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SOCIAL BEHAVIOUR TOWARDS TAX PAYMENT: A SURVEY-BASED EVIDENCE FROM SADC COUNTRIES

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Abstract

Tax non-compliance and its consequences have become a subject of increasing interest in academic literature and economic forums worldwide. While most studies on this issue focus on developed countries, there is a growing trend to explore understudied developing countries. To fill this gap, we investigated tax evasion drivers in eight Southern African Development Community (SADC) countries, using the round 7 Afrobarometer survey data conducted in 2019-2020. The survey's comprehensive coverage of economic, political, and sociological questions made it one of the most extensive surveys on the continent. We used logistic regression and Empirical Bayesian estimation and found that political legitimacy significantly influences tax evasion behavior in the SADC region. Individuals residing within the SADC are more likely to engage in tax evasion activities when they perceive a lack of access to fundamental services provided by their governments or harbor doubts about the legitimacy of political institutions. Therefore, policymakers in SADC member states should prioritize reviewing and evaluating economic policies, the performance and efficiency of political institutions, and more inclusive governance. We suggest that a strong and legitimate political framework, coupled with effective service delivery, can contribute to reducing tax evasion rates and enhancing public welfare outcomes. Institutional reforms, increased transparency, accountability, and a more inclusive governance system are necessary for fostering a culture of compliance and trust, leading to improved revenue collection.

Keywords*: Afro Barometer, Tax Compliance, Tax Evasion, Empirical Bayesian, SADC.*

VERGİ ÖDEMESİNE KARŞI SOSYAL DAVRANIŞ: SADC ÜLKELERİNDEN ANKETE DAYALI ÇALIŞMA

Öz

Vergi uyumsuzluğu ve sonuçları, dünya çapındaki akademik literatür ve ekonomik forumlarda artan ilgi konusu haline geldi. Bu konudaki çoğu çalışma,

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gelişmiş ülkelere odaklanırken, az çalışılan gelişmekte olan ülkeleri keşfetme eğilimi artmaktadır. Bu boşluğu doldurmak için, Güney Afrika Kalkınma Topluluğu (SADC) ülkelerinde vergi kaçırma nedenlerini araştırdık ve 2019-2020 yıllarında yapılan 7. tur Afrobarometre anket verilerini kullandık. Anketin kapsamlı ekonomik, siyasi ve sosyolojik sorulara sahip olması, kıtanın en geniş anketlerinden biri olmasını sağladı. Lojistik regresyon ve Ampirik Bayes tahminini kullandık ve SADC bölgesinde siyasi meşruiyetin vergi kaçırma davranışını önemli ölçüde etkilediğini bulduk. SADC'de yaşayan bireyler, hükümetlerinin temel hizmetlere erişimlerinde bir eksiklik veya siyasi kurumların meşruiyeti konusunda şüpheleri olduğunda daha fazla vergi kaçırma faaliyetinde bulunma eğilimindedirler. Bu nedenle, SADC üye devletlerindeki politika yapıcılar, ekonomi politikalarının gözden geçirilmesi ve değerlendirilmesi, siyasi kurumların performansı ve verimliliği ile daha kapsayıcı yönetişim konularına öncelik vermelidirler. Güçlü ve meşru bir siyasi çerçeve, etkili hizmet sunumu ile birleştirildiğinde, vergi kaçırma oranlarını azaltmaya ve halk refahı sonuçlarını artırmaya katkıda bulunabilir. Kurumsal reformlar, artan şeffaflık, sorumluluk ve daha kapsayıcı bir yönetişim sistemi, uyum ve güven kültürünün oluşması için gerekli olacaktır.

***Keywords**: Afrobarometre, Vergi uyumu, Vergi kaçakçılığı, Ampirik Bayesci, SADC.*

Introduction

Tax evasion is the act of corporate entities and individuals deliberately misrepresenting, manipulating, or hiding their disposable income in order to escape or reduce their tax responsibilities and liabilities. In the recent past, tax evasion has become a global trend in both developed and developing countries, and its causes and economic implications are widely discussed in the literature. The tax evasion sphere has gained much attention and interest since the emergence of empirical study (Picur & Riahi-Belkaoui, 2006). Particularly, tax evasion is a huge problem for developing countries. Governments lose a colossal amount of revenue in the process every year. It is very difficult to increase internal revenue when a large group of their citizens is not paying their correct amount of tax (Picur & Riahi-Belkaoui, 2006). This topic's widespread discussion and debate permeated international economic blocks and organizations such as OECD (Gemmell & Hasseldine, 2012). Consequently, it is equally hard for the developing states to fulfill their responsibilities of providing public goods and services to their people, hence they are forced to rely on foreign aid and donor funds, which augments their expenditures and gives them budget support. Thus, tax evasion is one of the main hindrances to economic growth and development globally and in developing countries in particular. Tax evasion is prevalent and widespread despite the fact that it is an illegal and criminal act under the law. It amounts to the neglect or evasion of civic responsibilities that entities and individuals must comply with. There are three main theories, which explain the tax phenomena.

The first one is the theory of ability to pay, which states that tax levies should be based on the individuals' capability to pay and according to their income level. The ability to pay theory is the bedrock of the current progressive tax systems around the globe. The well-known economist J.S Mill expanded this theory, in which its genesis goes back to the sixteenth century. The underlining idea is that those who afford should cater to government expenditures.

The second theory is called benefit theory, which states that tax should be imposed upon individuals and corporate entities according to the reciprocal benefits they get from tax. In other words, those who benefit the most from tax should contribute and pay the most to the government expenditure, while those who do not get meaningful reciprocal benefits from tax should be paying less. However, this not only violates the underpinning concept of tax, which is an obligatory duty and responsibility of individuals to the government but also intractable and difficult to implement in a practicable manner. It is difficult to measure the units of benefits that one gets from tax, therefore, impractical. Consequently, the theory is criticized widely, even though it seems closer to equality and fairness.

The third theory is known as the theory of equal distribution. It states that individuals should be taxed according to their capacity to pay, and the benefit should be the same. Theory of equal distribution is a widely accepted theory for an equitable tax system. This theory could be particularly relevant for SADC member countries in designing an equitable tax system to support economic development. By ensuring that individuals are taxed according to their capacity to pay, the tax burden can be shared more fairly across the population, helping to reduce inequality and promote economic growth, whilst ensuring that the benefits of taxation are distributed equally, the tax system can help to fund public services and infrastructure that are essential for economic development.

Since developing countries including SADC countries are facing massive tax evasion, it is imperative to comprehend and understand factors and motives driving tax non-compliance so that government and policymakers can find durable, innovative solutions to the problem. Thus, understanding the root cause of tax evasion is not only a mere academic exercise but also policy-makers obligation and governmental responsibility. Governments cannot carry out their fundamental obligations of service delivery when a swath number of their citizens are not contributing to the government revenue. Hence, studying citizens' attitude towards taxation system, how and what they believe about the tax, and putting in place innovative tools and policies, and creating a trustable environment accordingly of paramount significance. Since it is difficult for the government to acquire or generate enough domestic revenue and to execute it is mandates of providing decent public goods and services and financing them without comprehending the taxpayer's behavior

and attitudes towards the administration and tax system (Khlif & Achek, 2015).

The paper is structured as: section 2, reviews the relevant literature. Section 3 lays out data and methodology, whereas section 4 discusses results followed by a concise conclusion and references.

1. LITERATURE REVIEW

The literature regarding tax evasion is vast across countries and continents. Analyzing the causes of federal income tax in the US (Cebula, 2011), found that personal income tax evasion is an increasing function of the maximum marginal rate of personal income tax. He applied the Currency Ratio Model in his study. The study indicates evasion of personal income tax is a huge problem in the US economy. Ali et al. (2014) examined determinants of tax compliance behavior in four African countries namely Uganda, Tanzania, Kenya, and South Africa using Afro barometer public survey data of 2011/2012 (round 5). In their analysis, they found that tax compliance behavior and "provision of public service is proportionally related". In other words, there is a positive relationship between the two. However, the perception of the persons that there are ethnically segregated and treated differently and unjustly is asymmetrically related to the tax compliance behavior. Thus, there is a high chance of adopting tax evasion strategies and tactics if individuals think that they are unfairly treated or excluded from the system. Additionally, Kenyans and South Africans opine that a strict and robust tax enforcement system reduces tax evasion. Ugandans and Tanzanians believe that health and education services determine the tax compliance behavior while Kenyans think more about access to electricity and roads. Furthermore, a comparative study for Uganda and Tanzania reveals that administrative efficiency, reforms, and government-society relations improve tax revenue generation, which Tanzania is performing better than Uganda (Kim and Kim, 2018). Thus, although the two countries implemented similar reforms Tanzania's system performs better than its neighboring Uganda. The difference between Tanzania and Uganda's taxation system performance is attributed to the relationships between government and the society, which in this case Tanzania seem to have a better relationship with their government, hence less tax evasion.

Another study by Ali et al. (2014) suggest that citizens of Kenya and South Africa are less probable to comply with tax payment if they opine that their taxation system is evadable and if they think the government treats their ethnic group unfairly, while access to public service correlates positively with tax compliance. Thus, if citizens believe that they have access to basic public services and the government is fulfilling its public service delivery duty then they are inclined to pay tax, while the contrary is true.

Also, a study by Mocanu et al. (2021) looked into the Romania's profit tax evasion using 236 pieces of information from companies between 213 to 2017. Those are the companies which are prosecuted as a result of not paying their profit tax. They concluded that it is more likely that big companies, which are financially weak to engage in tax avoidance activities. Moreover, (Yalama and Gumus, 2013) investigated the effects of tax evasion in Turkey. They documented, statistical significance of demographic, economic, and admirative factors on tax evasion. They indicated that tax burden encourages tax evasion while demographic and economic indicators are negatively related to tax avoidance. A study by Annan et al. (2014) suggests that inflation, age, tax rate, and income have symmetric relationships in Ghana. In addition, (Ameyaw and Dzaka, 2016) studied the main factors affecting tax compliance for Ghana. Their result indicates economic, fiscal, administrative, and demographic factors have a positive influence on tax evasion. Likewise, Tabandeh et al. (2012) pinpointed that tax loads, inflation rate, and the size of the governments have a positive influence on tax evasion. However, the association between tax evasion, taxpayers' income, and trade openness is negative.

Another study by Athanasios et al. (2021) reveals that tax rate, rule of law, unemployment rate, government efficiency, and other factors have a considerable impact on Greece's tax evasion phenomena. Richardson (2006a) carried out cross-country study of tax evasion and its causes. His results show that non-economic factors have a very strong positive impact on tax evasion. Variables such as tax morale, fairness, education, and income sources affect tax evasion more than economic indicators. Also, the study indicates that complexity is the most vital factor for tax evasion. If the complexity level is low and other variables are high, then tax evasion is low.

Similarly, Mocanu et al. (2021) highlighted that non-economic variables have a greater impact on tax evasion compared to the economic variables for Italy and Romania. The study further reveals both positive and negative relationships between tax evasion and the explanatory variables used. A social marketing perspective review of tax compliance study by Marandu et al. (2015) which involves 18 previously published works worldwide indicates that "attitudinal, normative and subjective control variables were on the overall good predictors of tax compliance". However, the study posits that it is difficult to obtain a uniform result or make meaningful full comparison among the literature due to the wide range of different variables used to explain tax evasion phenomena.

Additionally, they have noted a lot of theoretical flaws in selecting the appropriate dependent variable in the literature. These drawbacks in theoretical premises lead to divergence outcomes, making it difficult to determine the main determinants of tax compliance. Thus, the policymakers should not merely rely on the traditional methods and coercive instruments that force citizens to pay taxes. On the contrary, it is recommendable to engage

persuasive methods of formatting citizens' attitudes towards tax compliance rather than punitive and compelling measures.

Also, Khlif and Achek (2015) concluded similar findings. They suggest that there are numerous unknown and undiscovered measurements and methods of tax evasion. Although mainly four categories of variables are cited the outcomes in the literature is ununiform. The main variables they mentioned in their study are economic, demographic, institutional, and cultural variables, which are widely used in the literature to measure determinants of tax evasion.

A study by Ritsema et al. (2003) investigated non-compliance for tax by targeting groups and individuals of tax evaders who "participated in the 1997 Arkansas Tax Penalty Amnesty Program" Their findings show that taxpayers' reasons for failing to pay taxes are not all uniform. Thus, the motivations deriving one not to pay tax stems from different factors and depends on many things like the rules in that area, percentage of tax he or she owes, knowledge level, and many other factors. Among other things, they found that difficult to evade tax, income, and marital status have a positive impact on tax evasion. Also, they have found that people who owe a higher amount of taxes are not driven to come forward by a sense of moral obligation. Empirical research by Kassa (2021) which studied "micro, small and large enterprises" of Woldia administration city reveals that normative and subjective indicators have no influence on tax evasion, while knowledge, fairness of tax, and moral responsibilities have a considerable impact on taxpayers to involve in tax evasion.

Kondelaji et al. (2016) examine factors affecting tax morale for Iran through social psychology viewpoint. Using World Survey Values (WSV) s, the study reveals that economic variables and conditional cooperation factors highly affect tax morality. On the other hand, other indicators such as religion, political factors, gender, marital status, and demographic variables have no meaningful impact on Iran's tax morality.

2. DATA AND METHODOLOGY

2.1. Data

In this study, we utilized Afrobarometer data of SADC countries, round 7 survey Kangwook Han (2020) to investigate tax evasion behavior among citizens of eight SADC countries: Botswana, Lesotho, Madagascar, Mozambique, South Africa, Tanzania, Zambia, and Zimbabwe. We excluded Eswatini, Mauritius, and Namibia due to their small data, which resulted in coefficients that lacked economic sense. The round 7 survey was selected for its comprehensiveness and relevance to tax evasion and tax compliance. We opted to use logistic regression analysis since our dependent variable is binary, taking on values of either 0 or 1. The variables

employed in our analysis are comprehensively outlined in table 2. The Logit model is written as:

2.2. Methodological Framework

The Logit model is written as:

$$P(Y = 1\,|X)\ \frac{1}{\left(1 + \ e^{\ -(X'\beta)}\right)} \tag{1}$$

$$P(Y = 1\,|X) = \frac{1}{\left(1 + e^{\ -(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 \ldots + \beta_k x_{23})}\right)} \tag{2}$$

$$\begin{aligned} Yi = \alpha + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3} + \beta_4 X_{i4} + \beta_5 X_{i5} + \beta_6 X_{i6} + \beta_7 X_{i7} \\ + \beta_8 X_{i8} + \beta_i X_{i9} + \beta_{10} X_{i10} + \beta_{11} X_{i11} + \beta_{12} X_{i12} + \beta_{13} X_{i13} \\ + \beta_{14} X_{i14} + \beta_{15} X_{i15} \ + \beta_{16} X_{i16} + \beta_{17} X_{i17} + \beta_{18} X_{i18} \\ + \beta_{19} X_{i19} + \beta_{20} X_{i20} + \beta_{21} X_{i21} + \beta_{22} X_{i22} + \beta_{23} X_{i23} \\ + \varepsilon \end{aligned} \tag{3}$$

Where the dependent variable Y is binary, which takes 1 for tax compliance or 0 otherwise. $\beta_1 - \beta_{23}$ are the slope coefficients. X_1 is an independent variable ranging from 18-99, 103, and 106, X_2 is also an independent variable which is without basic necessities, X_3 represents satisfaction with democracy, $X_4 - X_{19}$ represents trust for political institutions and social interaction, whereas $X_{20} - X_{21}$ are employment status and education level of the individuals, and X_{23} represents individuals' gender and whether he or she is from urban or rural areas. Finally, ε stands for the error term.

First, we test the general null hypothesis of the model which is all the dependent variables have no impact on the dependent variable, tax evasion, against the alternative hypothesis of independent variables have an influence on tax evasion. It could be written as:

$H_0 = \ X_1 - X_{16} \ = 0$

$H_1 = \ X_1 - X_{16} \ > 0$

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Thus, H_0 individual characteristics, economic deterrence, and political legitimacy have no influence on refusal to pay tax and the alternative H_1 is these factors affecting tax evasion.

Secondly, we test individual characteristics, economic deterrence, and political legitimacy separately. To see their respective impact on tax non-compliance. Table A contains descriptions of the variables with their respective categories and groups please see Table A.

$H_0 =$ political legitimacy has no impact on tax non-compliance.

$H_1 =$ political legitimacy has an impact on tax non-compliance.

$H_0 =$ individual characteristics have no impact on tax non-compliance.

$H_1 =$ individual characteristics have an impact on tax non-compliance.

$H_0 =$ deterrence has no impact on tax non-compliance.

$H_1 =$ deterrence has an impact on tax non-compliance.

Table A contains the description of the variables used in the study. Dep. denotes the dependent variable, while indep. denotes the independent variable.

2.3. Empirical Bayesian Estimation

The Bayesian approach is used for the estimation. The general model under the Bayesian framework (Carrington and Zaman, 1994) could be written as:

$$Y_{it} = \beta_i X_{it} + \varepsilon_{it} \qquad (4)$$

any spaces between the title and the text. After the end of the text, a space should be left between the other title.

where Y is the dependent variable. In our case it is the refusal to pay tax, i stands for the individuals and t is time. X is a vector of explanatory variables; in our case it consists the measures of governance, economic deterrence, individual characteristics, and fiscal exchange. β is the vector of slope coefficient. Equation (4) can be represented as

$$Y_i = \begin{bmatrix} y_{i1} \\ y_{i2} \\ . \\ . \\ . \\ y_{it} \end{bmatrix}_{t\times 1}, \quad X_{it} = \begin{bmatrix} x_{i1} \\ x_{i2} \\ . \\ . \\ . \\ x_{it} \end{bmatrix}_{t\times k}, \quad \varepsilon_{it} = \begin{bmatrix} \varepsilon_{i1} \\ \varepsilon_{i2} \\ . \\ . \\ . \\ \varepsilon_{it} \end{bmatrix}_{t\times 1} \text{and}$$

$$X_{it} = \begin{bmatrix} X_{it}^1 & X_{it}^2 & ..... & X_{it}^k \end{bmatrix}_{k-Regressors}$$

$\varepsilon_{it} \sim N\left(0,\ \delta_i^2\right)$ is the random error component.

The data density is $\frac{\hat{\beta}_i}{\beta} \sim$

$$N(\beta, \Omega_i) \tag{5}$$

and the prior density is $\beta \sim N(\mu, \Lambda)$ (6)

hence the posterior density become as $\beta / \hat{\beta}_i \sim N(m_i, V_i)$ (7)

the measure vector and variance co-variance matrix of the posterior density are given as

$$m_i = V_i\left(\Omega_i^{-1}\hat{\beta}_i + \Lambda^{-1}\mu\right) \quad and \quad V_i = \left(\Omega_i^{-1} + \Lambda^{-1}\right)^{-1} \tag{8}$$

As the Classical Bayes estimator is the mean of posterior. So therefore equation (8) becomes as

$$\hat{\beta}_{i(CB)} = V_i\left(\Omega_i^{-1}\hat{\beta}_i + \Lambda^{-1}\mu\right) \text{ and its variance-covariance matrix is } V_i = \left(\Omega_i^{-1} + \Lambda^{-1}\right)^{-1} \tag{9}$$

The two hyper-parameters i-e μ and Λ are unknown. In CB the two hyper-parameters are taken from any sources other than the data. However, if these two are estimated from the data, then $\hat{\beta}_{i(CB)}$ will be termed Empirical Bayes estimator, and equation (9) becomes as

$$\hat{\beta}_{i(EB)} = \hat{V}_i\left(\hat{\Omega}_i^{-1}\hat{\beta}_i + \hat{\Lambda}^{-1}\hat{\mu}\right) \tag{10}$$

where the values of equation (10) are as

$\hat{\Lambda} = \left(\sum_{i=1}^{n}\Omega_i^{-1}\right)^{-1}$ and $\hat{\mu} = \hat{\Lambda}\left(\sum_{i=1}^{n}\hat{\Omega}_i^{-1}\hat{\beta}_i\right)$ are the two hyper-parameters estimated from the data.

We apply the empirical Bayes to estimate the effects of governance, economic deterrence, individual characteristics, and fiscal exchange on tax refusal. The Empirical Bayes method has two main advantages over the traditional time series and cross-section methods. First, Empirical Bayes considers heterogeneity for each of the individuals. Secondly, it provides lower standard errors as compared to other estimations (Zaman, 1996).

3. RESULTS AND DISCUSSION

Logistic regression is a statistical method used to analyze and model the relationship between a binary outcome variable and one or more predictor variables. Since our dependent variable is binary, logistic regression has been used to analyze data and draw insights into the factors that may influence tax evasion.

Table ***1*** presents the results of this analysis, offering a glimpse into the factors that may be driving tax evasion in the region.

Table 1. Regression Output of Logit Model for all Countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Botswana	Lesotho	Madagascar	Mozambique	South Africa	Tanzania	Zambia	Zimbabwe
age	-0.0134	-0.0225	-0.0014	-0.0189*	0.0127	-0.0050	0.0771	-0.0066
	(0.0296)	(0.0220)	(0.0038)	(0.0114)	(0.0187)	(0.0362)	(0.0555)	(0.0403)
wtout_b_services	0.5299*	0.1702	0.1011	0.3984***	-0.0856	-0.3338	0.5918	-0.0250
	(0.2986)	(0.1795)	(0.1397)	(0.0986)	(0.1318)	(0.3693)	(0.3948)	(0.3552)
fear_crimeh	0.7733**	-0.0967	0.2116	0.2254*	0.0114	-0.1040	-0.2187	0.2669
	(0.3933)	(0.2348)	(0.1627)	(0.1150)	(0.1483)	(0.0362)	(0.4641)	(0.4673)
free_election	-1.892**	-0.0122	0.2009	0.2202	0.3599	-1.2127	-0.4508	-0.4672
	(0.7662)	(0.3812)	(0.2099)	(0.1600)	(0.2258)	(0.8665)	(0.6247)	(0.5727)
satisfaction_f_dem	-0.0326	-0.4420	-0.2382	0.1922	-0.2676	0.8659*	0.8534	-1.3004*
	(0.5027)	(0.2852)	(0.2938)	(0.1532)	(0.2650)	(0.5052)	(0.8155)	(0.7647)
unequal_tr	0.0231	-0.0169	0.2598	-0.1961	-0.0438	0.6142	0.1576	-1.0505*
	(0.3981)	(0.3102)	(0.2638)	(0.1326)	(0.1910)	(0.5329)	(0.5516)	(0.6357)
t_fpresident	-1.02***	-0.2168	0.4506	-0.1908	0.0141	0.8786	0.6198	-0.2790

	(0.3899)	(0.3969)	(0.3705)	(0.1914)	(0.2367)	(0.7143)	(1.0076)	(0.3811)
t_parliament	0.7062	-0.2496	0.0910	0.5109***	0.0925	-0.1591	0.0022	0.9264
	(0.5130)	(0.3430)	(0.3516)	(0.1939)	(0.2866)	(0.5081)	(0.8427)	(0.7307)
t_loc_gov	0.8029*	0.1218	-0.1193	-0.1809	0.3063	0.0035	0.6413	0.4423
	(0.4266)	(0.3219)	(0.2723)	(0.1896)	(0.2585)	(0.5706)	(0.6295)	(0.5862)
t_ruling_party	0.7796**	-0.1074	-0.4386	-0.1432	-0.0935	-1.6915**	-0.0315	0.7172
	(0.3944)	(0.3686)	(0.3483)	(0.1583)	(0.2267)	(0.6717)	(1.0071)	(0.7227)
corr_pr_off	0.2491	-0.4095	-0.5462	-0.1619	-0.0342	0.8602	1.3247	0.1647
	(0.6130)	(0.5256)	(0.3982)	(0.2000)	(0.3118)	(1.1646)	(0.9426)	(0.9187)
corr_memp	-0.4130	-0.2576	-0.1782	-0.0547	-0.3349	-0.6743	0.0993	0.4939
	(0.6854)	(0.7334)	(0.4746)	(0.2245)	(0.3866)	(0.9357)	(1.2580)	(1.0521)
corr_tax_off	0.0901	0.7200	0.7910	-0.0429	-0.1780	-1.4177	0.5280	-0.7359
	(0.6972)	(0.7099)	(0.4839)	(0.2280)	(0.4135)	(1.0934)	(1.3424)	(1.1792)
corr_police	-1.0323*	-0.5011	0.8272**	0.3832**	-0.0645	0.3312	-0.8769	-1.4238
	(0.6100)	(0.5545)	(0.3616)	(0.2040)	(0.3308)	(0.8511)	(0.9764)	(0.8794)
corr_level	0.5926	-0.2278	0.2729	-0.1475	-0.1726	-0.2880	-0.0277	-0.1269
	(0.3731)	(0.2390)	(0.2402)	(0.1165)	(0.1758)	(0.4697)	(0.5231)	(0.5722)
diff_t_avoid_paying_t	0.1575	-0.1650	0.4905*	-0.1110	0.1928	-0.0206	-1.0555*	0.3241
	(0.3303)	(0.2869)	(0.2887)	(0.1267)	(0.1800)	(0.4205)	(0.5745)	(0.4665)
dt_get_id	0.1477	0.8296**	-0.6644*	-0.2380	0.0374	-0.2136	-0.4814	0.1840

	(0.4541)	(0.3252)	(0.3517)	(0.1735)	(0.2193)	(0.4613)	(0.6364)	(0.5499)
h_crime	-2.21***	-0.4324	-0.4458*	0.0526	-0.3707	0.3366	-0.0230	-0.9205*
	(0.7806)	(0.4584)	(0.2620)	(0.1605)	(0.2422)	(0.7718)	(0.7971)	(0.5311)
h_bhealth_s	0.4476	0.0200	-0.4681	-0.0365	0.1867	-0.4180	0.6154	0.5007
	(0.5523)	(0.4127)	(0.3068)	(0.1869)	(0.2787)	(0.5396)	(0.9243)	(0.6666)
h_corruption	1.3621**	1.1956***	0.0360	-0.3882**	-0.4575*	0.3927	0.7101	0.3872
	(0.6361)	(0.3954)	(0.3346)	(0.1637)	(0.2506)	(0.7246)	(0.9707)	(1.0438)
emp_status	1.1955**	0.0437	0.2120	0.0606	-0.2287	-0.8390	1.5767	-0.2796
	(0.4998)	(0.3047)	(0.2062)	(0.1404)	(0.1716)	(0.5650)	(0.9695)	(0.5482)
edu_level	-0.0638	-0.0726	0.1813	0.0042	-0.0274	-0.3713	0.0210	-0.7449
	(0.2303)	(0.2237)	(0.1563)	(0.0137)	(0.0172)	(0.2969)	(0.0556)	(0.5047)
gender	1.7014*	-0.5223	0.1869	0.2183	0.2893	-0.3680	-0.4152	-1.7553
	(0.9214)	(0.6273)	(0.4735)	(0.2983)	(0.4705)	(1.2592)	(1.2412)	(1.1899)
Constant	6.1868	3.4370	1.8519	1.3837	3.4719**	12.3467**	-5.9540	16.0337**
	(4.3070)	(2.7299)	(1.8003)	(1.1080)	(1.5903)	(6.1938)	(4.1131)	(6.5061)

Standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

As shown in the

Table ***1*** we run eight (8) countries' regressions and nested them for better comparison and understanding.

One of the classical logistic regression assumption is that the calculated correct assignment rate must be greater than 50%. The result indicates that the

probability of not paying tax when citizens are not provided with decent services is almost 60% hence holding the classical assumption of the logistic regression.

Out of the 23 explanatory variables in the model, 6 are insignificant, while 17 are significant for different levels and for different countries. The insignificant variables are corrupt presidential office (corr_pr_off), corrupt members of parliament (corr_memp), corrupt tax officials (corr_tax_off), the general level of corruption (corr_level), handling basic health services by the government (h_bhealth_s), and education level (edu_level). We interpreted only the significant variables and the respective countries.

Without basic services (wtout_b_services): the absence of basic services exhibits a positive correlation with tax payment, which is statistically significant at the 10% level, and 1% level in the case of Botswana and Mozambique. The positive coefficient indicates that individuals who have access to fundamental services, or who never miss them, are more inclined to pay taxes compared to those who lack access to basic services. In essence, the provision of basic services by the government enhances the likelihood of tax compliance among individuals.

Fearing crime at home (fear_crimeh): There is a positive association between fear crime at home and tax payment, which is statistically significant at the 5% level and 10% level for Botswana and Mozambique, respectively. The positive coefficient suggests that individuals who experience fear of crime at home are more inclined to fulfill their tax obligations than those who do not experience such fear. This outcome may seem counter-intuitive, but it is plausible that fearful individuals are more vulnerable to crime and may pay their taxes promptly to avoid any potential harassment.

Free election (free_election): The perception of free and fair elections has a statistically significant association only for Botswana at a 5% level, with a negative coefficient. This indicates that individuals who hold the view that elections are not free, and fair are less likely to fulfill their tax obligations to the government than those who believe in the fairness and freedom of the election process.

Satisfaction for democracy (satisfaction_f_dem): The satisfaction level with democracy has a statistically significant association only for Tanzania and Zimbabwe, at the 10% level. For Tanzania, the coefficient is positive, while for Zimbabwe, it is negative. This implies that in Zimbabwe, individuals who are not satisfied with the democratic conditions of the country are less likely to fulfill their tax obligations to the government than those who are satisfied. Conversely, in Tanzania, the opposite is true, where individuals who are satisfied with the democratic conditions of the country are more likely to comply with their tax obligations. This difference in outcomes could be attributed to the fact that Tanzania is predominantly governed by one main political party, and people generally perceive the level of corruption to be lower compared to other countries in the region, which increases satisfaction with the ruling party.

Equal Treatment (unequal_tr): The perception of equal treatment has a statistically significant association only for Zimbabwe, at the 10% level, with a negative coefficient. This implies that individuals who believe that they are not treated equally are more likely to engage in tax evasion than those who believe in equal treatment.

Trusting the president (t_fpresident): has a negative relationship with tax payment and is also significant at 5% level for Botswana only. People who do not trust the president are more likely to avoid tax payments than those who trust the president. That is the probability of paying taxes decreases as the presidential trust declines. Intuitively, this is expected.

Trusting the parliament (t_parliament): Trusting the parliament exhibits a positive relation with tax payment, with statistical significance at the 1% level for Mozambique. The coefficient indicates that individuals who trust parliament are more likely to fulfill their tax obligations to the government.

Trusting the local government has a positive relation with tax payment at the 10% level for Botswana only. Thus, People who trust the local government are more likely to pay taxes than those who don't have faith in the local government.

Trusting the ruling party (t_ruling_party): is only significant for Botswana and Tanzania. Botswana shows a positive coefficient, while Tanzania is showing a negative relationship with tax payment and is significant at the 10% level. Thus, those who trust the ruling party are more probable to pay tax than those who do not trust the ruling party in Botswana. However, people who do not trust the ruling party or haven't heard enough about them are less likely to pay the tax than those who trust the ruling party or heard enough about them in Tanzania.

Corruption in the Police (corr_police): is significant for Botswana Madagascar and Mozambique. It is 10% is significant for Botswana and Madagascar, while its 5% is significant for Mozambique. Botswana has a negative coefficient, while the other countries have positive coefficients. The negative coefficient of Botswana implies that people who believe that the police sector is corrupt are more probable to engage in tax manipulation and avoidance than those who opine the opposite. On the other hand, the positive coefficient of the two other countries means that those who believe that the police are not corrupt are more likely to pay tax to the government.

Difficult to avoid basic paying tax (diff_t_avoid_paying_t): is only significant for Madagascar and Zambia at 10% significant level. While the positive coefficient of Madagascar implies those, who think to avoid tax is hard are more likely to pay tax to the authority, the negative coefficient of Zambia indicates that those who believe they can avoid tax are more likely to engage in tax fraud activities.

Difficult to get an identity document (dt_get_id): is significant for Lethoso and Madagascar at 5% and 10 % level. The coefficient is positive for Lethoso, while that of Madagascar is negative. The positive coefficient means that people who have access to get the national identification document are

more likely to pay tax to the authority, while the negative shows that those who have difficulty access to get the national identification document are less likely to pay the tax.

Handling Crime (h_crime): is significant for Botswana, Madagascar, and Zimbabwe at 5% and 10% levels respectively. The coefficients for the three countries are negative, indicating that those who believe that the government is mishandling the crime activities are less likely to avoid tax payment.

Handling Corruption (h_corruption): is significant for Botswana, Lethoso, Mozambique, and South Africa. Botswana and Lethoso have a positive coefficient of 5% and 1% significance level, while Mozambique and South Africa have negative coefficients of 5% and 10 significance levels. In the case of Botswana and Lethoso, people who believe that the government is handling the corruption are more probable to pay tax than those who opine the opposite. On the other hand, in the case of Mozambique, and South Africa people who think the government aren't handling corruption properly are less likely to pay tax.

Handling basic health services is positively related to tax payment and highly significant. The probability value is 0.000, which is smaller than all the significant levels of 1%, 5%, and 10%. The positive coefficient indicates that people who believe that the government handles basic health service delivery well are more likely to pay tax than those who believe the government is mishandling basic health service delivery.

Employment status (emp_status): is positively related to the tax payment and is significant at the 5 % level for Botswana only. In other words, people with a full-time or part-time job are more likely to pay taxes to the government than the unemployed.

The results of this study provide new insights into the drivers of tax compliance and evasion in SADC countries. Our finding that political legitimacy factors like trust in government institutions and satisfaction with democracy significantly influence tax evasion aligns with prior research. For example, studies in Latin America have similarly concluded that a lack of trust in political institutions and dissatisfaction with regime performance undermine tax morale (Carrillo et al., 2017 and Sanney et al., 2020). The fiscal exchange model posits that citizens view tax payment as an exchange for state services and accountability, so when political institutions are perceived as ineffective or untrustworthy, citizens feel less obligated to pay taxes (Moore, 2004).

Our finding for access to basic services also corroborates previous studies showing that the provision of public goods incentivizes tax compliance (Ali et al., 2014 and Timmons and Garfias, 2015). According to the fiscal exchange theory, citizens reciprocate the delivery of health, education, and other services by complying with tax laws. The positive influence of access to basic services on tax compliance in our models reinforces this perspective.

The negative relationship between perceived corruption and tax evasion found in some countries mirrors past findings that corruption erodes tax morale and promotes noncompliance (Alabede et al., 2011 and McGee, 2006). When citizens believe officials or institutions like the police are corrupt, they become cynical about how taxes are used and evade more. Our study reaffirms corruption's corrosive effects on tax compliance.

The positive association between employment status and tax compliance in Botswana aligns with research in transition economies showing formal sector workers are more likely to pay taxes (Alm, 2018 and Kasper et al., 2015). Formal employees face greater enforcement and have taxes automatically deducted, explaining their higher compliance. Our study bolsters the notion that employment status shapes compliance incentives.

While we found education level insignificant, past studies identify mixed effects of education on tax evasion (Damayanti et al., 2015 and Richardson, 2006b). Our inconclusive result for education underscores the need for further research on its role as a driver of compliance.

Overall, by validating multiple established drivers of tax compliance and evasion, this study strengthens the generalizability of previous findings to the sub-Saharan African context. Our results demonstrate that even in developing countries with weaker institutions, political, economic and social factors influence citizens' willingness to pay taxes in predictable ways. This conformity with the broader literature speaks to the universality of theoretical frameworks like the fiscal exchange model.

At the same time, our study provides original evidence on sub-national variations in drivers of compliance across SADC countries. The heterogeneity we find highlights the importance of local political and institutional contexts in shaping tax morale. Our granular country-level analysis thus enriches the literature and sets the stage for future comparative research in the region.

In table 2 result of empirical bayes is depicted. In empirical Bayes estimation, the prior is a probability distribution reflecting our prior beliefs about the unknown parameter, while the posterior is a probability distribution reflecting our beliefs about the unknown parameter after seeing the data. Bayes' theorem, which takes into account the prior distribution and the likelihood function, is used to calculate the posterior distribution.

In other words, the estimated prior distribution and the observed data are used to compute the posterior distribution. Empirical Bayes estimation is a useful statistical inference method for the estimation of unknown parameters in a more informative way than the standard Bayesian approach. Stata 16 has been used for the regression analysis and the output is shown in table 2.

Table 2. Empirical BayesPosterior Estimation Results for all Countries

Variables	Botswana	Lesotho	Madagascar	Mozambique	South Africa	Tanzania	Zambia	Zimbabwe
age	0.000	0.000	0.000	-0.001	0.000	0.000	-0.001	0.000

wtout_b_services	-0.038***	-0.036***	-0.025*	-0.048***	-0.032*	-0.026**	-0.035***	-0.027*
free_election	0.005	-0.003	-0.013	-0.021	-0.005	0.005	-0.002	0.003
satisfaction_f_dem	0.007	0.012	0.006	-0.008	0.004	-0.009	-0.013	0.005
unequal_tr	0.028	0.034**	0.022	0.041*	0.032	0.027	0.033**	0.033**
t_fpresident	0.018	0.014	0.003	0.015	0.007	0.014	0.005	0.010
t_parliament	-0.005	0.007	0.004	-0.015	-0.005	-0.015	0.003	-0.005
t_loc_gov	-0.046*	-0.039**	-0.046*	-0.039**	-0.049*	-0.038**	-0.035**	-0.045*
t_ruling_party	0.038**	0.035**	0.049*	0.057*	0.046*	0.060*	0.036	0.033
corr_pr_off	0.056**	0.036	0.047	0.054**	0.042	0.049	0.023	0.050
corr_memp	0.017	0.013	0.005	0.004	0.022	0.005	0.011	0.000
corr_tax_off	0.019	0.023	0.008	0.024	0.032	0.025	0.030	0.025
corr_police	-0.028	-0.037	-0.054*	-0.046**	-0.043	-0.045	-0.042	-0.024
corr_level	0.015	0.024	0.011	0.021	0.019	0.015	0.019	0.022
diff_t_avoid_paying_t	0.020	0.039*	0.008	0.015	0.025	0.027	0.032**	0.009
dt_get_id	-0.030	-0.052***	-0.011	-0.018	-0.023	-0.028	-0.020	-0.030
h_crime	0.007	0.000	0.024	0.003	0.003	0.008	0.007	0.007
h_bhealth_s	-0.021	-0.020	-0.012	-0.019	-0.029	-0.025	-0.036	-0.029
h_corruption	0.037	0.010	0.034	0.059*	0.055*	0.035	0.051*	0.049**
emp_status	-0.029	-0.031**	-0.019	-0.030**	-0.020	-0.020	-0.033**	-0.027
edu_level	0.000	-0.003	0.004	-0.008	0.006	0.006	0.007	0.001
gender	0.019	0.033	0.026	0.028	0.024	0.029	0.027	0.055
Constant	0.496***	0.587***	0.472***	0.623***	0.471***	0.461***	0.521***	0.446***

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

The Empirical Bayesian posterior result in Table 2 depicts that the independent variables of without basic services, free election, trust of parliament, trust of local government, corruption in the police, difficulty to get

an ID, handling basic health services, and employment status all exhibit negative relations with the dependent variable of paying tax.

The negative relationship between lack of fundamental services and tax payment could be due to the fact that individuals who do not have access to basic services provided by the government feel neglected and therefore less inclined to fulfill their tax obligations. Moreover, they do not see the benefits of paying taxes if they do not receive the necessary services that they need.

The negative relationship between a free election and tax payment could be attributed to the perception of individuals that the government is not acting in their best interests, leading to a lack of trust in the government and consequently a reluctance to pay tax.

The negative association between the trust of parliament and tax payment indicates that individuals who have no confidence in the government's legislative branch may perceive that their tax payments will not be used for public service delivery. Therefore, they may be more inclined to avoid fulfilling their tax obligations.

The negative association between trust in local government and tax payment suggests that individuals who have little trust in their local government may not perceive that their tax payments will be used effectively and efficiently at the local level, leading to a reluctance to pay tax.

The negative association between corruption in the police and tax payment could be due to the perception of individuals that their tax payments may be misused for corrupt practices rather than being used for the betterment of society.

The negative relationship between difficulty to get ID and tax payment may indicate that individuals who face challenges in obtaining identification documents may have difficulty accessing government services and may feel neglected, leading to a reluctance to pay tax.

The negative association between handling basic health services and tax payments implies that individuals who do not receive adequate basic health services from the government perceive that their tax payments are not being used efficiently and for their interest, leading to a reluctance to pay tax.

Finally, the negative relationship between employment status and tax payment may suggest that individuals who are unemployed or have low-income jobs may not have the financial capacity to pay taxes, leading to a reluctance to fulfill their tax responsibilities. On the Contrary other independent variables indicate mixed and positive relations.

In a nutshell, the negative relationships between these independent variables and tax payment could be attributed to various factors such as the perceived effectiveness and efficiency of the government, the provision of basic services, trust in the local and national government, corruption, and financial capacity, Whereas the positive nexus is duet to more informed

citizens, government with lesser corruption level, more services delivery and rigid system where tax evasion is not likely. However, the empirical Bayesian posterior result in table A shows no tangible significance. In short, the empirical Bayesian estimation did not perform better than the logit model.

Conclusion

The findings of this study have several important theoretical and practical implications. On the theoretical side, our results support the fiscal exchange theory, which posits that citizens are more likely to comply with tax laws when they perceive the government to be legitimate and feel they receive benefits in return for their tax contributions. The significant influence of political legitimacy variables in our models reinforces this theoretical perspective.

On the practical side, our findings suggest several policy avenues that governments in the SADC region could pursue to improve tax compliance. First, enhancing trust in political institutions and satisfaction with democracy should be priorities. Anti-corruption reforms, transparency initiatives, and free and fair elections may help engender greater legitimacy and trust. Second, improving access to and quality of basic public services could incentivize greater tax compliance. Investing in healthcare, education, water, sanitation, and other public goods demonstrates that tax revenues are used for citizen welfare. Finally, tailored tax education and simplification of tax codes could aid compliance, especially among less educated citizens.

However, this study has some limitations worth acknowledging. First, the cross-sectional nature of the survey data does not allow us to make definitive claims about causality. Experimental or longitudinal data would better establish causal relationships. Second, self-reported measures of tax evasion likely underestimate actual evasion. More objective tax auditing data could validate the results. Third, we examined a limited set of predictor variables due to data availability constraints. Future research could incorporate additional cultural and psychological factors.

Notwithstanding these limitations, our study makes an important contribution to understanding tax evasion in sub-Saharan Africa. The results can inform policymakers seeking to increase tax compliance and generate greater public revenues in the region. With appropriate reforms, governments can foster an environment where citizens are willing to pay their taxes, restoring the fiscal social contract and supporting development.

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Appendix

Table A. Description of the Variables

Variables (Code Name)	Full Name	Description
tax_payment	Tax payment (Dep)	Tax compliance 1 Tax refusal 0
gender	Gender (indep)	**0** Male **1** Female
urbanrural	Urban or Rural (indep)	0 rural 1 urban
age	Age (ind)	18-99, 103, 106
emp_status	Employment status (indep)	0, 1, 2, 3, increasing from jobless to having a full-time job
edu_level	Education Level (indep)	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, increasing from being illiterate to postgraduate
Variables Indicating Economic Deterrence and Physical Exchange		

diff_t_obtain_bservices	Difficult to obtain basic services (indep)	1, 2, 3, 4, increasing from very easy to very difficult
h_bhealth_s	Handling basic health services (indep)	1, 2, 3, 4, increasing from badly to very well
h_crime	Handling Crime (indep)	1, 2, 3, 4, increasing from very badly to very well
h_corruption	Handling corruption (indep)	1, 2, 3, 4, increasing from very badly to very well
wtout_b_services	without basic necessities (indep)	1, 2, 3, 4, 5, 6, increasing from having services to not having services
Variables that indicate Political Legitimacy		
t_fpresident	Trust for the president (indep)	0, 1, 2, 3, increasing from not at all, to a lot
t_fparliament	Trust for the parliament (indep)	0, 1, 2, 3, increasing from not at all, to a lot
t_loc_gov	Trust for the local government (indep)	0, 1, 2, 3, increasing from not at all, to a lot
t_ruling_party	Trust for the ruling party (indep)	0, 1, 2, 3, increasing from not at all, to a lot
corr_level	Corruption level (indep)	1, 2, 3, 4, 5, increasing from increased a lot, to Decreased a lot
satis_f_dem	Satisfaction with democracy (indep)	1, 2, 3, 4, increasing from not at all, to very satisfied

Source: *Afrobarometer, 2020.*

Table B. Empirical Bayesian Prior Results

Variables	Coeff.	Var.	SE	tstat	pvalue
age	-0.0004	5.0677	2.251155	-0.00018	0.999859
wtout_b_services	-0.03329	0.000152	0.012309	-2.70449	0.011163*
free_election	-0.00437	0.000393	0.019817	-0.2204	0.827056
satisfaction_f_dem	0.001115	0.000465	0.021566	0.051702	0.959109
unequal_tr	0.031499	0.0004	0.019995	1.575361	0.125661
t_fpresident	0.010753	0.00051	0.022592	0.475947	0.63756
t_parliament	-0.00361	0.000587	0.024218	-0.14906	0.8825
t_loc_gov	-0.04244	0.000446	0.021109	-2.01067	0.053424*
t_ruling_party	0.044358	0.000503	0.022431	1.977568	0.057228*

corr_pr_off	0.044258	0.000998	0.031585	1.401245	0.171401
corr_memp	0.009169	0.001351	0.036751	0.249493	0.80468
corr_tax_off	0.023979	0.001389	0.037269	0.643416	0.524843
corr_police	-0.04034	0.00082	0.028631	-1.40907	0.169095
corr_level	0.018148	0.000284	0.016843	1.077492	0.289849
diff_t_avoid_paying_t	0.021816	0.000333	0.018235	1.196336	0.240935
dt_get_id	-0.02698	0.000438	0.020933	-1.28904	0.207234
h_crime	0.007306	0.000534	0.023109	0.316161	0.75407
h_bhealth_s	-0.02379	0.000602	0.024527	-0.97008	0.339761
h_corruption	0.041443	0.000652	0.025542	1.622517	0.115156
emp_status	-0.02615	0.000318	0.017827	-1.46662	0.152886
edu_level	0.001424	0.000143	0.011943	0.119193	0.905917
gender	0.030454	0.001626	0.040323	0.755236	0.455996
Constant	0.511424	0.024226	0.155648	3.285786	0.002594

*Coefficients * p<0.1*

The Omnibus test is used to test the null hypothesis that all the means in a population are equal. If the p-value is less than the specified alpha level, then the null hypothesis is rejected, and the conclusion is that there is a significant difference between at least two of the means in the population. In this case, we can see in Table C that all the p-values are less than 1 % hence the null hypothesis of equal mean is rejected and we conclude that there is a significant difference between at least two of the means in the population.

Table C. Omnibus Test Results Results

(n = 2131)	D-H	P-value	asy.	P-value
age	3892.507	0.000	3273.394	0.000
	3.79e+05	0.000	9.43e+07	0.000
wtout_b_services	249.146	0.000	131.288	0.000
	808.051	0.000	226.193	0.000
fear_crimeh	104.644	0.000	70.834	0.000
	242.844	0.000	131.614	0.000
free_election	46.564	0.000	76.174	0.000
	71.003	0.000	44.179	0.000
satisfaction_f_dem	123.023	0.000	79.004	0.000
	124.572	0.000	230.178	0.000
unequal_tr	175.928	0.000	90.244	0.000
	145.369	0.000	75.493	0.000

t_fpresident	87.801	0.000	51.755	0.000
	81.420	0.000	58.265	0.000
t_parliament	830.228	0.000	230.243	0.000
	339.615	0.000	166.686	0.000
t_loc_gov	188.662	0.000	103.859	0.000
	63.182	0.000	40.405	0.000
t_ruling_party	47.104	0.000	37.292	0.000
	268.330	0.000	129.216	0.000
corr_pr_off	181.538	0.000	309.019	0.000
	7.724	0.021	7.776	0.021
corr_memp	. 145.3687	0.000	355.539	0.000
corr_tax_off	80.3197	0.000	134.321	0.000
corr_police	81.4198	0.0000	58.2654	0.0000
corr_level	830.2276	0.0000	230.2431	0.0000
diff_t_avoid_paying_t	339.6147	0.0000	166.6861	0.0000
dt_get_id	188.6621	0.0000	103.8588	0.0000
h_crime	63.1822	0.0000	40.4047	0.0000
h_bhealth_s	47.1042	0.0000	37.2921	0.0000
h_corruption	268.3304	0.0000	129.2160	0.0000
emp_status	181.5377	0.0000	309.0195	0.0000
edu_level	7.7237	0.0210	7.7762	0.0205
gender	.	.	355.5392	0.0000

The Hosmer-Lemeshow test is a goodness-of-fit test for logistic regression models. The test calculates the chi-squared statistic for the difference between the observed and expected counts of successes and failures in the predicted risk groups. A significant chi-squared statistic indicates that the model is not a good fit for the data. If the p-value is less than the alpha level, then the null hypothesis is rejected, and the conclusion is that the model is not a good fit for the data. in our case, as shown in Table D the p-value is greater than the alpha hence we cannot reject the null hypothesis. Thus, the model is a good fit for the data.

Table D. Hosmer-Lemeshow Test Results

Goodness-of-fit test after logistic model	
Number of observations	2,131
Number of covariate patterns	2,131
Pearson chi2(2108)	2132.75

Prob > chi2	0.3483

The chi-square test will test the null hypothesis that there is no association between the dependent variable (refuse_tpaytax) and the independent variables. The alternative hypothesis is that there is an association between the dependent variable and one or more of the independent variables. The p-value is a measure of the probability of obtaining the observed chi-square statistic if the null hypothesis is true. A low p-value (typically less than alpha 0.01, 0.05, 0.1) indicates that the null hypothesis is likely to be false and that there is an association between the dependent variable and one or more of the independent variables.

Table E. Pearson chi2 Test Results

VARIABLES	Pearson chi2	Prob Value
age	234.3381	0.978
wtout_b_services	29.8628	0.072
fear_crimeh	0.6743	0.032
free_election	16.5924	0.166
satisfaction_f_dem	21.1893	0.171
unequal_tr	16.0370	0.190
t_fpresident	19.4546	0.246
t_parliament	12.2086	0.730
t_loc_gov	22.7217	0.121
t_ruling_party	24.7331	0.075
corr_pr_off	25.1956	0.014
corr_memp	23.7513	0.022
corr_tax_off	20.7398	0.054
corr_police	17.6114	0.128
corr_level	10.6568	0.955
diff_t_avoid_paying_t	16.4757	0.170
dt_get_id	18.8107	0.093
h_crime	37.5570	0.002
h_bhealth_s	17.2755	0.368
h_corruption	35.7768	0.003
emp_status	39.8876	0.005
edu_level	30.3186	0.735
gender	1.9441	0.746