\alpha_i)}} = \frac{e^{\alpha}}{1 + e^{\alpha}} \tag{13}$$

taking a form of a cumulative logistic distribution.

Specifying the probability of a positive behavioural response, we derive Equation (14)

$$1 - P_i = \frac{1}{1 + e^{\alpha_i}} \tag{14}$$

Thus, the odds ratio of a positive behavioural response to e-levy which expresses the ratio of responding to the e-levy imposition by increasing, decreasing, or not changing the status quo to stopping electronic transactions is specified as

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{\alpha_i}}{1 + e^{\alpha_i}} = e^{\alpha_i} \tag{15}$$

Equation (15) is the exponential form transformed by taking the natural log to yield Equation (16)

$$L_i = ln\left(\frac{P_i}{1 - P_i}\right) = \alpha_i = \beta_1 + \beta_2 X_i \tag{16}$$

Equation (16) shows a linear expression of the variables and parameters. Following Amoah et al. (2020), the marginal effect is specified as:

$$\frac{\delta\alpha(y|x)}{\delta(x)} = \left[\frac{\delta F(\beta x')}{\delta(\beta x)'}\right]\beta$$

Rewriting Equation (10) as an econometric model to include the regressors and error term leads us to Equation (17):

$$\begin{aligned} BRes = {} & \beta_0 + \beta_1 Income_i + \beta_2 Marstatus_i + \beta_3 Subknow_i + \beta_4 Objknow_i + \beta_5 Edu_i + \beta_6 Trust_i \\ & + \beta_7 Elmpl_i + \mu_i \end{aligned} \tag{17}$$

Where the dependent variable, *BRes* measures the probability that a respondent exhibits a behavioural response to the e-levy.

The independent variables were selected based on the comparative treatment theory, related empirical studies, and data availability. The definitions of the variables and the expected relationship with the dependent variable are discussed below:

Income captures the income level of the respondents measured in Ghana cedis. Income is the take-home monthly income or net salary range of the individual consumer. A priori, we expect that an individual on a relatively higher income level will engage in more mobile money transactions, and thereby have a positive behavioural response to the e-levy, holding all else constant.

Marstatus is a dummy capturing the marital status of the respondents. It is represented as 1 for married and 0 otherwise. A priori, we expect married people to have a positive behavioural response to the e-levy as the joint burden shared makes the married inclined to tax compliance more than the unmarried.

Subknow captures the subjective knowledge of the individual to e-levy. A priori, we expect that an individual with subjective knowledge of the e-levy will have a positive behavioural response.

Objknow represents the objective knowledge of the individual to e-levy. The objective knowledge measures whether the respondent has the same knowledge or understanding as the proponents of the e-levy. A priori, we expect a positive behavioural response given a fair knowledge of the e-levy.

Edu is the educational level attained by the respondent. Education level is measured by whether the respondent was educated at the primary, secondary, tertiary (first degree, master, doctorate) level or no education. A priori, we expect individuals with higher levels of education to have a positive behavioural response to the e-levy.

Trust refers to an individual's trust in government. It is denoted as 1 whether the individual has trust in the central government and 0 for no trust in the central government. We expect that as individuals trust the government more, they become tax compliant or have a positive behavioural response to the tax, holding all else constant.

Elmpl refers to the expected e-levy implementation timeframe. *A priori*, we expect that individuals who want the e-levy to be implemented now will have a positive behavioural response whereas those who want implementation in the future are more likely to have a negative behavioural response.

To help readers appreciate the statistical description of the variables, a summary of all the variables and their central tendencies are presented in Table A1 (see Appendix).

4. Results and discussion

In theory, people will behave differently because of a proposed tax. While others will reduce their transactions, some will increase while others will continue to behave indifferently as if nothing affects them, and others will choose to stop any transaction related to the tax to avoid it. In this context, four behavioural changes are observed.

Table 1 presents the behavioural response per the proposed electronic levy. The majority of the respondents, constituting 46.81 percent, said that they would stop using mobile money. Another 41.37 percent also said that they will reduce their transactions on mobile money. Nonetheless, 10.65 percent of the respondents maintained they will continue to use mobile money as if nothing has changed, thus keeping the status quo whereas. Furthermore, 1.17 percent which is relatively lower may constitute high-income earners, who will rather increase their mobile money transactions after the e-levy is imposed. These results differ from those of Bongomin et al. (2020) which show that Ugandans are more likely to stop using mobile money if a transaction tax is imposed.

According to the 2010), every tax administration action or communication should "resonate" with behavioural elements, and tax administrations should be aware of public misconceptions or inaccuracies that may influence behaviour. From Table 2, the majority of the participants in the

Table 1. Analysis of behavioural response to e-electronic levy

Behavioural Response	Frequency	Percent
I will continue to use mobile money like nothing has changed (Keep the status quo)	292	10.65
I will rather increase my mobile money transactions	32	1.17
I will reduce my transactions on mobile money (MoMo)	1,134	41.37
I will stop using mobile money (MoMo)	1,283	46.81
Total	**2,741**	**100**

Table 2. Analysis of positive & negative behavioural response to E-electronic levy

Positive and Negative Behavioural Responses	Frequency	Percent
Negative Behavioural Response	2,417	88.18
Positive Behavioural Response	324	11.82
Total	**2,741**	**100**

survey representing approximately 88 percent had negative behavioural responses to e-levy whereas close to 12 percent were positive responses to the levy. These results are similar to those in Table 1, where the majority of respondents indicated that they will reduce their transactions or stop using mobile money entirely. In this sense, these can be viewed as negative behavioural responses. Similarly, in Table 1, the results show that nearly 12% of respondents said that they will rather keep using mobile money like nothing has changed or increase their transactions on the mobile money system. These behaviours can be thought of as positive behavioural responses.

The next step in our analysis is to examine the drivers of behavioural responses in the sample data. This is done by estimating the regression model presented in Equation (17) with the logit estimation technique, based on the binary nature of the dependent variable. The regression results from this estimation technique are presented in Table 3.

Further subsample analysis is then conducted to see if the identified drivers, especially trust in government and the implementation timeframe of the E-levy, also influence positive behavioural responses in the sample data. These results are also presented in Table 4.

Consider now the regressions result of Equation (17), as shown in Table 3. Table 3 shows the logit fixed effect results of behavioural change dependent on the respondent's socioeconomic demography (income, marital status, education), knowledge (subjective and objective knowledge), trust in government, and e-levy implementation timeframe. Following Amoah and Addoah (2021), a logit fixed effect regression is used because of the binary nature of our regressand (behavioural change) which is not perfectly predicted by the regressors. Further, its associated average marginal effects are also estimated for ease of interpretation. In Table 3, we observe that the probability of a respondent having a behavioural change relative to the base outcome is positive and significant for income, objective knowledge, trust in government, and the e-levy implementation time frame, holding all else constant.

To commence with the interpretation of the results, we first assume that all other factors are held constant except the variable in question. To summarise, the results indicate that income,

Table 3. Regression results of behavioural change to E-levy

	(1)		(2)	
VARIABLES	**Logit**	**Average Marginal Effects**	**Logit (*Fixed Effects*)**	**Average Marginal Effects**
Income (log)	0.2183***	0.0449***	0.1886***	0.0384***
	(0.061)	(0.012)	(0.065)	(0.013)
Marital Status (*married*)	−0.4861***	−0.1009***	−0.4342***	−0.0891***
	(0.103)	(0.021)	(0.106)	(0.020)
Subjective Knowledge	0.0628	0.0129	0.0571	0.0116
	(0.174)	(0.035)	(0.176)	(0.036)
Objective Knowledge	0.4333***	0.0894***	0.4160***	0.0849***
	(0.100)	(0.020)	(0.102)	(0.019)
Education	−0.7637*	−0.1572*	−0.7928*	−0.1613*
	(0.420)	(0.086)	(0.430)	(0.087)
Trust in Government	1.0831***	0.2140***	1.0814***	0.2110 ***
	(0.328)	(0.057)	(0.332)	(0.056)
E-Levy Implementation Time frame				
Future (Passed after 2022)	3.4777***	0.4999***	3.5046***	0.4988***
	(0.327)	(0.016)	(0.329)	(0.016)
Now (Passed in 2022)	1.6771***	0.3504 ***	1.6503***	0.3425***
	(0.254)	(0.039)	(0.256)	(0.040)
Constant	−1.1759*		−2.1690**	
	(0.629)		(0.884)	
Regional Fixed Effects	*No*		*Yes*	
Observations	2,351	2,351	2,351	2,351

Dependent Variable: Behavioural Change (Behavioural Change=1, No Behavioural Change=0) Standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

marital status, objective knowledge, trust in government, and e-levy implementation timeframe were all statistically significant determinants of a respondent's behavioural change to e-levy at a 1% significance level whereas education was significant at a 10% significance level. However, subjective knowledge was found to be insignificant.

Theoretically, income is a key determinant of purchase behaviour. So, income is included in the model as an important determinant of the respondent's behavioural change. We show evidence that a one percent increase in income, is associated with a 3.84% increase in the probability of respondent's behavioural change to the e-levy. Thus, as income increases, a respondent will be more likely to have a behavioural change to the e-levy.

In contrast to expectations, relative to the unmarried, the married is associated with an 8.91% less probability to exhibit a behavioural change for the e-levy. Thus, a married respondent is less likely to have a behavioural change to the e-levy compared to the unmarried. This is plausible, in

Table 4. Regression results of positive behavioural responses

	(1)		(2)	
VARIABLES	**Logit**	**Average marginal effects (Delta-method)**	**Logit**	**Average marginal effects (Delta-method)**
Trust in Government	0.6549**	0.0555**	0.6924**	0.0582**
	(0.269)	(0.025)	(0.273)	(0.025)
E-Levy Implementation Timeframe				
Future (Passed after 2022)	4.3389***	0.6861***	4.3892***	0.6815***
	(0.230)	(0.028)	(0.239)	(0.028)
Now (Passed in 2022)	2.0671***	0.1820***	2.1525***	0.1918***
	(0.304)	(0.041)	(0.313)	(0.042)
Other Determinants	*Yes*	*Yes*	*Yes*	*Yes*
Regional Dummies	*No*	*No*	*Yes*	*Yes*
Constant	−4.4297***		−4.0694**	
	(1.239)		(2.000)	
LR chi2(8/25)	692.60***		703.43***	
Pseudo R2	0.4836		0.4912	
Observations	1,364	1,364	1,364	1,364

Dep Variable: Positive Behavioural Responses Standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

that the married may have a lot of household-level transactions to do (e.g., transfer of housekeeping money and children's upkeep) that eventually translates into higher absolute cost hence the married may shy away from the e-levy as compared to the unmarried. As noted in Seidu and Asante (2011), financial burdens and responsibilities are more associated with the married than the unmarried.

Also, a respondent with objective knowledge of the e-levy has an 8.49% more probability to have a behavioural change to the e-levy than one without objective knowledge. This implies that cognitive power as a result of education and/or advocacy has the probability to influence behavioural change to the e-levy.

Amoah et al. (2017), have shown that trust matters in the payment of services especially if they are public in nature. Our results show that there is a 21.10% probability that a respondent who trusts in the three arms of government will show a behavioural change to the e-levy compared to a respondent who does not trust in the arms of government. A respondent who trusts in the government believes the revenue generated may be used for the purpose and not corruptly diverted into private pockets. Stated differently, tax non-compliance will rise if taxpayers do not trust the tax administration to collect taxes fairly (Murphy, 2004). The perception of fairness and trust in tax administration are crucial instruments for behavioural change. Compliance is inevitable provided its administration demonstrates the expected level of trust (see Alm et al., 2010; Reeson & Dunstall, 2009).

We also observe that the time frame in the e-levy implementation is a significant determinant of behavioural change to the e-levy. That is, a respondent who wants e-levy in the future (*passed after 2022*), is more likely to have a behavioural change relative to the one who wants it cancelled. There is a 49.88% probability of a behavioural change associated with a respondent who wants the

e-levy to be passed after 2022. Similarly, a respondent who wants e-levy to be passed now (*in 2022*) is associated with a 34.25% probability of a behavioural change. This implies that those who want the e-levy passed in the future (i.e., after 2022) are quantitatively greater than those who want it passed in 2022. Indeed, the evidence so far shows that people have more tendency to exhibit a behavioural change to the e-levy (*either in 2022 or after 2022*) compared to those that want the e-levy cancelled now. Similarly, behavioural change presents two scenarios namely, positive and negative responses. For robustness, the two government-induced factors (Trust and Time of implementation [time frame]), which are exogenous are modeled against the positive and negative behavioural responses. The results which are presented in Table 4, align with the results shown in Table 3 and fall in line with our expectations as well.

Results from Table 4 show a significant positive effect of *Trust in Government* on the positive behavioural responses. It is expected that when people trust in the government, they will not hesitate to exhibit a positive behavioural change in favour of the e-levy because they believe the government will use the outcomes judiciously. Relative to a respondent who does not trust in government, we observe that a respondent who trusts in government is 5.82% likely to exhibit a positive behavioural response. Corroborating with the earlier finding in Table 3, trust in government is found to significantly influence positive behavioural responses to the e-levy. This is consistent with the tax compliance literature which establishes that trust in the government ensures compliance to tax obligations through the individuals' perception of fairness in the tax system (Jimenez & Iyer, 2016).

We also observe that relative to those who want the e-levy cancelled, a respondent who wants the e-levy *implemented after 2022* or *passed in 2022* is 68.15% and 19.18% likely to exhibit a positive behavioural response, respectively. In effect, we show evidence that respondents show interest in the passage of the e-levy bill in the future (i.e passed after 2022) is quantitatively greater than those who want it passed now (i.e*., passed in 2022*). That is, relative to those who want the e-levy cancelled, we show evidence to corroborate our earlier finding that the time frame is very sensitive to positive behavioural changes. Similarly, we conclude that respondents are not against the e-levy per se, however, they are concerned about the time of its implementation.

4.1. Discussion

This research is motivated by the quest of developing country governments to rely on the growing telecommunication and mobile money business to raise enough funds for their expenditure. This has become so critical given the global economic and financial sector shocks as a result of the COVID-19 pandemic and the Russia-Ukraine crises. For some countries, for example, Ghana, the impact has been so devastating to the extent that they have consistently been downgraded in their international ratings, their debt-to-GDP ratio keeps rising, inflation and exchange rates depreciation have all had their negative impacts leading to incessant demonstrations, a threat to political peace and stability. This has presented two options for economic recovery. The first is to rely on international donors with conditionalities and sometimes borrow at higher costs. The second is to rely on internal sources that do not necessarily crowd out the private sector. The latter, popularly described as a home-grown solution has been firmed up by the government leading to the introduction of an electronic transaction tax. Although the electronic levy appears novel in Ghana, the levy has been implemented in other African countries. For example, the electronic levy was passed in Kenya and Uganda in 2018, passed in Malawi in 2019 and in Tanzania in 2021.

In this study, given the negative reactions and experiences of the other African countries in introducing the e-levy law, expectations were not different. To inform policy strategy in rolling out this law, given the continent's existing reactional evidence, this study asked participants, "assuming that the e-levy is passed into law, what will be their behavioural response"? The majority, constituting approximately 47% indicated that they will stop using mobile money whiles 41% also indicated a reduction in mobile money transactions. This implies that if the law is not well thought through in line with clients' cooperation before its implementation a possible backlash is inevitable.

To investigate this further, some relevant variables were plugged into a behavioural model to ascertain the determinants of such behavioural responses. Income, marital status, objective knowledge, trust in government, and time frame for the implementation were identified to be the statistically relevant drivers of the behavioural responses. For income, our results show that low-income respondents are inclined to pay the e-levy as compared to high-income earners. Although this is counterintuitive from the literature point of view as we were expecting the low-income earners to be inclined to evasion and avoidance (Bloomquist, 2003; Porcano, 1988), relative to the high-income earners (Anderhub et al., 2001). Nonetheless, this is shown to be plausible as the high-income earners have more responsibilities and more transactions which is associated with higher absolute costs hence their negative behavioural response.

Marital status represents the household's joint decisions and sharing of financial responsibilities. The result shows that married respondents are less likely to change their behaviour given the e-levy payment. Consistent with the literature, the married are less likely to evade and avoid taxes than the unmarried (Richardson & Sawyer, 2001; Seidu & Asante, 2011). This is underscored by the predominantly tax-compliant gender effect -the woman. Thus, the woman is more likely to influence the man to be compliant instead of just disregarding the law with its consequences.

Objective knowledge is the respondent's accurate knowledge of the e-levy just as the policy maker has envisaged. This evidence suggests that respondents who are well informed are more likely to change their behaviour to e-levy payment. In line with the literature, when citizens have objective knowledge, they are more likely to comply with tax payments ((Akinboade, 2015; Armah-Attoh & Awal, 2013; Kira, 2017; Nkwe, 2013). Our evidence is counterintuitive yet plausible. If those who have objective knowledge also know the measure of corruption being reported by reliable institutions, then their knowledge of the degree of corruption is likely to counter their knowledge of what their money can be used for.

Trust is generally relevant in making public policy decisions. Given that the e-levy is a levy by the government, trust in the government in theory is expected to play an important role in the expected levy-payers decisions. The results show that relative to respondents who are likely to stop using mobile money to avoid payment of the e-levy, those who trust in the government are more likely to exhibit behavioural changes towards the e-levy payment. Corroborating the results with literature, Alm et al. (2006), in an empirical study show that trust positively drives tax behaviour. This means that those who trust in the government will not stop patronizing the services that will earn the government revenue to meet her numerous expenditures.

Time is also an important determinant in decision-making. Although a public good consensus regarding the time of implementation can be very difficult to arrive at, nonetheless, a majority decision can be largely helpful. Based on the results, relative to those who are of the view that the e-levy should be cancelled and not implemented at all, those who want the e-levy to be implemented now and after the year 2022 are more likely to exhibit behavioural changes. This means that majority of the respondents are not opposed to the implementation of the e-levy per se, however, what perhaps may constitute their challenge is how favourable the time of implementation is. That is, if respondents are allowed to plan and adjust in line with incomes and expenditures, they are more likely to patronize the e-levy.

5. Conclusion and policy recommendations

The study concludes that both positive and negative behavioural changes to the use of mobile money have resulted from the planned implementation of electronic levy in Ghana. The use of pre-tax survey data contributes empirical evidence to the policy discourse that has erupted as part of getting legitimization for the planned electronic levy. The evidence attests to the fact that, although some e-levy users may be insensitive to the e-levy, a greater share of the electronic transaction users on the contrary will be very sensitive to the e-levy. That is, while a few of the respondents argued that they will increase their use of electronic transactions, the majority indicated their willingness to either reduce their use of mobile money or stop patronising electronic transactions entirely, ahead of the passage of the e-levy. We further conclude that these

behavioural responses to the e-levy are driven by the respondent's income, marital status, trust in government, and choice of implementation time frame. Aside from the influence of socio-economic factors, we conclude that positive behavioural responses to the e-levy are probable when people have more trust for the government, based on its use of tax revenues, or perhaps when the e-levy is implemented later, at a time that is suitable for most people.

The study recommends proper education of the general public and advocacy at all levels in the public and keen consideration of implementing the e-levy at a later time when compliance is likely to improve. This will induce inclusiveness and responsive behavioural changes towards the rollout of the e-levy to meet the government's expected revenues for the levy. The study further observed the sensitivity of objective knowledge to behavioural changes. This implies that if users are properly educated to acquire objective knowledge about what their taxes will go into coupled with transparency, this is likely to influence levy compliance. Again, generally, governments have reneged on most of their development promises, hence trust in government has remained somewhat questionable. This study recommends a framework that will make the government transparent from the point of collection, use and accountability. This will rekindle the almost dead trust in government and motivate users of electronic services to be reassured that their taxes will be re-invested into good use for their ultimate benefit. Moreover, in as much as the government needs money urgently to avert the consequences of reverting to the International Monetary Fund for a bailout, the timeframe for implementation is also critical. For now, people have not come to terms with this e-levy novelty hence the need to go for a bailout and gradually roll out the e-levy with an affordable and all-embracing rate to rake in the returns. This is preferable to charging an exorbitant rate now which may end up killing expected payers' interest, encourage avoidance and evasion, and subsequently kill the initiative. By implication, if the e-levy is not rolled out well, government's revenue targets will remain an illusion and the novelty in this tax system will fail miserably. However, if the government, through proper stakeholder engagements, transparently rolls this out in an affordable manner, this will significantly help bridge the deficit gaps that annually beset the country.

Given that the present study focuses on a pre-tax survey, future research can focus on a post-tax survey that analyses behavioural dynamics resulting from the imposition of the electronic tax in May 2022. This will help strengthen engagement with policymakers and revive discussion on the e-levy's legitimization.

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Appendix

Table A1. Descriptive statistics

	Behavioural Dummy	Income	Marital Status	SubKnow	Objknow	Age	Edu	Trust	Elmpl
Mean	0.52	3189.98	0.68	0.91	0.66	35.87	0.97	0.05	0.23
Median	1.00	2300.00	1.00	1.00	1.00	34.00	1.00	0.00	0.00
Standard Dev.	0.50	2810.33	0.47	0.29	0.47	10.02	0.17	0.23	0.52
Skewness	−0.08	1.21	−0.77	−2.81	−0.70	0.75	−5.42	3.91	2.24
Kurtosis	1.01	3.39	1.60	8.87	1.49	3.89	30.33	16.30	7.06
Minimum	0.00	203.00	0.00	0.00	0.00	18.00	0.00	0.00	0.00
Maximum	1.00	10000.00	1.00	1.00	1.00	75.00	1.00	1.00	2.00
N	2810.00	2601.00	2810.00	2810.00	2805.00	2810.00	2810.00	2810.00	2810.00