

Revenue generation for sustainable growth in Ghana: Is targeting nil-filing a worthwhile exercise?

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Revenue Generation for Sustainable Growth in Ghana: Is Targeting Nil-filing a Worthwhile Exercise?

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Abstract

Nil-filing brings in no revenue but imposes an administrative burden on revenue authorities when the practice takes root. Although it has received very little policy and academic attention compared to other forms of deviant tax filing behaviours, recent studies for Eswatini, Ethiopia, Rwanda and Uganda, all find significant levels of nil-filing. How widespread is this practice in Africa? This study focuses on Ghana and aims to ascertain whether similar levels of nil-filing and other forms of deviant tax compliance behaviours exist. Employing both descriptive and econometric analyses of administrative data compiled from 27 of Ghana's 59 tax offices, we find that although nil-filing levels are low, they are on an upward trajectory. We also find that non-filing levels are particularly high, and analyses of taxpayer characteristics and modes of tax payment are important predictors of the probability of different taxpayer behaviours. We argue that although the drive to expand the country's tax base is commendable, both nil-filing and non-filing are immediate concerns that the Ghana Revenue Authority needs to address. The study makes some policy recommendations based on the analysis.

1.0 Introduction

Sustainable revenue generation for development ranks high on the list of priorities, particularly for developing countries. In 2022, the International Monetary Fund (IMF) forecast Ghana's debt-to-GDP ratio to hit 84.6%, and according to its April 2022 Fiscal Monitor report, the total debt-to-GDP was estimated at 81.8% in 2021, higher than the 80.1%, approximately GH¢351.8 billion quoted by the Bank of Ghana. However, low tax-to-GDP ratios (approximately 9.2% (March 2022) and 13% (in 2023)), coupled with other macroeconomic concerns, including a depreciating currency and ultra-high inflation levels have further underscored the need for sustainable revenue generation from within the country. The country's tax revenue authority, the Ghana Revenue Authority (GRA), overseeing tax administration in Ghana, tasked with improving tax compliance and revenue generation within the country is continuously seeking to improve its functions, and this study aims to contribute to its quest.

Typically, both policy and research on tax compliance place full attention on two kinds of taxpayers i.e., those who do fail to file declarations i.e., *non-filers* (see Brockmeyer *et al.*, 2019; Gangl *et al.*, 2017) and those who file, but under report their true tax liabilities (see Mascagni and Nell, 2022; Shimeles *et al.*, 2017). However, recent studies (see Santoro and Mdluli, 2019 for Eswatini; Lediga *et al.*, 2020; Mascagni *et al.*, 2022 for Rwanda; Almunia *et al.*, 2024) have highlighted a third category, *nil-filers*, that have been much less visible in academic and policy debates and yet constitute a significant proportion of registered taxpayers,

particularly in low-income countries (Cleary *et al.*, 2017). Although *nil-filers* file declarations, they report zeros on all parts of their tax declaration, including income and tax. As they produce no revenue, and report essentially no information, by actively filing declarations, they impose an administrative cost/burden on the revenue authority, and further wasting limited resources. Given Ghana's quest to improve on sustainable revenue generation, coupled with the evidence of significant levels of *nil-filing* in other African countries, this study aims to start the conversation on ascertaining the extent of nil-filing in Ghana, and also determine the extent of other unfavourable tax filing behaviours such as *non-filing*, *stop-filing*, and *late filing*.

For this study, working with GRA staff, we extracted data from administrative data held in the GRA's tax offices across the country.¹ Preliminary analysis of the data shows that although efforts to increase the number of registered taxpayers seem to be working, and tax revenue is improving, the 'problem' of *nil-filing* is not as significant as has been found in other countries but has since seen an upward trajectory in the last few years. *Non-filing* is, however, a significant problem. Further empirical analyses using multinomial and panel probit methods show that taxpayer characteristics do influence the probability of taxpayers engaging in specific taxpayer behaviours. This underscores the need for the GRA to ensure full recording of taxpayer characteristics in their administrative datasets, which can help researchers identify determinants of patterns in behaviour.

This report proceeds as follows. Section 2 presents a background on Ghana's recent economic challenges which have motivated the need for sustainable revenue generation and the country's tax system. Section 3 reviews the data, while Section 4 presents the methodology employed. Section 5 presents and discusses the results and Section 6 concludes.

2.0 Background

2.1 Recent Challenges in Ghana

Ghana, having a population of about 33.7 million (2022)² and bordered by the Atlantic Ocean, Togo, Côte d'Ivoire, and Burkina Faso is classified as a lower middle-income country with a GDP per capita of US\$2,238.20. To put this in context, Ghana's recent economic trajectory has been significantly challenging with notably elevated inflation, subdued growth, and substantial pressure on public finances and debt sustainability. Both internal and external shocks appear to have exacerbated the country's existing fiscal and debt vulnerabilities, resulting in constrained access to international markets, limited domestic financing options, and an increased reliance on monetary measures to support government expenditures. Ghana's general government gross debt-to-GDP ratio, reported to be 83.6% (April 2024)³, is deemed unsustainable. This, in recent years, has compelled the country's government to embark on a combination of responses including a significant fiscal consolidation program, a

¹ We are grateful for the data collection support of GRA staff, particularly Dr Alex Kombat, Dr Charles Addae, Alex Ntow, Felix Ghartey, Israel Dzokoto, Delali Sunu, Lydia Obeng-Adyei, Dr Stephen Nabareseh, Michael Gyasi, Bryne Yorke, Docia Asare, Ali-Kukubor Kobla Jnr., Abdul-Razak Awafo, Christian Welbeck, Kwesi Osei-Agyei and Godwin Amponsah.

² See World Bank data (<https://data.worldbank.org/indicator/SP.POP.TOTL?locations=XN-GH>)

³ See IMF Data Mapper,

https://www.imf.org/external/datamapper/GGXWDG_NGDP@WEO/GHA?zoom=GHA&highlight=GHA

comprehensive debt restructuring programme, and other reforms aimed at fostering economic stability and resilience. These stabilisation efforts are being supported by an (approximately) \$3bn Extended Credit Facility program of the IMF. Unsurprisingly, these developments have hampered the pace of economic growth, which was reported to be as high as 14% in 2011, fell to 0.5% in 2020, rose to 2.9% in 2023 and is projected to remain weak in 2024.

Clearly, macroeconomic stability will be necessary to return the country to its potential growth rate of 5%. Fiscal consolidation seems to be helping with the estimated deficit of 4.6% of GDP at the end of 2023, significantly lower than the 10.7% deficit in 2022. Revenues and grants in 2023 reached 15.7% of GDP, the same level as 2022, despite lower oil revenues. Following some periods of more stable exchange rates and the effects of monetary policy tightening in 2022-23, the year-on-year inflation fell from 53.4% in January 2023 to, a still-significantly-above-target, 23.2% in December 2023.⁴ Over the first months of 2024, the deceleration of inflation stalled due to pass-through of the depreciation on prices of imported goods, on non-food inflation while food inflation marginally fell. It is becoming evident that critical reforms are required in the country, which will include strengthening the insolvency regime, access to finance, improving the energy sector, and the legal and regulatory environment faced by foreign direct investors. Others include accelerating digitalization and harnessing the opportunities offered by the Africa Continental Free Trade Agreement (ACFTA) through integration with global value chains. Over the longer term, significant structural reforms aimed at promoting private sector development and increasing FDI attractiveness aimed at revenue generation, are necessary to raise the country's growth potential.

2.2 Tax system in Ghana

Typically, sub-Saharan African countries have lagged significantly in government revenue collection, with a median tax ratio of about 13% of GDP in 2022 compared with average of 18% in other emerging and developing countries and 27% in the advanced economies. With current GDP per capita in Ghana hovering around \$2,230 (in 2024), and foreign direct investment (net inflows) falling from an all-time high of 9.5% of GDP in 2008 to 2% in 2022⁵, revenue generation to support any credible efforts at sustainable development will have to come from within the country. This has become a core concern and underscores the importance of this current study.

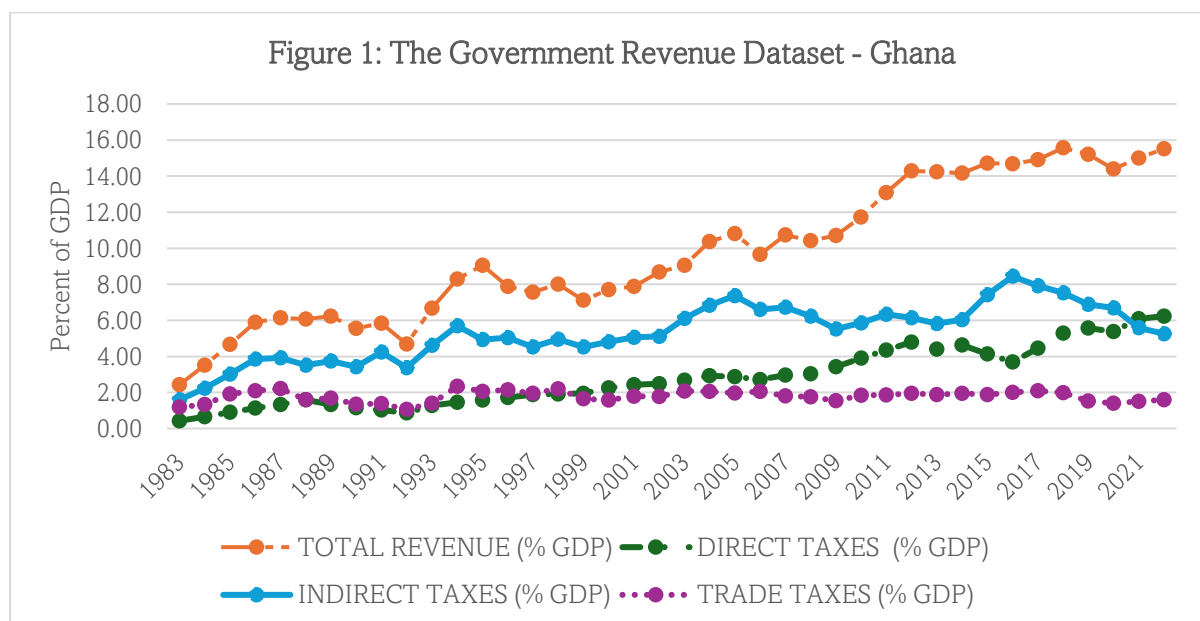
Although Ghana's tax-to-GDP ratio is low, which is typical of countries in sub-Saharan Africa, the country's government revenue as a percentage of GDP, has increased significantly to the current 15.84%, from an abysmal 1.97% in 1981 (see Figure 1). However, it still lags that of several countries in the sub-region, and below the average for emerging and developed economies globally.

The country's tax authority, the Ghana Revenue Authority (GRA), tasked with the responsibility of government revenue collection, in collaboration with partner organisations and researchers is seeking to improve on revenue generation for sustainable growth, and this work aims to contribute to this quest. According to Ghana's Ministry of Finance *2022 Annual*

⁴ Currently, the Bank of Ghana's inflation target is 8% with a symmetric band of 2%.

⁵ See IMF Data Mapper, https://www.imf.org/external/datamapper/GGXWDG_NGDP@WEO/GHA?zoom=GHA&highlight=GHA

Tax Revenue Performance Report and the Institute for Fiscal Studies' *2023 Distributional Analysis of Ghana's Tax System*, over 43% of the revenue collected comes from direct taxes.⁶



Source: UNU-WIDER Government Revenue Dataset'. Version 2023. <https://doi.org/10.35188/UNU-WIDER/GRD-2023>.

Over the last decade, the two largest contributors to Ghana's total tax revenue have been Corporate Income Tax (CIT) and Value Added Tax (VAT), with CIT contributing 23.3% in 2022 and 25.2% in 2021 while VAT contributed 20.9% in 2022 and 20.5% in 2021. With Corporate tax collections amounting to GH¢17.65 billion in 2022, up from GH¢14.48 billion in 2021, CIT is the largest contributor to Ghana's tax revenue. Personal Income Taxes (PIT) has been hovering around 16%.

In Ghana, CIT is defined as the tax imposed on the income of companies incorporated under the laws of Ghana or elsewhere (See Section 1 of the [Income Tax Act, 2015, \(Act 896\)](#)). Payment period of CIT, which is on a self-assessment payment basis, must be done in four quarterly instalments i.e., the end of March, June, September, and December. Although the general CIT rate is 25%, there are contemporary rates depending on the nature of business carried out by an entity, the location of the business and the specific industry in which it operates. PIT, on the other hand, is charged on an individual's total income (income from employment, business, and investment), and must be paid by employees, sole proprietors or persons in partnership who earn income above GH¢402/month. Pay-As-You-Earn (PAYE), which is the most common mechanism for paying tax on employment income in Ghana, accounted for 95% of PIT revenue in 2019, and is typically captured within the categories known to have less scope to allow practices even remotely close to evasion due to easier detection (Kleven *et al.*, 2011). This notwithstanding, in Ghana, their employers' proclivity to nil-file is unknown and such practices have been under-investigated. It is worth noting that

⁶ Direct taxes comprise Personal Income Tax, Corporate Income Tax, Mineral Royalties, National Fiscal Stabilisation Levy, Airport Tax plus other direct taxes. Indirect taxes comprise VAT (includes National Health Insurance Levy, Ghana Education Trust Fund Levy, COVID-19 Health Levy), Communication Service Tax, Excise duty plus Other indirect taxes include Petroleum taxes, Special Petroleum Tax, E-Transfer Levy, Energy Sector Recovery Levy, Energy Debt Recovery Levy and Pollution & Sanitation Levy.

Ghana's PIT (i.e., on incomes received by individuals) follows a progressive schedule of rates in line with the First Schedule of the [Income Tax Act, 2015, \(Act 896\)](#). The tax schedule is adjusted over time to address wage inflation (by bracket creep), as well as equity and fiscal sustainability concerns.⁷ By law, every employer is required to make monthly deductions of tax from the total emoluments of each employee and remit any taxes due within 15 days after the end of the month. Further, any final payment is due at the time of filing the annual PIT return i.e., not later than 31 March following the end of every year of assessment. In this study, given that opportunity to nil-file is typically found in CIT and PIT. We focus on these two largest contributors to Ghana's direct taxes i.e., PIT and CIT.

3.0 Data

The data used in this study, compiled in conjunction with staff from the GRA, has been retrieved from administrative datasets of tax declarations and records held in the various tax offices across the country. For this study, due to budget constraints, we analyse administrative tax data held in about 50% i.e., 27 of the country's 59 taxpayer service centres. To make the analyses representative, we focus on the major tax offices in both the Southern and Northern parts of the country i.e., Specifically 19 from Accra tax offices and 8 from Northern Ghana.⁸ Given that the southern regions in Ghana are relatively urban, with relatively less poverty levels, whereas the northern regions are more rural with higher poverty levels, this distinction is relevant.

We note that for all the tax offices, the administrative datasets contain all the CIT and PIT declarations from 2010 to 2023 at the taxpayer level. Our final dataset includes taxpayer characteristics including tax filing status and other taxpayer characteristics such as year of registration for the CITs, Sector of business, Gender of CEO, Location of firm, Age of CEO at last birthday, among others.⁹ Critical consideration of these characteristics can provide relevant information on firm and owner characteristics which may be associated with specific tax-filing behaviours.

Tables 1(a) –1(c) and Figures 2 – 4 present some descriptive statistics from our compiled dataset (See Appendix 3 and 4 for further detail).

⁷ See <https://mofep.gov.gh/sites/default/files/reports/revenue/2022-Annual-Tax-Revenue-Performance-Report.pdf>

⁸ Accra Tax Offices group comprises Achimota, Adenta, Agbogbloshie, Ashaiman, Circle, Kaneshie, Kasoa, Legon, Madina, Makola, Mataheko, Nima, Osu, Ring Road, Spintex, Tema TSC 1, Tema TSC 9, Teshie, and Weija. Northern Group comprises Bawku TSC, Bolgatanga, Lawra, Tamale East, Tamale West, Wa, Walewale, and Yendi.

⁹ See Appendix 2 for a brief description of the key variables used in our analysis.

Table 1(a): Summary of Taxpayer Characteristics (Full sample)

CEO gender	Aggregate		PIT		CIT	
	Count	Percentage	Count	Percentage	Count	Percentage
<i>Female</i>	3,415	15.4%	2,898	27.3%	517	4.45%
<i>Male</i>	9,753	43.9%	5,884	55.46%	3,869	33.28%
<i>Unknown</i>	9,066	40.8%	1,828	17.23%	7,238	62.27%
Legal status						
<i>Limited Liability</i>	11280	50.70%	1	0.00%	11279	97.00%
<i>Sole Proprietor</i>	10432	46.90%	10280	96.89	152	1.30%
<i>Unknown</i>	522	2.35%	329	3.10%	193	1.66%
Mode of payment						
<i>Cash</i>	4,856	21.8%	2,853	26.89%	2,003	17.23%
<i>Mobile money (Momo)</i>	1,859	8.36%	1,594	15.02%	265	2.28%
<i>Online</i>	14,078	63.3%	5,781	54.49%	8,297	71.38%
<i>Unknown</i>	1,441	6.48%	382	3.60%	1,059	9.11%
Payment mode changed?						
<i>No</i>	9,302	41.8%	4,921	46.38%	4,382	37.69%
<i>Yes</i>	11,312	50.9%	5,188	48.90%	6,124	52.68%
<i>Unknown</i>	1,620	7.29%	501	4.72%	1,119	9.63%
Firm Size						
<i>Large</i>	61	0.27%	1	0.04%	60	0.51%
<i>Medium</i>	110	0.5%	4	0.04%	106	0.91%
<i>Micro</i>	10,425	46.9%	4,345	40.95%	6,080	52.30%
<i>Small</i>	1,001	4.5%	124	1.17%	877	7.54%
<i>Unknown</i>	10,637	47.8%	6,136	57.83%	4,501	38.71%

CEO Age						
<i>Under30</i>	269	1.21%	195	1.84%	74	0.64%
<i>30to50</i>	4,499	20.2%	2,911	27.44%	1,588	13.66%
<i>50plus</i>	2,901	13%	1,867	17.60%	1,034	8.90%
<i>Unknown</i>	14,565	65.5	5,637	53.13%	8,928	76.81%
Sector						
<i>Primary</i>	191	0.86%	32	0.30%	159	1.37%
<i>Secondary</i>	416	1.87%	90	0.85%	326	2.80%
<i>Tertiary</i>	13,405	60.3%	6,644	62.62%	6,761	58.16%
<i>Quaternary</i>	488	2.19%	169	1.59%	319	2.74%
<i>Unknown</i>	7734	34.8%	3,675	34.63%	4,059	34.92%
CEO Highest Qualification						
<i>No Education</i>	16	0.07%	11	0.10%	5	0.04%
<i>Primary</i>	104	0.47%	87	0.82%	17	0.15%
<i>Professional</i>	51	0.23%	31	0.29%	20	0.17%
<i>Secondary</i>	1,264	5.68%	1,072	10.10%	192	1.65%
<i>Tertiary</i>	4,409	19.8%	1,885	17.77%	2,524	21.71%
<i>Vocational</i>	45	0.20%	38	0.36%	7	0.06%
<i>Unknown</i>	16,345	73.7%	7,486	70.56%	8,859	76.21%

Table 1(b): Summary of Taxpayer Characteristics (Accra Tax Offices dataset)

	Aggregate		PIT		CIT	
CEO gender	Count	Percentage	Count	Percentage	Count	Percentage
<i>Female</i>	3,146	17.70%	2,668	33.90%	478	4.83%
<i>Male</i>	6,831	38.50%	4,438	56.40%	2,393	24.20%
<i>Unknown</i>	7,778	43.80%	757	9.63%	7,021	71.00%
Legal status						
<i>Limited Liability</i>	9,773	55%	1	0.00%	9,772	98.80%
<i>Sole Proprietor</i>	7,848	44.20%	7,837	99.70%	11	0.11%
<i>Unknown</i>	134	0.75%	25	0.31%	109	1.10%
Mode of payment						
<i>Cash</i>	4,541	25.60%	2,608	33.20%	1,933	19.50%
<i>Mobile money (Momo)</i>	1,543	8.69%	1436	18.30%	107	1.08%
<i>Online</i>	10,609	59.80%	3,744	47.60%	6,865	69.40%
<i>Unknown</i>	1,062	5.98%	75	0.95%	987	9.98%
Payment mode changed?						
<i>No</i>	8,872	41.8%	4,627	58.80%	4,245	42.90%
<i>Yes</i>	1,259	50.9%	194	2.47%	1,065	10.80%
<i>Unknown</i>	7,624	7.29%	3,042	38.70%	4,582	46.30%
Firm Size						
<i>Large</i>	56	0.31%	1	0.01%	55	0.55%
<i>Medium</i>	104	0.6%	4	0.05%	100	1.01%
<i>Micro</i>	8,763	49.4%	3815	48.50%	4,948	50.00%
<i>Small</i>	932	5.2%	110	1.40%	822	8.31%
<i>Unknown</i>	7,900	44.5%	3933	50.00%	3,967	40.10%

CEO Age						
<i>Under30</i>	217	1.21%	181	2.30%	36	0.36%
<i>30to50</i>	3,393	19.1%	2480	31.50%	913	9.23%
<i>50plus</i>	2,443	14%	1663	21.10%	780	7.89
<i>Unknown</i>	11702	65.90%	3539	45.00%	8163	82.5
Sector						
<i>Primary</i>	166	0.94%	23	0.29%	143	1.45%
<i>Secondary</i>	408	2.23%	87	1.11%	321	3.25%
<i>Tertiary</i>	10,553	59.4%	5,125	65.20%	5,428	54.90%
<i>Quaternary</i>	445	2.51%	149	1.89%	296	2.99%
<i>Unknown</i>	6,183	34.8%	2,479	31.50%	3,704	37.40%
CEO Highest Qualification						
<i>No Education</i>	13	0.07%	9	0.11%	4	0.04%
<i>Primary</i>	68	0.383	57	0.73%	11	0.11%
<i>Professional</i>	48	0.27%	30	0.38%	18	0.18%
<i>Secondary</i>	1,073	6.04%	939	11.90%	134	1.35%
<i>Tertiary</i>	2,456	13.80%	944	12.00%	1,512	15.30%
<i>Unknown</i>	14,097	79.40%	5,884	74.80%	8,213	83.00%
<i>Vocational</i>	13	0.07%	9	0.11%	4	0.04%

Table 1(c): Summary of Taxpayer Characteristics (Northern Ghana dataset)

CEO gender	Aggregate		PIT		CIT	
	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>
<i>Female</i>	269	5.75%	230	8.37%	39	2.25%
<i>Male</i>	2,922	62.40%	1,446	52.60%	1,476	85.20%
<i>Unknown</i>	1,488	31.80%	1,071	39%	217	12.50%

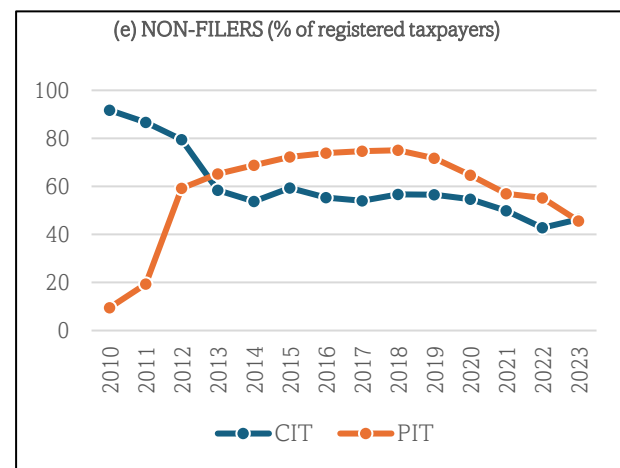
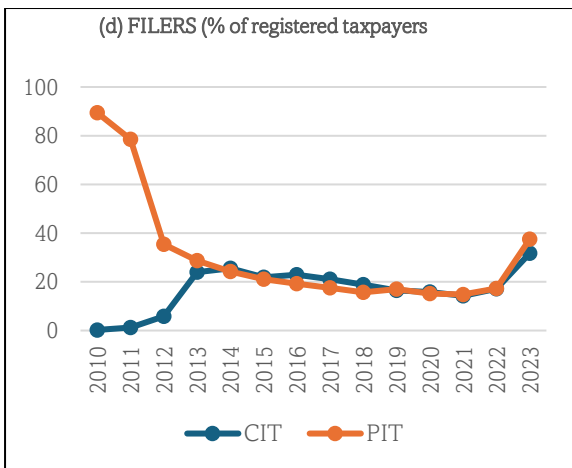
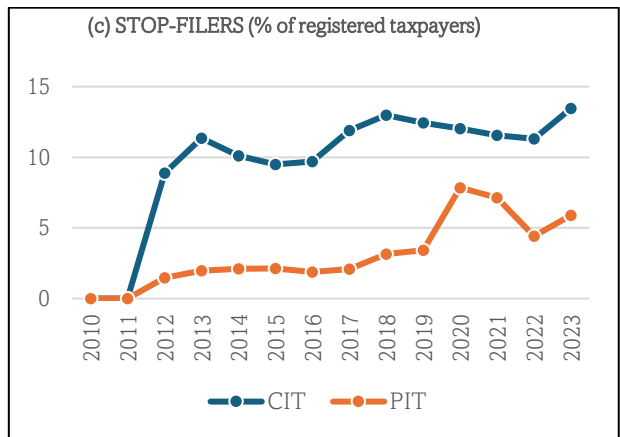
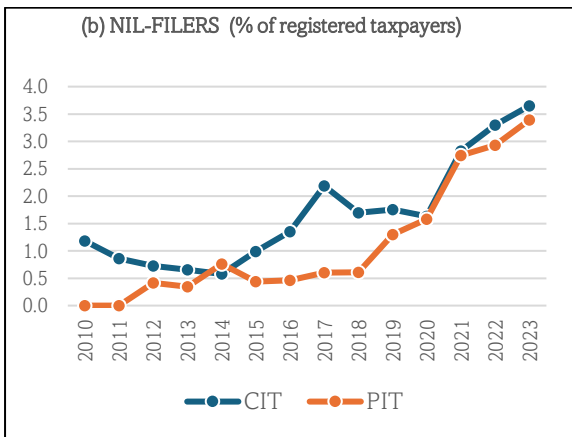
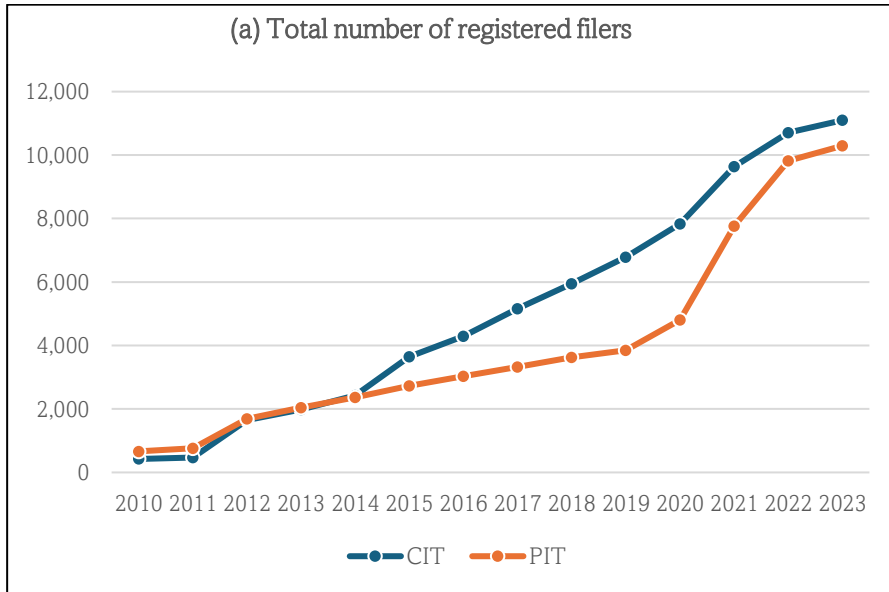
Legal status						
<i>Limited liability</i>	1,507	32.20%	0	0%	1,507	87.00%
<i>Sole proprietor</i>	2,584	55.20%	2,443	88.90%	141	8.14%
<i>Unknown</i>	588	12.60%	304	11.10%	84	4.85%
Mode of payment						
<i>Cash</i>	315	6.73%	245	8.92%	70	4.04%
<i>Mobile money (Momo)</i>	316	6.75%	158	5.75%	158	9.12%
<i>Online</i>	3,469	74.10%	2,037	74.20%	1,432	82.70%
<i>Unknown</i>	579	12.40%	307	11.20%	72	4.16%
Payment mode changed?						
<i>No</i>	430	9.19%	294	10.70%	136	7.85%
<i>Yes</i>	3,688	82.30%	2,146	78.10%	1,542	89.00%
<i>Unknown</i>	361	8.06%	307	11.20%	54	3.12%
Firm Size						
<i>Large</i>	5	0.11%	0	0%	5	0.29%
<i>Medium</i>	6	0.13%	0	0%	6	0.35%
<i>Micro</i>	69	35.50%	14	0.51%	55	3.18%
<i>Small</i>	1,662	1.47%	530	19.30%	1,132	65.40%
<i>Unknown</i>	2,937	62.80%	2,203	80.20%	534	30.80%
CEO Age						
<i>Under30</i>	52	1.11%	14	0.51%	38	44.20%
<i>30to50</i>	1,106	23.60%	431	15.70%	657	39.00%
<i>50plus</i>	458	9.79%	204	7.43%	254	14.70%
<i>Unknown</i>	3,063	65.50%	2098	76.40%	765	44.20%
Sector						
<i>Primary</i>	25	0.53%	9	0.33%	16	0.92%

<i>Secondary</i>	8	0.17%	3	0.11%	5	0.29%
<i>Tertiary</i>	2,852	61.00%	1,519	55.30%	1,333	77.00%
<i>Quaternary</i>	43	0.92%	20	0.73%	23	1.33%
<i>Unknown</i>	1,751	37.40%	1,196	43.50%	355	20.50%
CEO Highest Qualification						
<i>No Education</i>	3	0.06%	2	0.07%	1	0.01%
<i>Primary</i>	36	0.77%	30	1.09%	6	0.03%
<i>Professional</i>	3	0.06%	1	0.04%	2	0.12%
<i>Secondary</i>	191	4.08%	133	4.84%	58	3.35%
<i>Tertiary</i>	1,953	41.70%	941	34.30%	1,012	58.40%
<i>Unknown</i>	2,493	53.30%	1,640	59.70%	653	37.70%

Some preliminary observations are noteworthy. First, most registered taxpayers are male, and when the sample is disaggregated into CIT and PIT, it is still noticeable that there are significantly less females, particularly so in the CIT cohort. A similar observation is made for the Accra and Northern Ghana sub-samples. It is worth noting that several of the sampled taxpayers did not have their gender information recorded in the administrative dataset. Next, when we consider the *mode of payment*, the online mode appears to be the preferred route by far (63.3%), followed by cash payments (21.8%). There is also a positive shift to the change in the mode of payment for the full sample, CIT and PIT. The preference for online payments is similar in both the Accra and Northern Ghana sub-samples. Third, although there are several taxpayers who do not provide information on their number of employees, it is noteworthy that overall, almost 47% of taxpayers fall in our *Micro*-sized cohort (≤ 10 employees), followed by 4.5% of taxpayers with 11-49 employees. Unsurprisingly, most of the CEO ages recorded fall into the 30-to-50 years and 50-plus groups. When the sample is disaggregated into the CIT and PIT groups, a similar observation is made. However, here too it is noticeable that several taxpayers do not disclose/do not know their age. Fourth, most of the taxpayers in our sample (>60%, overall; approx. 62% in PIT and 58% in CIT respectively) are registered as operating in the *Tertiary sector* i.e., mainly service providers, although there are again several taxpayers who do not have this information officially recorded.¹⁰ In comparison to the highest level of *formal education qualifications attained by CEOs*, the majority of registered taxpayers have tertiary-level qualification/education. This suggests that many taxpayers are educated to a high level in Ghana. There is, however, evidence to suggest that the majority of the registered taxpayers with secondary level education are registered as PIT, rather than CIT. It is again noteworthy that many taxpayers do not provide information on their qualifications.

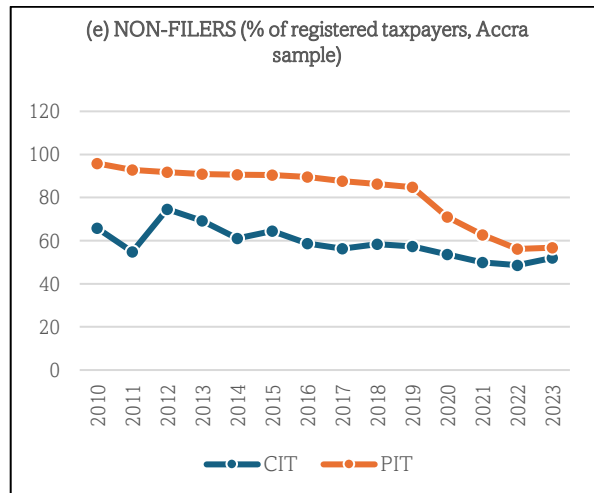
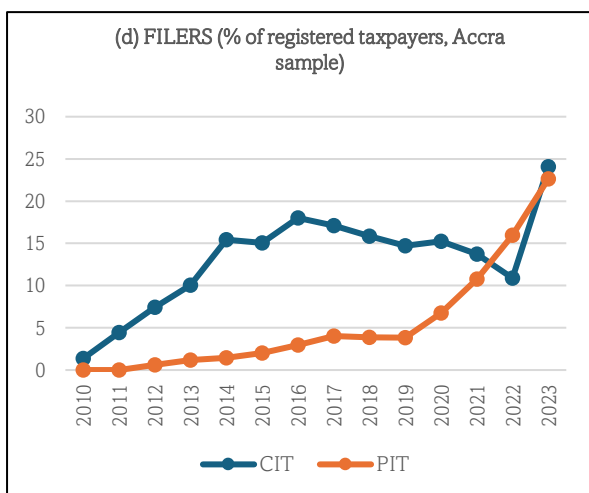
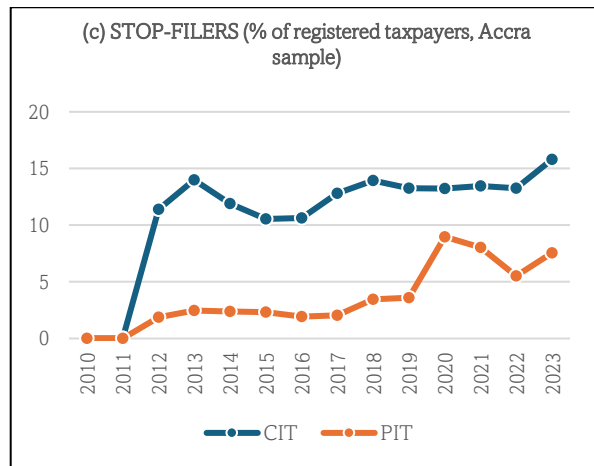
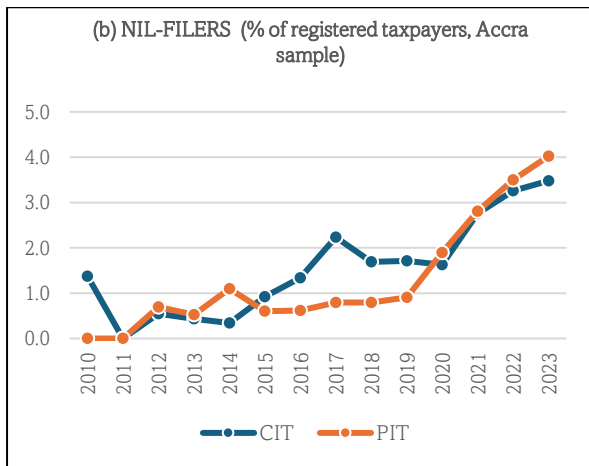
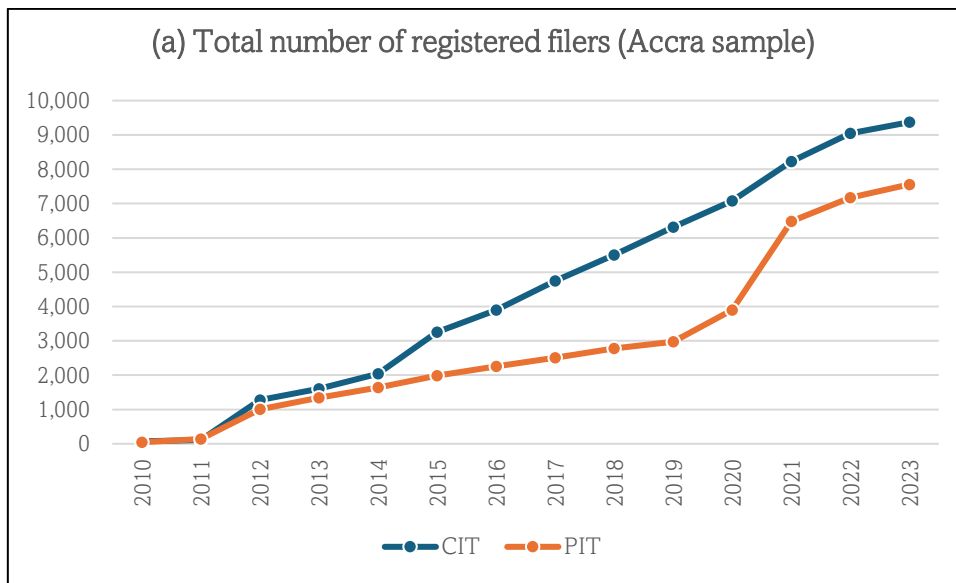
¹⁰ See Appendix 2.

Figure 2 (a)-(e): Summary view of tax-filing status, 2010-2023 [Full sample]



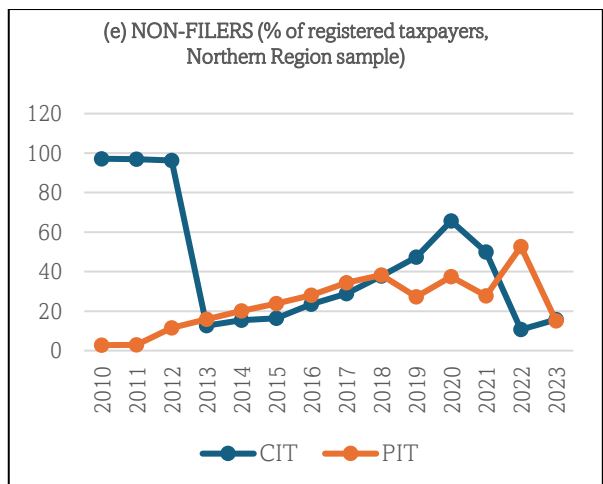
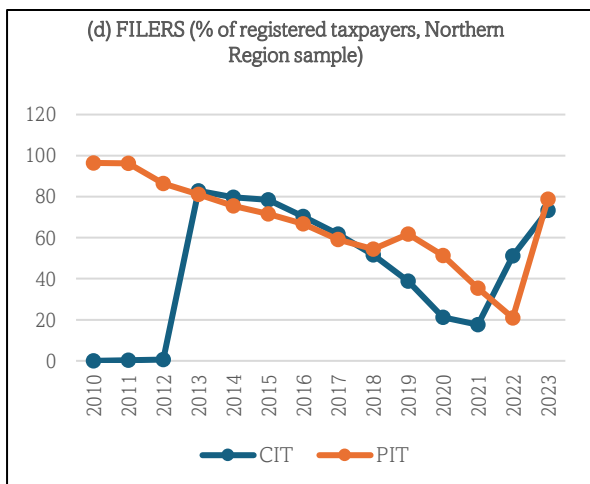
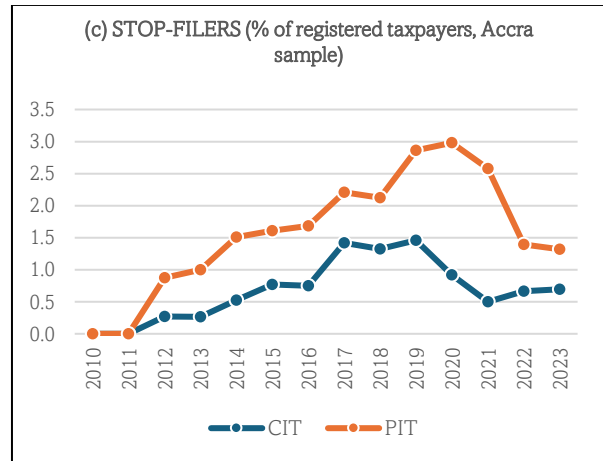
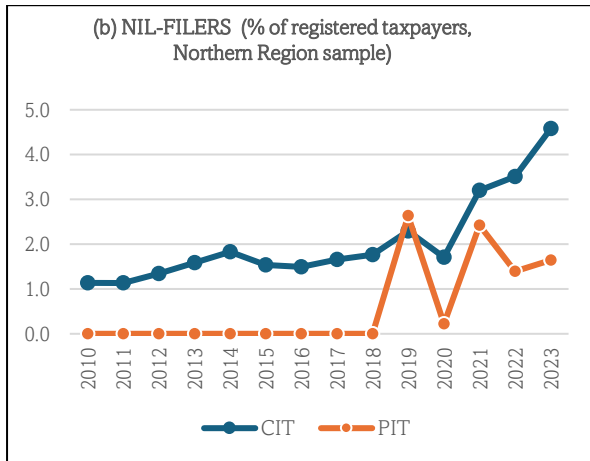
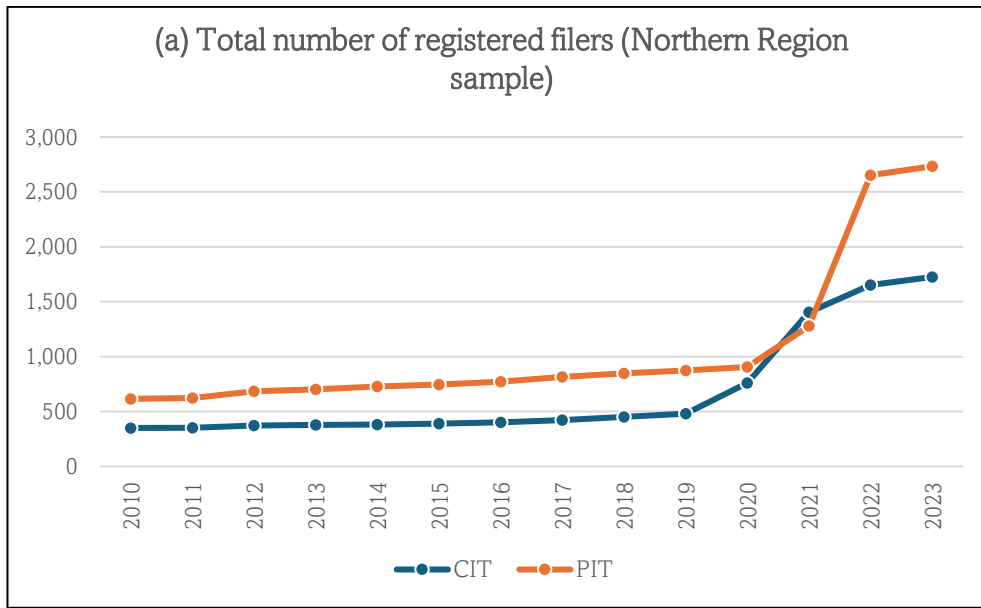
Notes: Summary data provided in Appendix 4.

Figure 3 (a)-(e): Summary view of tax-filing status, 2010-2023 [Accra sample]



Notes: Summary data provided in Appendix 4.

Figure 4 (a)-(e): Summary view of tax-filing status, 2010-2023 [Northern Region sample]



Notes: Summary data provided in Appendix 4.

4.0 Methodology

The primary aim of this study is to quantify tax filing behaviours of taxpayers in Ghana, with particular interest in the incidence of nil-filing. To achieve this, this study analyses tax declaration records from administrative datasets for both CIT and PIT registered entities in a sample of 27 tax centres across the country (See footnote 7).

First, to explore the relationship between taxpayer behaviour and relevant taxpayer characteristics, we take a cursory review of the descriptive data information presented in Section 3, together with the graphical illustrations presented in Appendix 3. This is aimed at giving a preliminary view of the 'size' of the adverse filing behaviours i.e., nil-filing, non-foiling, late-filing and stop-filing across the years considered.

Subsequently, in seeking to obtain a more quantitative examination of the data, we run descriptive regressions to explain the likelihood of a given tax-filing behaviour with explanatory variables such as taxpayer sector, CEO age, CEO gender, Payment mode and other taxpayer characteristics. Given the aims of our study, we first employ a multinomial probit approach for specific years i.e., 2015, 2020 and 2022. Consideration of 2015/2020 estimations will allow us to comment on observable differences in behaviour before the Covid-19 pandemic, whereas the 2020/2022 estimations will allow us to comment on *pre- post*-Covid behaviour changes. Further, we employ a panel probit approach. It is important to note that, although these approaches are not claiming to assign causality, they are indicative of the characteristics associated with specific tax-filing behaviours, allow us to ascertain changes in the probability of a given outcome e.g., *nil-filing*.

5.0 Results and Discussion

Tables 2 – 4 present a summary view of the tax filing dynamics from 2010 to 2023 for three samples i.e., the full sample, the Accra sample and the Northern Ghana sample. Some observations are noteworthy.

First, the *total number of registered taxpayers* with details in the GRA's administrative datasets has increased noticeably, from 1,088 in 2010 to 21,389 in 2023. For the Accra sample (but not for Northern Ghana), CIT registrations increased markedly from 2014 onwards, whereas for both the subsamples, the PIT seems to have increased markedly from 2019. This overall increase in number of taxpayers seems to align with the GRA's drive to improve on taxpayer registrations nationwide, and also with the observation in Figure 1, which shows a steady increase in tax revenue over time. Second, for the *percentage of nil-filers*, across all three samples, we see that unlike evidence presented in other studies (see Mascagni *et al.*, 2022 for Rwanda and Santor and Mdluli (2019) for Eswatini), the share of non-filers is much less for the sample of Ghana's tax offices we analyse. For example, though Mascagni *et al.* report, for Rwanda, approximately an average of 53% for CIT and 17% for PIT, we find Ghana's share of nil-filings to be under 5% for each. Although this suggests that *nil-filing* is not as pervasive in Ghana, the trend seems to be increasing. This suggest that this is a matter that the GRA may need to monitor closely. In the Northern Ghana sample, CIT taxpayers tend to nil-file significantly more than PIT taxpayers (Figure 4(b)). It is noticeable that across all three samples, the percentage of *nil-filers* shows a marked increase since the start of the Covid-19 pandemic. Third, while in the Accra sample, there appears to be an upward trend in the

percentage of *stop-filers* since 2010, this is more evident in the CITs relative to the PITs. There is also a relatively lower number of *stop-filers* in the Northern Ghana sample, and unlike the Accra sample, there appears to have been a downward trend since 2020, to under 1.5% in 2023. Fourth, for the full and the Northern Ghana samples, the percentage of PIT taxpayers *filing* seems to have decreased noticeably, unlike the steady increase seen in same seen in the Accra sample (Figure 3(d)). There is a clear increase in the percentage of filers since 2022 across all three samples; and since 2013 through to 2022, the percentage of filers for both CIT and PIT has been steady at about a lowly 20%, rising to about 40% in 2023 (Figure 2(d)). Finally, there seems to be a significant percentage of *non-filers* in Ghana, and there is also a noticeable contrast between the Accra and Northern Ghana samples. More PIT taxpayers fail to file in Accra compared the Northern Ghana, where more CIT taxpayers fail to file. From the combined sample (Figure 2(e)), between 50% and 60% of taxpayers fail to file, according to our sample, even though this is significantly lower (albeit still high) in Northern Ghana (i.e., approx. 20%). Overall, the preceding analyses, though preliminary, highlight some significant and policy-relevant issues: *Nil-filing* in Ghana is relatively low, compared to what has been reported in other African countries. However, it is trending upwards, so the GRA needs to monitor this behaviour.

Next, analysis of the empirical estimations is instructive. Starting with the multinomial probit analysis, Tables 2a and 2b report the marginal effects obtained for the full sample and Accra samples respectively, for 2015, 2020 and 2022.¹¹ In addition, for the full sample estimation for 2022, we analyse CIT and PIT subsamples separately, to determine if there are any noticeable differences across the groups.

In general, increases in CEO age tends to decrease the probability of filing across all years. However, whereas the decrease in probability decreased between 2015 and 2020 i.e., from -8.8% to -2.3%, the *post-Covid* marginal effect increased to minus 6.6%. Interestingly, for the 2022 estimations, we find that for taxpayers in the CIT subsample, an increase in CEO age is associated with a much more significant decrease (-13.1%) in the probability to file, compared that found for the PIT taxpayers (-2.5%). *Pre-Covid*, higher CEO qualification was associated with lower probability to file. However, *post-Covid*, the reverse is observed (though insignificant). Higher probability to file was associated with male CEOs, except for the PIT subsample in 2022. Again, significant difference in marginal effect is noticeable between CIT and PIT groups in 2022 i.e., while there is a 20.4% increase in probability to file for males in CIT, there is a 4.5% decrease for males in the PIT subsample. Further, larger sized firms are associated with a decrease in probability to file.

Regarding probability to *nil-file*, increases in CEO age and Firm size are associated with increased probability to nil-file. Estimates from the CIT and PIT subsamples in *post-Covid* era show that while higher CEO education is associated with an increased probability to nil-file, it is associated with a decrease for the CIT subsample. Larger sized firms are more likely to *nil-file*, a tendency that appears to have increased (from 2.8% in 2020 to 14.5% in the *post-Covid* era). Here also, for the *post-Covid* era, there is a noticeable difference between the CIT and PIT marginal effects.

¹¹ The Northern Ghana sample estimation could not converge; hence we do not report estimates for that sample.

From the revenue generation perspective, we note that the probability of not filing i.e., *non-filer*, was associated with higher CEO education and also larger Firm size in the *pre-Covid* era. However, in *post-Covid* era, higher CEO education and Firm size are associated with a lower (albeit small) probability to *non-file*.

CEO age tends to increase probability to *late-file*, whereas, generally, CEO education, Firm size and male-CEO-headed taxpayer units tend to be associated with decreased probability to *late-file*. In the *post-Covid* era, while male CEOs are associated with 10.7% less likelihood to nil-file for CITs, we find an 11.2% increase in probability to *nil-file* for PITs.

Overall, for the full sample, higher CEO age appears to be associated with lower probability to *file* taxes and higher probability to *nil-file*. Males are associated with higher probability to file, and a lower probability to *non-file* and *late-file*, particularly in the *post-Covid* era. While some minor differences are evident, the observations that can be made from the Accra subsample (Table 2b) are qualitatively similar to that from Table 2a.

The overarching inference from the multinomial probit estimates in Tables 2a-2b is that there is sound evidence that taxpayer characteristics tend to have a significant bearing on increasing/decreasing the probability to *file*, *nil-file*, *non-file* or *late-file*. When this is considered in relation to the observations from Tables 1(a)-1(c) i.e., that the number of unknowns (unprovided information) is significant, it becomes imperative that the GRA needs to ensure that the taxpayer records are complete and up to date, to enable them implement actions to encourage/discourage specific tax filing behaviours.

Table 2a: Multinomial probit model (Marginal Effects [%]): Full sample

	2015	2020	2022		
Pr(Filer)	ALL	ALL	ALL	CIT	PIT
<i>CEO_age</i>	-8.8*** (0.02)	-2.3** (0.01)	-6.6*** (0.01)	-13.1*** (0.02)	-2.5 (0.02)
<i>CEO_educ</i>	-0.6 (0.01)	-1.5** (0.01)	0.5 (0.01)	2.2 (0.02)	-1.0 (0.01)
<i>CEO_gender</i>	8.8*** (0.02)	0.2 (0.01)	3.4* (0.02)	20.4*** (0.04)	-4.5** (0.02)
<i>Firm_size</i>	-9.5*** (0.01)	-4.7*** (0.00)	-8.6*** (0.00)	-9.4*** (0.01)	-6.0*** (0.01)
<i>Firm_age</i>	0.0 (0.00)	0.1*** (0.00)	0.3*** (0.00)	0.5*** (0.00)	-0.01 (0.00)
Pr(Nil-Filer)					
<i>CEO_age</i>	6.8*** (0.02)	2.2 (0.02)	4.4*** (0.02)	9.0*** (0.02)	4.1 (0.02)
<i>CEO_educ</i>	-3.7*** (0.01)	-4.4*** (0.01)	1.6* (0.01)	-5.1** (0.02)	9.3*** (0.01)

<i>CEO_gender</i>	-10.2*** (0.03)	-5.0** (0.02)	-9.7*** (0.02)	-5.8 (0.03)	-6.6** (0.02)
<i>Firm_size</i>	7.8*** (0.01)	2.8*** (0.01)	14.5*** (0.01)	6.1*** 0.01	15.6*** (0.01)
<i>Firm_age</i>	0.0 (0.00)	0.1** (0.00)	-0.1* (0.00)	-0.4*** (0.00)	0.5*** (0.00)
Pr(Non-Filer)					
<i>CEO_age</i>	-0.0 (0.00)	-0.5 (0.00)	0.6 (0.00)	0.8 (0.01)	-0.1 (0.00)
<i>CEO_educ</i>	0.9** (0.00)	0.7** (0.00)	-0.8 (0.00)	-2.1*** (0.01)	-1.1 (0.00)
<i>CEO_gender</i>	0.8 (0.01)	-0.9 (0.01)	0.0 (0.00)	-5.3 (0.01)	-0.6 (0.01)
<i>Firm_size</i>	0.2 (0.00)	0.6* (0.00)	-1.7*** (0.00)	-0.8 (0.00)	-1.5*** (0.00)
<i>Firm_age</i>	0.0 (0.00)	-0.03** (0.00)	-0.1*** (0.00)	-0.1*** (0.00)	-0.1*** (0.00)
Pr(Late-Filer)					
<i>CEO_age</i>	1.6 (0.01)	5.5 (0.01)	1.3 (0.01)	3.3 (0.02)	-1.4 (0.02)
<i>CEO_educ</i>	0.2 (0.01)	0.1 (0.01)	-5.0*** (0.01)	-0.9 (0.02)	-7.9*** (0.01)
<i>CEO_gender</i>	-0.8 (0.02)	6.0*** (0.02)	6.5*** (0.02)	-10.7*** (0.03)	11.2*** (0.02)
<i>Firm_size</i>	0.9 (0.01)	1.2 (0.01)	-5.7*** (0.01)	-0.5*** (0.01)	-7.9*** (0.01)
<i>Firm_age</i>	-0.1*** (0.00)	0.0 (0.00)	-0.1*** (0.00)	0.0 (0.00)	-0.4*** (0.00)

Notes. *****, ***, **, * represent significance at 1, 5, 10% respectively. Entries in brackets are the standard errors of the marginal effects reported.

Table 2b: Multinomial probit model (Marginal Effects [%]): Accra sample

	2015	2020	2022		
Pr(Filer)	ALL	ALL	ALL	CIT	PIT
<i>CEO_age</i>	0.7 (0.01)	1.1 (0.01)	-3.5** (0.01)	-0.8 (0.02)	-2.4 (0.02)
<i>CEO_educ</i>	1.3 (0.01)	-0.5 (0.01)	-1.5* (0.00)	1.8 (0.02)	-0.1 (0.01)
<i>CEO_gender</i>	1.5 (0.01)	0.44 (0.01)	-3.1* (0.01)	0.0 (0.02)	-3.2 (0.02)
<i>Firm_size</i>	0.00 (0.00)	-2.5*** (0.00)	-1.3* (0.00)	1.8* (0.01)	-6.2*** (0.01)
<i>Firm_age</i>	-1.5 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
Pr(Nil-Filer)					
<i>CEO_age</i>	-1.7 (0.02)	1.3 (0.02)	1.9 (0.02)	0.3 (0.03)	1.9 (0.03)
<i>CEO_educ</i>	-6.6*** (0.01)	-8.2*** (0.01)	4.1*** (0.01)	-5.7* (0.03)	9.9*** (0.01)
<i>CEO_gender</i>	-3.0 (0.02)	-8.1*** (0.02)	-4.0* (0.02)	10.2** (0.04)	-7.8* (0.03)
<i>Firm_size</i>	2.0* (0.01)	6.4*** (0.01)	12.2*** (0.01)	0.2 (0.01)	19.7*** (0.01)
<i>Firm_age</i>	0.0 (0.00)	0.0 (0.00)	0.2*** (0.00)	-0.07 (0.00)	0.5*** (0.00)
Pr(Non-Filer)					
<i>CEO_age</i>	-0.4 (0.00)	-1.0 (0.00)	1.0 (0.00)	1.0 (0.01)	0.2 (0.00)
<i>CEO_educ</i>	0.4 (0.00)	0.3 (0.00)	-1.4*** (0.00)	-3.4*** (0.01)	-1.4*** (0.00)
<i>CEO_gender</i>	0.3 (0.00)	-1.2* (0.01)	-0.3 (0.01)	-0.7 (0.01)	-0.6 (0.01)
<i>Firm_size</i>	-0.2 (0.00)	-1.4*** (0.00)	-2.6*** (0.00)	-2.7*** (0.00)	-2.2*** (0.00)
<i>Firm_age</i>	0.00 (0.00)	0.0 (0.00)	-0.08*** (0.00)	0.0 (0.00)	-0.1*** (0.00)
Pr(Late-Filer)					

<i>CEO_age</i>	1.4 (0.01)	-0.1 (0.01)	1.3 (0.01)	2.6 (0.02)	0.5 (0.02)
<i>CEO_educ</i>	1.0 (0.00)	1.4 (0.01)	-6.3*** (0.01)	-2.1 (0.02)	-9.2*** (0.01)
<i>CEO_gender</i>	0.3 (0.02)	9.4*** (0.02)	6.3*** (0.02)	-8.4** (0.04)	11.0*** (0.02)
<i>Firm_size</i>	-0.2 (0.00)	-2.9 (0.01)	-9.6*** (0.01)	-5.3*** (0.01)	-11.0*** (0.01)
<i>Firm_age</i>	-0.1 (0.00)	0.0 (0.00)	-0.1*** (0.00)	0.0 (0.00)	-0.4*** (0.00)

Notes: ***,** represent significance at 1, 5,10% respectively. Entries in brackets are the standard errors of the marginal effects reported.

Next, given that the multinomial analysis focusses on specific years, some important information may be lost. Therefore, the panel probit approach spanning 2010-2022 is instructive, and the results reported in Tables 3a – 3c show how an increase in a predictor variable affects the predicted probability of a stated outcome. A few observations are noteworthy. For *nil-filing*, in the combined sample, the predicted probability is negatively affected by increases in virtually each of the considered taxpayer variables, except for online payments. For the CIT sample, the predictors CEO age, education and being male all tend to increase the predicted probability of *nil-filing*. Interestingly, for PIT taxpayers, non-cash payers i.e., *Momo* and *online*, are more likely to nil-file. The converse is true for CIT taxpayers. Better monitoring of the PIT taxpayers in the secondary sector to prevent nil-filing seems a good policy move.

Table 3b presents the likelihood to *non-file*. The estimates provide evidence that many of the variables tend to increase the predicted probability to *non-file*, which align with our initial observation that the proportion of non-filers in Ghana is rather high. We also note that, as found for likelihood to *nil-file*, the non-cash taxpayers i.e., by *Momo* and *online*, are more likely to *non-file* in the PIT group, while the converse is true for CIT taxpayers. The take home message here is that, in its drive to adopt more convenient modes of payment, Ghana's tax authority, the GRA, needs to pay more attention to CITs. Estimates reported in Table 3c suggest that *Sector* and *Mode of Payment* are key influencers of the likelihood to file. It highlights the areas the GRA can pay more attention to, in order to influence the likelihood of the predicted outcome.

Table 3a: Panel probit model estimates [Likelihood to Nil-file]

	Full sample			ACCRA			NORTHERN		
	ALL	CIT	PIT	ALL	CIT	PIT	ALL	CIT	PIT
<i>CEO_age</i>	Less	More	Less	Less	More	Less	More	More	Less
<i>CEO_educ</i>	Less	More	Less	Less	Less	Less	More	0	Less

<i>CEO_gender</i>	Less	More	Less	Less	More	Less	More	0	More
<i>Firm_size</i>	Less	Less	Less	Less	Less	Less	More	More	More
<i>Firm_age</i>	Less	Less	Less	Less	Less	Less	Less	Less	Less
Sector (Rel. to Primary)									
<i>Secondary</i>	Less	Less	More	Less	Less	More	-	-	-
<i>Quaternary</i>	Less	Less	Less	Less	Less	Less	-	-	-
<i>Tertiary</i>	Less	Less	Less	Less	Less	Less	-	-	-
Payment mode (Rel. to Cash)									
<i>Mobile money (Momo)</i>	Less	Less	More	Less	Less	More	-	-	-
<i>Online</i>	More	Less	More	More	Less	More	-	-	-
No. of Obs.	16,294	8,022	8,272	13,087	5,795	7,292	2,828	1,794	719

Notes: **More** (Less) implies that an increase (a decrease) in the predictor leads to an increase in the predicted probability of the stated outcome. *Momo* represents Mobile money mode of payment; - represents insufficient observations to determine predicted probability.

Table 3b: Panel probit model estimates [Likelihood to Non-file]

	Full sample			ACCRA			NORTHERN		
	ALL	CIT	PIT	ALL	CIT	PIT	ALL	CIT	PIT
<i>CEO_age</i>	More	More	More	More	More	More	More	Less	More
<i>CEO_educ</i>	More	Less	More	More	Less	More	More	Less	More
<i>CEO_gender</i>	More	More	Less	More	More	Less	More	Less	More
<i>Firm_size</i>	More	Less	More	More	Less	More	More	More	More
<i>Firm_age</i>	More	More	More	More	Less	More	More	More	More
Sector (Base: Primary)									
<i>Secondary</i>	Less	More	Less	Less	Less	Less	More	More	-
<i>Quaternary</i>	Less	More	More	More	More	More	Less	More	Less

<i>Tertiary</i>	More	More	More	More	More	More	More	More	-
Payment mode (Base: Cash)									
<i>Mobile money (Momo)</i>	Less	Less	More	Less	Less	-	Less	More	Less
<i>Online</i>	Less	Less	More	Less	Less	Less	Less	Less	Less
No. of Obs.	16,294	8,022	8,272	13,08 7	5,795	7,233	3,207	2,227	976

Notes: More (Less) implies that an increase (a decrease) in the predictor leads to an increase in the predicted probability of the stated outcome. *Momo* represents Mobile money mode of payment; - represents insufficient observations to determine predicted probability.

Table 3c: Panel probit model estimates [Likelihood to file]

	Full sample			ACCRA			NORTHERN		
	ALL	CIT	PIT	ALL	CIT	PIT	ALL	CIT	PIT
<i>CEO_age</i>	Less	Less	Less	Less	More	Less	Less	Less	Less
<i>CEO_educ</i>	Less	Less	Less	Less	More	Less	Less	Less	Less
<i>CEO_gender</i>	More	More	Less	Less	Less	Less	Less	-	Less
<i>Firm_size</i>	Less	Less	Less	Less	More	Less	Less	Less	Less
<i>Firm_age</i>	More	More	More	Less	Less	More	Less	Less	More
Sector (Base: Primary)									
<i>Secondary</i>	More	Less	More	More	More	More	More	Less	-
<i>Quaternary</i>	Less	Less	Less	Less	Less	Less	Less	-	Less
<i>Tertiary</i>	More	More	More	More	More	Less	More	Less	-
Payment mode (Base: Cash)									
<i>Momo</i>	More	More	More	More	More	More	More	-	More
<i>Online</i>	More	More	More	More	More	More	Less	More	Less
No. of Obs.	16,294	8,022	8,272	13,08 7	5,795	7,272	3,207	2,190	976

Notes: More (Less) implies that an increase (a decrease) in the predictor leads to an increase in the predicted probability of the stated outcome. *Momo* represents Mobile money mode of payment; - represents insufficient observations to determine predicted probability.

The panel probit estimates reported in Tables 3a-3c, complementing the multinomial probit estimations reported in Tables 2a-2b, underscore the importance of tax authorities having administrative datasets that contain full information, which can then be analysed to better understand patterns in taxpaying behaviours. We find that taxpayer characteristics such as *CEO_age*, *CEO_gender*, *CEO_educ*, *Firm_size*, *Firm_age*, and *Sector* are relevant pointers in this regard. It is important to note that although these are not directly under the policy control of the GRA, the results serve as important pointers as to where the GRA should target its monitoring efforts. Importantly, the policy variable that is firmly within the remit of the GRA is the avenue(s) they provide for the mode of payment, taking regional facilities into consideration. The results reported in Tables 3a-3c show that, in comparison to the cash mode of payment, both *Momo* and *Online* modes of payment generally influence taxpayers' likelihood to *nil-file*, *non-file* or *file*, and needs to be encouraged to improve tax revenue generation. Unsurprisingly, in Northern Ghana, *Momo* emerges as a preferred mode, given that internet access and facilities are less readily available.

7.0 Conclusions

Aiming to better understand the broader challenges of taxation, such as constant pressure on revenue authorities to raise tax revenues, administrative complexities and compliance costs, this research has sought to gain better understanding of the extent of different taxpayer behaviours in Ghana. Taxpayer data from Administrative Datasets collated from 27 of the 59 tax offices across the country were examined, further disaggregated into CIT and PIT subsamples as well as regional (Accra and Northern Ghana) subsamples. Preliminary analysis of the data, spanning 2010-2023, showed that *nil-filing* in Ghana is not as high (averaging just under 5%) as has been reported in some other African countries such as Rwanda (53% for CIT and 17% for PIT for 2013-2017) and Eswatini (20.4% for 2013-2017). However, we find clear indication that *nil-filing* has been on an upward trend, and particularly so since 2019. The extent of *non-filing* is particularly worrying, averaging 59.2% (60.4% for CIT and 58.02% for PIT), which suggests that while the GRA has chopped success in increasing number of registered taxpayers, it must do better with getting taxpayers to file and pay their due taxes. This is essential for sustainable revenue generation.

Both multinomial and panel probit estimations highlight the importance of understanding the potential influence of taxpayer characteristics such as *CEO_age*, *CEO_gender*, *CEO_educ*, *Firm_size*, *Firm_age*, and *Sector*, as well as policy variables such as *Mode of Payment*. While the impacts of the characteristics inform the GRA on area to improve monitoring, the *Mode of Payment* estimates confirm that *Online* and *Momo* modes can improve the probability to *file* and, overall, decrease the likelihood of *nil-filing*. The evidence of the importance of taxpayer characteristics in explaining taxpayer behaviour underscores the fact that the GRA should do well to drastically reduce, if not eliminate, the proportion of incomplete taxpayer information being provided and held within the official administrative datasets. Clearly, the level of *non-filing* and the upward trends being seen in *nil-filing* are incompatible with the country's aim to achieve sustainable revenue generation. This lays a clear foundation for a necessary extension to this work, which will extend the data analyses for the remaining tax offices in the country, and subsequently undertake both qualitative and quantitative analyses into the reasons underlying the specific taxpayer behaviours and which

cost-effective approaches the GRA can undertake to maximise compliant taxpayer practices across the country.

Overall, these policy measures are to be implemented in addition to existing efforts by the GRA to increase the number of people who should register to pay their taxes but have not done so yet. As like other developing countries, especially in Africa, South Asia and Latin America, the informal sector is huge, such efforts should continue. However, in this study, we argue that such drives alone will not improve revenue generation in a sustainable way unless the GRA pays attention to registered taxpayers who are *non-filing* and/or *nil-filing*.

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APPENDIX

APPENDIX 1: Ghana Revenue Authority Tax Office in sample

Accra Tax Offices group comprises Achimota, Adenta, Agbogbloshie, Ashaiman, Circle, Kaneshie, Kasoa, Legon, Madina, Makola, Mataheko, Nima, Osu, Ring Road, Spintex, Tema TSC 1, Tema TSC 9, Teshie, and Weija. Northern Group comprises Bawku TSC, Bolgatanga, Lawra, Tamale East, Tamale West, Wa, Walewale, and Yendi.

APPENDIX 2: Description of Variables

Variable	Description
Firm size	
<i>Micro</i>	Less than 10 employees
<i>Small</i>	Between 11 and 49 employees
<i>Medium</i>	Between 50 and 99 employees
<i>Large</i>	Over 100 employees.
CEO Age	
<i>Under30</i>	CEO age is 29 years or less.
<i>30to49</i>	CEO aged between 30 and 49
<i>50plus</i>	CEO aged 50 or over.
Sector	
<i>Primary</i>	Broad sector for businesses with main product in raw materials, including production and extraction.
<i>Secondary</i>	A broad category/sector for businesses involved in manufacturing and processing
<i>Tertiary</i>	A broad categorisation for businesses providing services (not physical products).
<i>Quaternary</i>	Broad sector for businesses engaged in knowledge sharing e.g., training institutes and universities.
Firm Age	Number of years since formal registration with GRA
CEO Gender	Gender of the CEO: Male/Female
Mode of payment	Method of payment of tax revenue: cash, mobile money, online.
CEO education	Highest educational qualification obtained by the CEO
<i>No Education</i>	No formal education recorded
<i>Primary</i>	Basic formal education up to primary level
<i>Secondary</i>	Some formal education up to secondary level
<i>Vocational</i>	Some formal training in a vocation

<i>Professional Tertiary</i>	A professional qualification/certification achieved University qualification achieved.
Firm status	
<i>Limited liability Sole proprietor</i>	Registered unit is operating as a limited liability Registered unit is operating as a sole proprietor.

APPENDIX 3: Summary Statistics

Table A3a. CEO Gender

	Aggregate		PIT		CIT	
	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>
ALL						
<i>Female</i>	3,415	15.4%	2,898	27.3%	517	4.45%
<i>Male</i>	9,753	43.9%	5,884	55.46%	3,869	33.28%
<i>Unknown</i>	9,066	40.8%	1,828	17.23%	7,238	62.27%
ACCRA						
<i>Female</i>	3,146	17.70%	2,668	33.90%	478	4.83%
<i>Male</i>	6,831	38.50%	4,438	56.40%	2,393	24.20%
<i>Unknown</i>	7,778	43.80%	757	9.63%	7,021	71.00%
NORTHERN						
<i>Female</i>	269	5.75%	230	8.37%	39	2.25%
<i>Male</i>	2922	62.40%	1446	52.60%	1476	85.20%
<i>Unknown</i>	1488	31.80%	1071	39%	217	12.50%

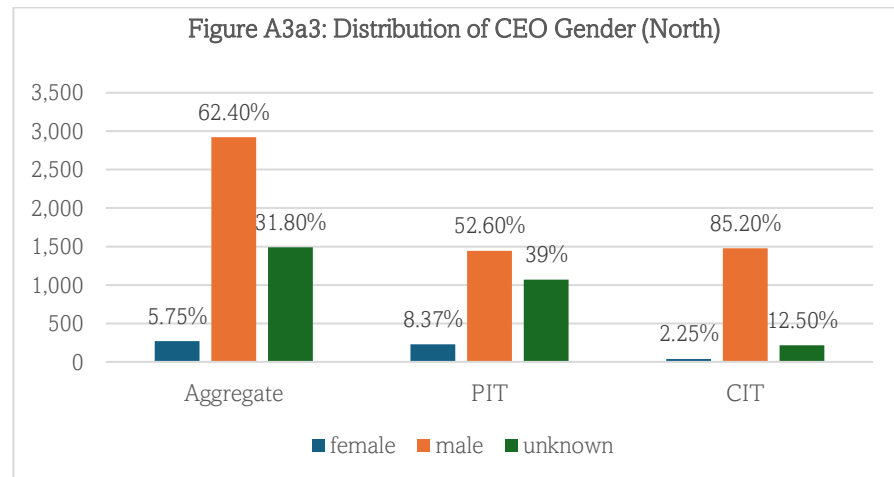
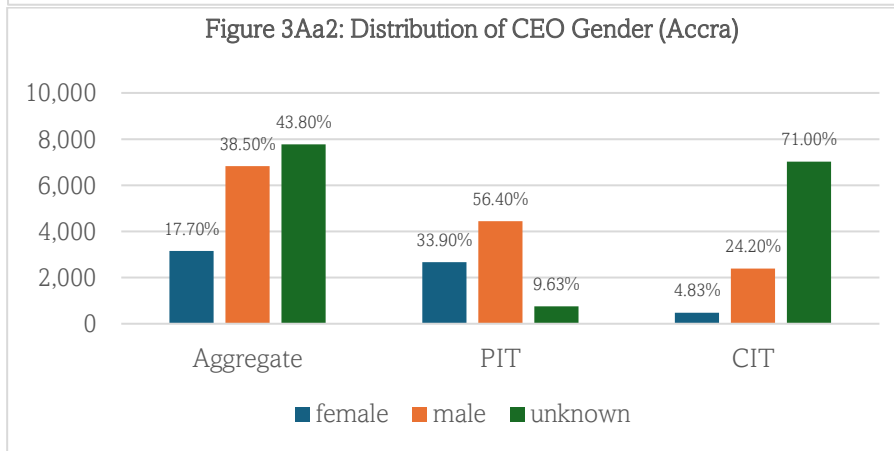
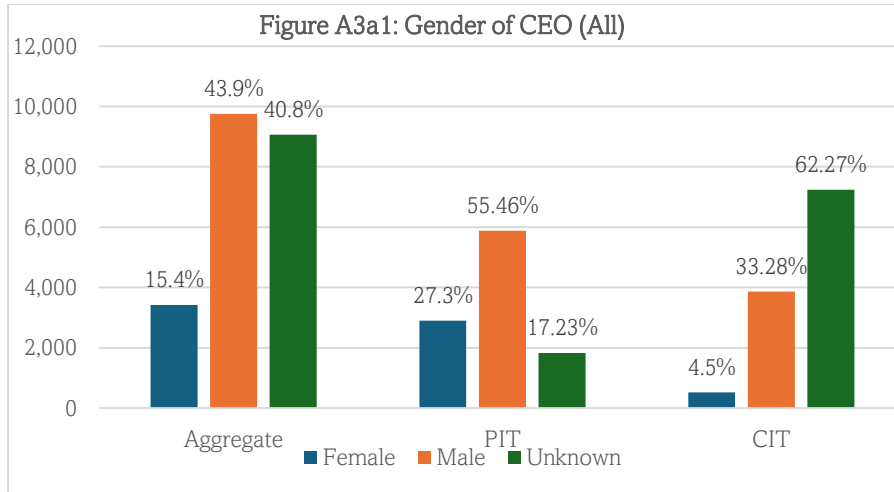
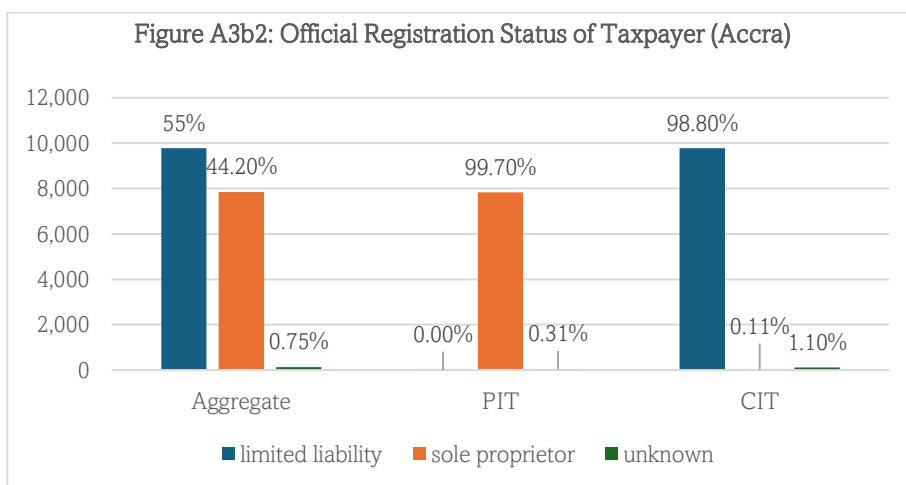
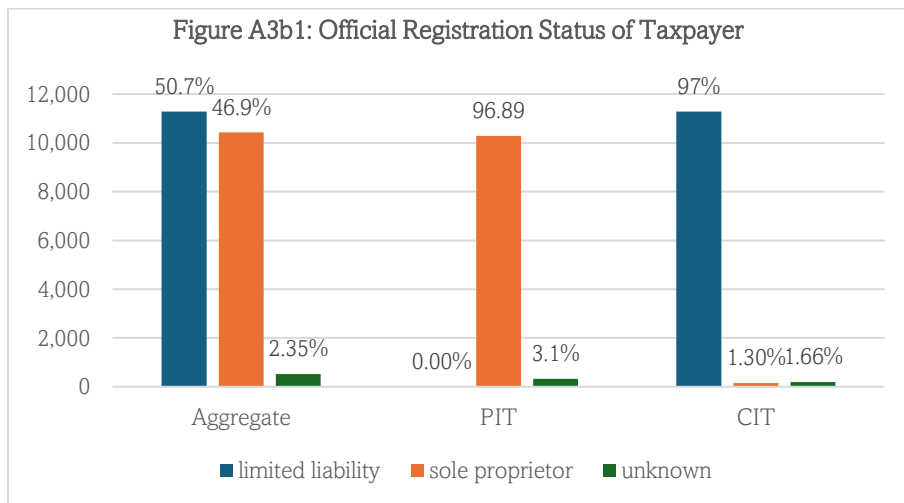


Table A3b. Official Registration Status of Taxpayer

	Aggregate		PIT		CIT	
	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>
ALL						
<i>Limited Liability</i>	11280	50.70%	1	0.00%	11279	97.00%

<i>Sole Proprietor</i>	10432	46.90%	10280	96.89	152	1.30%
<i>Unknown</i>	522	2.35%	329	3.10%	193	1.66%
ACCRA						
<i>Limited liability</i>	9,773	55%	1	0.00%	9,772	98.80%
<i>Sole proprietor</i>	7,848	44.20%	7,837	99.70%	11	0.11%
<i>Unknown</i>	134	0.75%	25	0.31%	109	1.10%
NORTHERN						
<i>Limited liability</i>	1507	32.20%	0	0%	1507	87.00%
<i>Sole proprietor</i>	2584	55.20%	2443	88.90%	141	8.14%
<i>Unknown</i>	588	12.60%	304	11.10%	84	4.85%



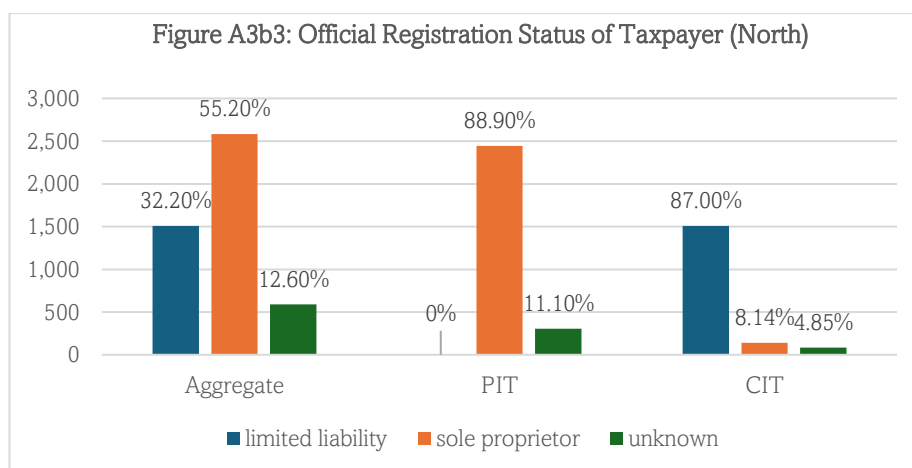


Table A3c: Mode of Payment

	Aggregate		PIT		CIT	
ALL	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>
<i>Cash</i>	4,856	21.8%	2,853	26.89%	2,003	17.23%
<i>Mobile money (Momo)</i>	1,859	8.36%	1,594	15.02%	265	2.28%
<i>Online</i>	14,078	63.3%	5,781	54.49%	8,297	71.38%
<i>Unknown</i>	1,441	6.48%	382	3.60%	1,059	9.11%
ACCRA						
<i>Cash</i>	4,541	25.60%	2,608	33.20%	1,933	19.50%
<i>Mobile money (Momo)</i>	1,543	8.69%	1,436	18.30%	107	1.08%
<i>Online</i>	10,609	59.80%	3,744	47.60%	6,865	69.40%
<i>Unknown</i>	1,062	5.98%	75	0.95%	987	9.98%
NORTHERN						
<i>Cash</i>	315	6.73%	245	8.92%	70	4.04%
<i>Mobile money (Momo)</i>	316	6.75%	158	5.75%	158	9.12%
<i>Online</i>	3,469	74.10%	2,037	74.20%	1,432	82.70%
<i>Unknown</i>	579	12.40%	307	11.20%	72	4.16%

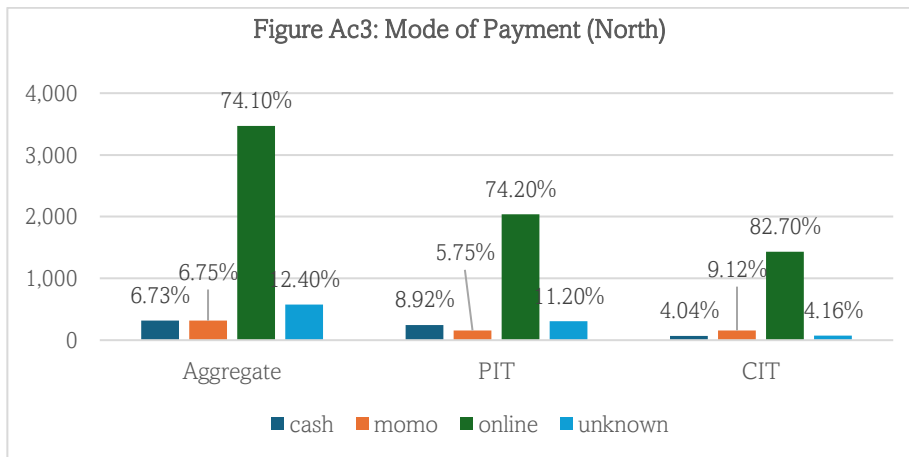
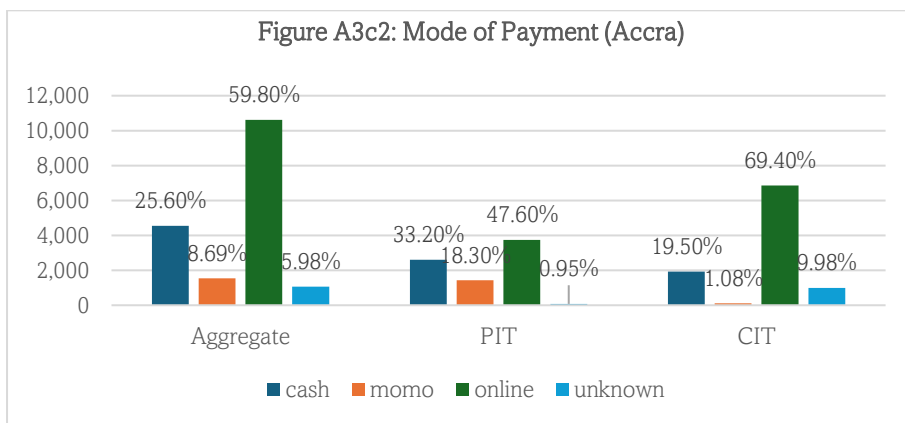
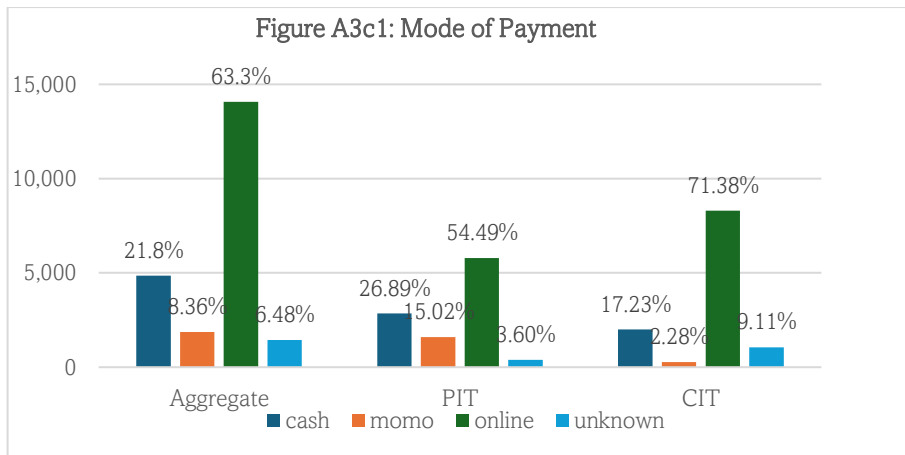
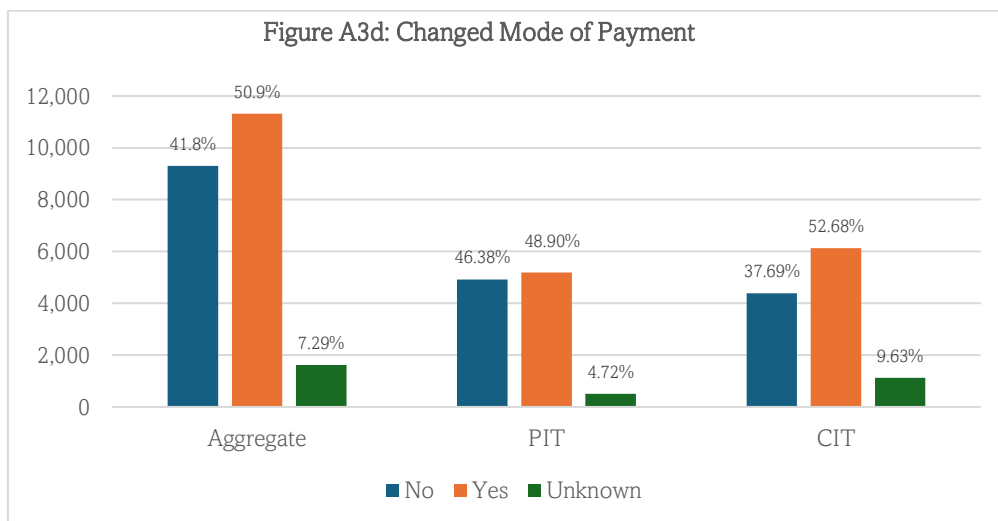


Table A3d: Changed Mode of Payment

	Aggregate		PIT		CIT	
Changed mode of payment since registration?	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>
ALL						
<i>No</i>	9,302	41.8%	4,921	46.38%	4,382	37.69%
<i>Yes</i>	11,312	50.9%	5,188	48.90%	6,124	52.68%
<i>Unknown</i>	1,620	7.29%	501	4.72%	1,119	9.63%
ACCRA						
<i>No</i>	8,872	41.8%	4,627	58.80%	4,245	42.90%
<i>Yes</i>	1,259	50.9%	194	2.47%	1,065	10.80%
<i>Unknown</i>	7,624	7.29%	3,042	38.70%	4,582	46.30%
NORTHERN						
<i>No</i>	430	9.19%	294	10.70%	136	7.85%
<i>Yes</i>	3688	82.30%	2146	78.10%	1542	89.00%
<i>Unknown</i>	361	8.06%	307	11.20%	54	3.12%



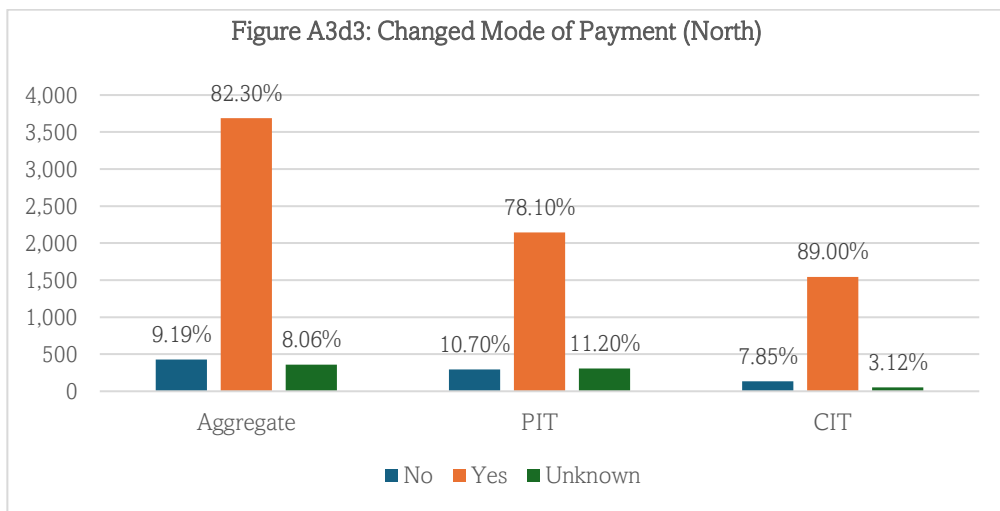
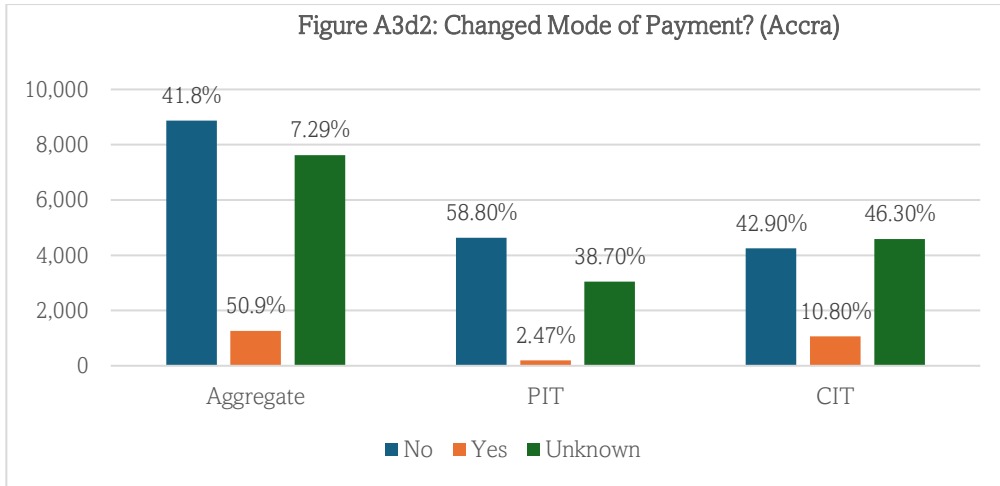
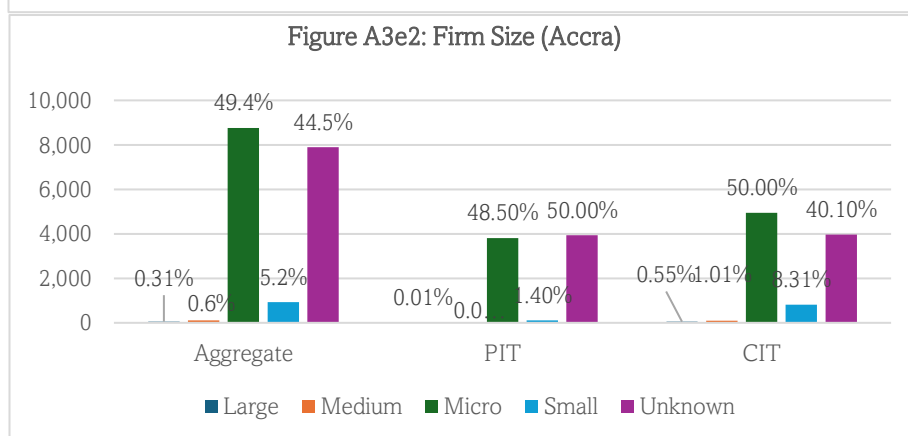
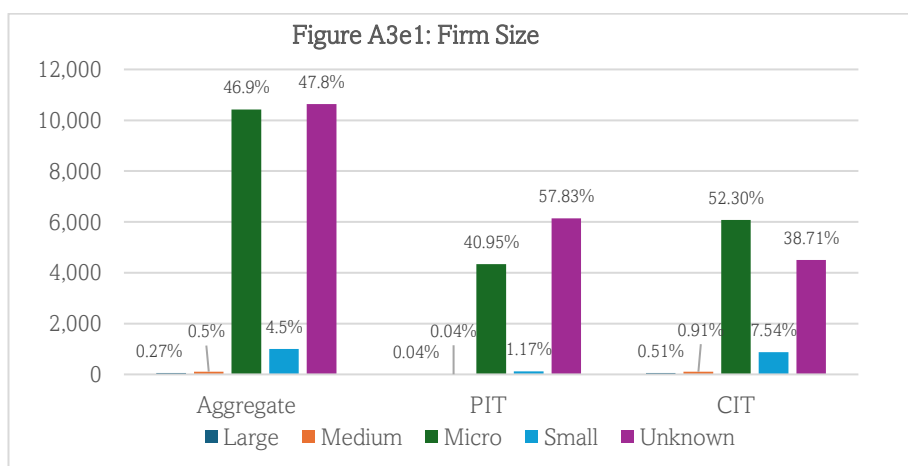


Table A3e: Firm Size

	Aggregate		PIT		CIT	
	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>
ALL						
<i>Large</i>	61	0.27%	1	0.04%	60	0.51%
<i>Medium</i>	110	0.5%	4	0.04%	106	0.91%
<i>Micro</i>	10,425	46.9%	4,345	40.95%	6,080	52.30%
<i>Small</i>	1,001	4.5%	124	1.17%	877	7.54%
<i>Unknown</i>	10,637	47.8%	6,136	57.83%	4,501	38.71%
ACCRA						
<i>Large</i>	56	0.31%	1	0.01%	55	0.55%

<i>Medium</i>	104	0.6%	4	0.05%	100	1.01%
<i>Micro</i>	8763	49.4%	3815	48.50%	4948	50.00%
<i>Small</i>	932	5.2%	110	1.40%	822	8.31%
<i>Unknown</i>	7900	44.5%	3933	50.00%	3967	40.10%
NORTHERN						
<i>Large</i>	5	0.11%	0	0%	5	0.29%
<i>Medium</i>	6	0.13%	0	0%	6	0.35%
<i>Small</i>	69	35.50%	14	0.51%	55	3.18%
<i>Micro</i>	1662	1.47%	530	19.30%	1132	65.40%
<i>Unknown</i>	2937	62.80%	2203	80.20%	534	30.80%



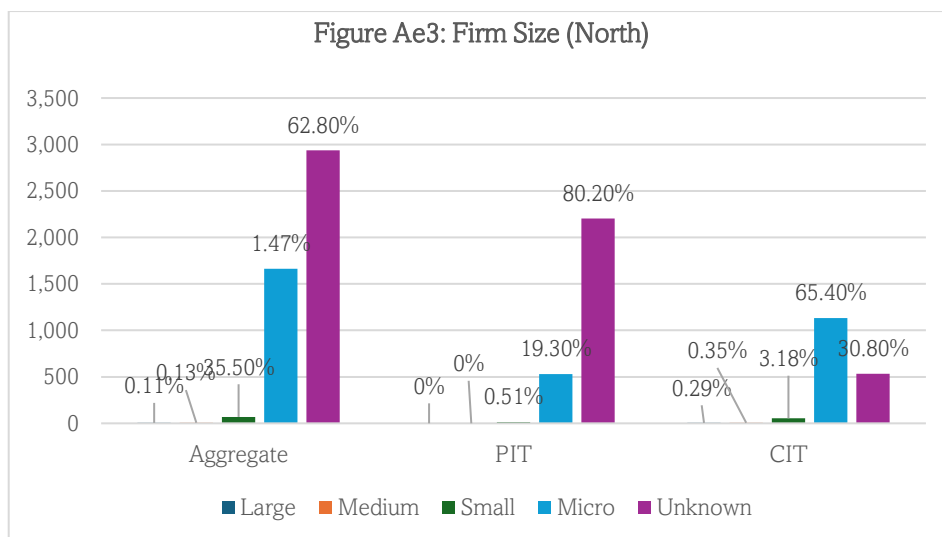


Table A3f: Age of CEO

	Aggregate		PIT		CIT	
	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>	<i>Count</i>	<i>Percentage</i>
ALL						
<i>Under30</i>	269	1.21%	195	1.84%	74	0.64%
<i>30to50</i>	4,499	20.2%	2,911	27.44%	1,588	13.66%
<i>50plus</i>	2,901	13%	1,867	17.60%	1,034	8.90%
<i>Unknown</i>	14,565	65.5	5,637	53.13%	8,928	76.81%
ACCRA						
<i>Under30</i>	217	1.21%	181	2.30%	36	0.36%
<i>30to50</i>	3393	19.1%	2480	31.50%	913	9.23%
<i>50plus</i>	2443	14%	1663	21.10%	780	7.89
<i>Unknown</i>	11702	65.90%	3539	45.00%	8163	82.5
NORTHERN						
<i>Under30</i>	52	1.11%	14	0.51%	38	44.20%
<i>30to50</i>	1106	23.60%	431	15.70%	657	39.00%
<i>50plus</i>	458	9.79%	204	7.43%	254	14.70%
<i>Unknown</i>	3063	65.50%	2098	76.40%	765	44.20%

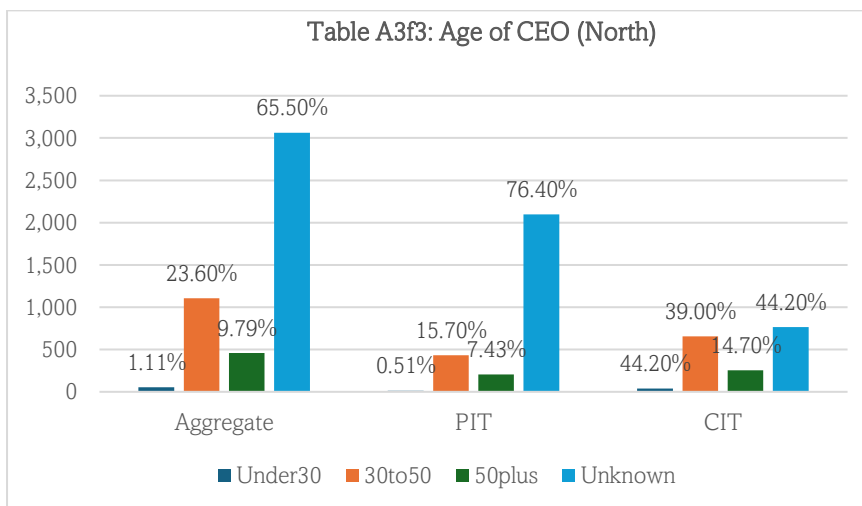
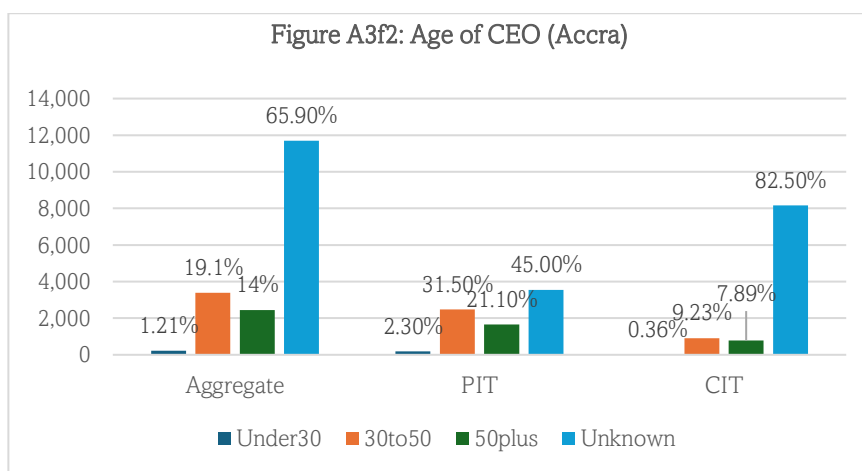
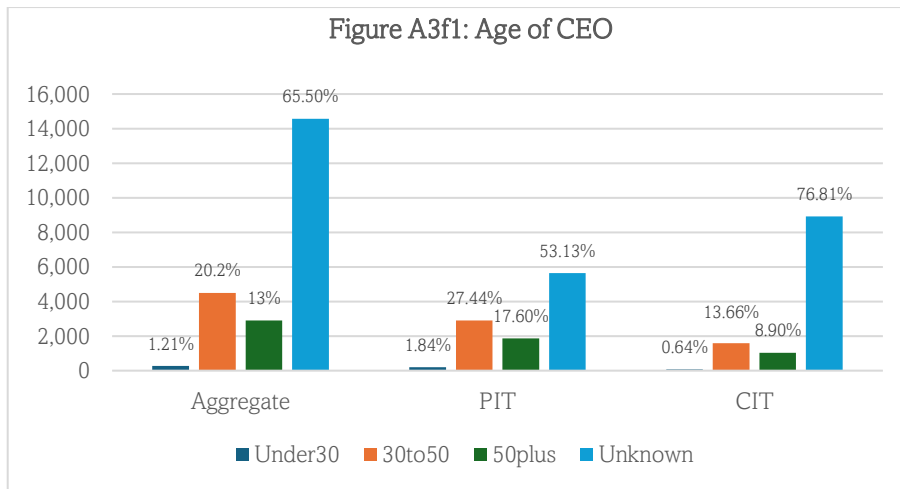
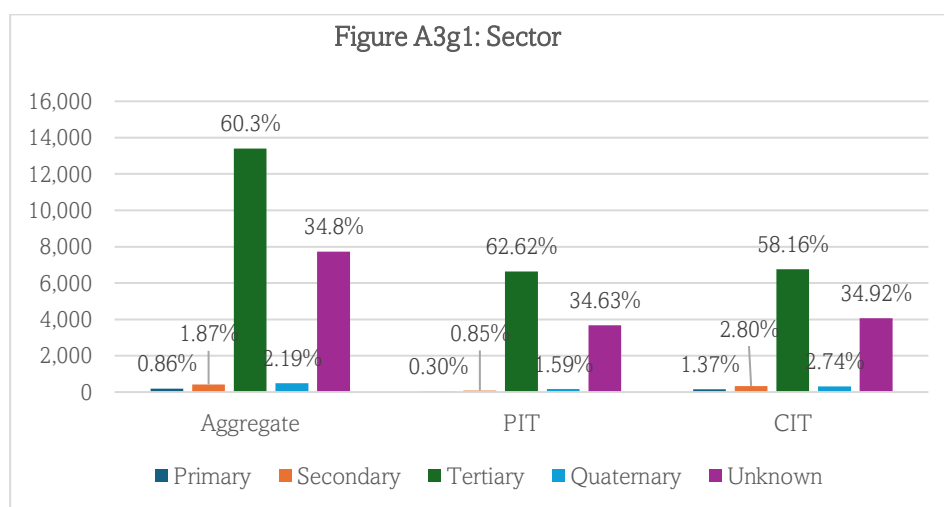


Table A3g: Sector

	Aggregate		PIT		CIT	
	Count	Percentage	Count	Percentage	Count	Percentage
ACCRA						

<i>Primary</i>	191	0.86%	32	0.30%	159	1.37%
<i>Secondary</i>	416	1.87%	90	0.85%	326	2.80%
<i>Tertiary</i>	13,405	60.3%	6,644	62.62%	6,761	58.16%
<i>Quaternary</i>	488	2.19%	169	1.59%	319	2.74%
<i>Unknown</i>	7734	34.8%	3,675	34.63%	4,059	34.92%
ACCRA						
<i>Primary</i>	166	0.94%	23	0.29%	143	1.45%
<i>Secondary</i>	408	2.23%	87	1.11%	321	3.25%
<i>Tertiary</i>	10553	59.4%	5125	65.20%	5428	54.90%
<i>Quaternary</i>	445	2.51%	149	1.89%	296	2.99%
<i>Unknown</i>	6183	34.8%	2479	31.50%	3704	37.40%
NORTHERN						
<i>Primary</i>	166	0.94%	23	0.29%	143	1.45%
<i>Secondary</i>	408	2.23%	87	1.11%	321	3.25%
<i>Tertiary</i>	10553	59.4%	5125	65.20%	5428	54.90%
<i>Quaternary</i>	445	2.51%	149	1.89%	296	2.99%
<i>Unknown</i>	6183	34.8%	2479	31.50%	3704	37.40%



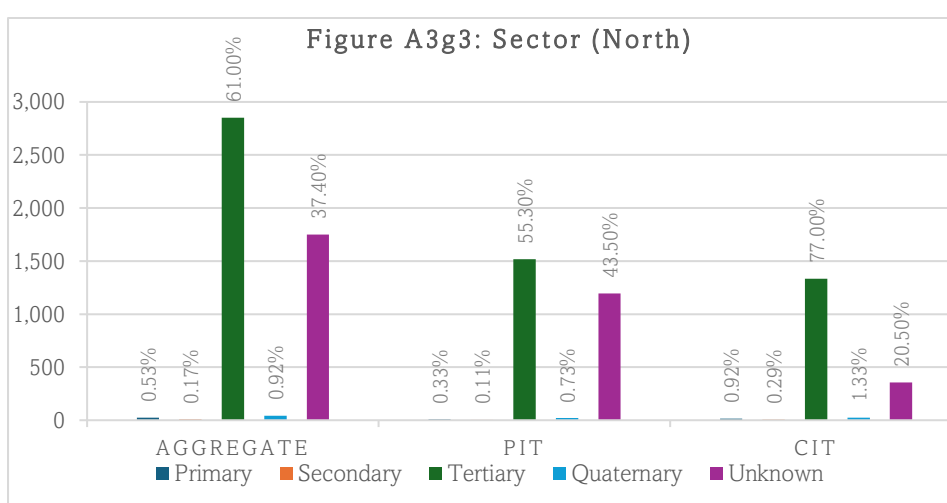
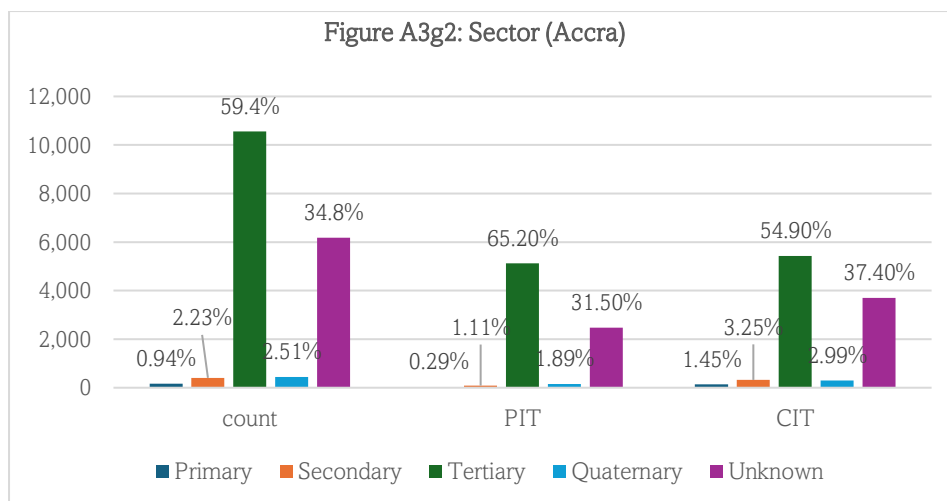
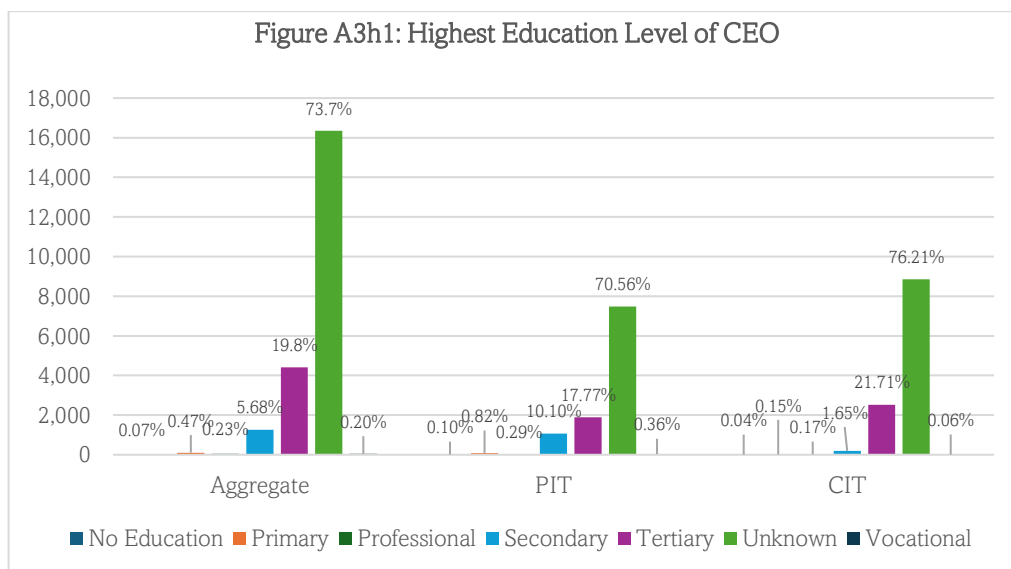
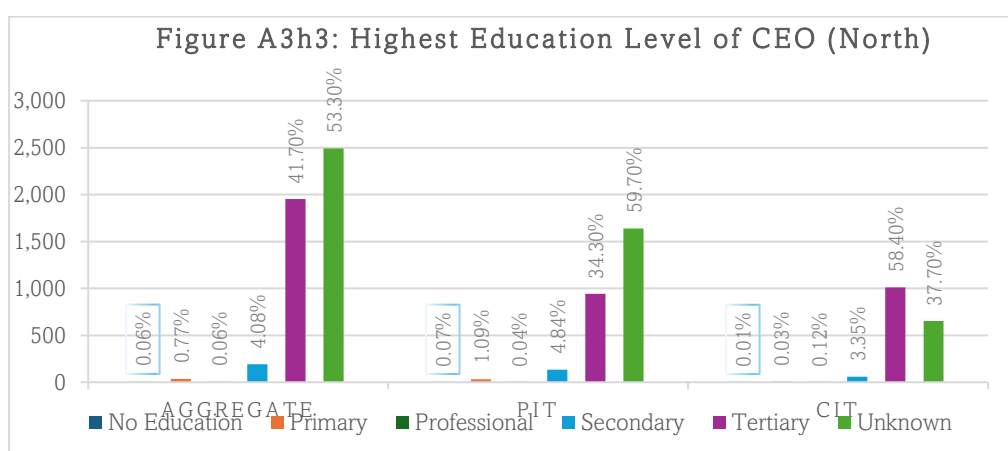
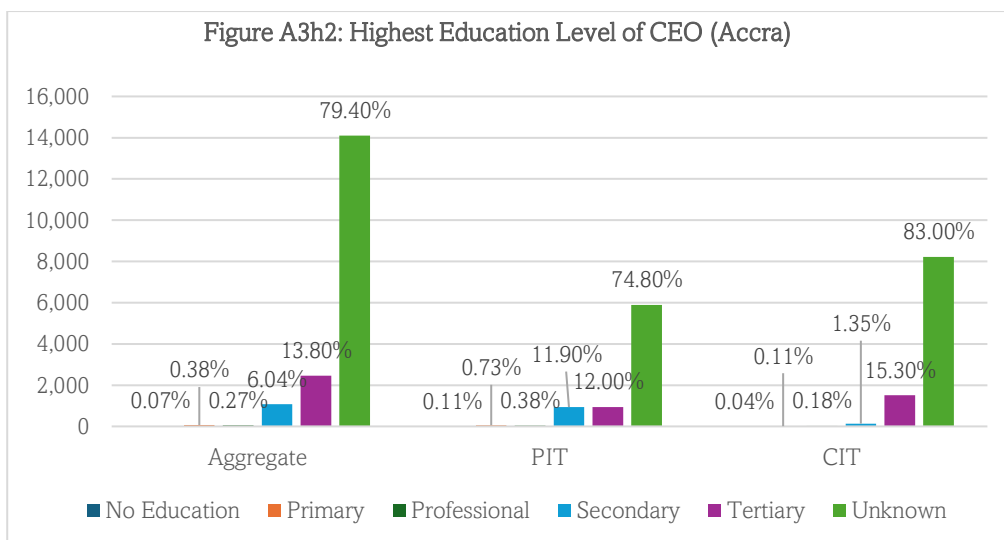


Table A3h: Highest Education Level of CEO

	Aggregate		PIT		CIT	
	Count	Percentage	Count	Percentage	Count	Percentage
<i>No Education</i>	16	0.07%	11	0.10%	5	0.04%
<i>Primary</i>	104	0.47%	87	0.82%	17	0.15%
<i>Professional</i>	51	0.23%	31	0.29%	20	0.17%
<i>Secondary</i>	1,264	5.68%	1,072	10.10%	192	1.65%
<i>Tertiary</i>	4,409	19.8%	1,885	17.77%	2,524	21.71%
<i>Vocational</i>	45	0.20%	38	0.36%	7	0.06%
<i>Unknown</i>	16,345	73.7%	7,486	70.56%	8,859	76.21%

ACCRA						
<i>No Education</i>	13	0.07%	9	0.11%	4	0.04%
<i>Primary</i>	68	0.383	57	0.73%	11	0.11%
<i>Professional</i>	48	0.27%	30	0.38%	18	0.18%
<i>Secondary</i>	1,073	6.04%	939	11.90%	134	1.35%
<i>Tertiary</i>	2,456	13.80%	944	12.00%	1,512	15.30%
<i>Unknown</i>	14,097	79.40%	5,884	74.80%	8,213	83.00%
NORTHERN						
<i>No Education</i>	3	0.06%	2	0.07%	1	0.01%
<i>Primary</i>	36	0.77%	30	1.09%	6	0.03%
<i>Professional</i>	3	0.06%	1	0.04%	2	0.12%
<i>Secondary</i>	191	4.08%	133	4.84%	58	3.35%
<i>Tertiary</i>	1,953	41.70%	941	34.30%	1,012	58.40%
<i>Unknown</i>	2,493	53.30%	1,640	59.70%	653	37.70%





APPENDIX 4

Table A4a: Filing status: Percentage of registered taxpayers (Combined Dataset), 2010 – 2023

	Total number of registered taxpayers		NIL-FILERS		NON-FILERS		LATE-FILERS		STOP-FILERS		FILERS	
	CIT	PIT	CIT	PIT	CIT	PIT	CIT	PIT	CIT	PIT	CIT	PIT
2010	424	664	1.18	0.00	91.75	9.49	6.84	1.05	0.00	0.00	0.24	89.46
2011	466	763	0.86	0.00	86.70	19.40	11.16	2.10	0.00	0.00	1.29	78.51
2012	1654	1691	0.73	0.41	79.50	59.25	4.78	3.13	8.89	1.48	5.86	35.36
2013	1980	2040	0.66	0.34	58.38	65.15	5.30	3.14	11.36	1.96	23.99	28.68
2014	2423	2369	0.58	0.76	53.78	68.85	9.62	3.33	10.11	2.11	25.59	24.23
2015	3643	2731	0.99	0.44	59.32	72.32	7.99	3.04	9.50	2.12	21.85	21.02

2016	4297	3031	1.35	0.46	55.34	73.87	10.45	3.33	9.70	1.88	22.88	19.20
2017	5165	3324	2.19	0.60	54.04	74.64	10.47	3.46	11.89	2.08	21.05	17.54
2018	5951	3625	1.70	0.61	56.75	75.03	9.44	4.06	12.97	3.14	18.82	15.70
2019	6789	3851	1.75	1.30	56.61	71.80	12.37	5.12	12.43	3.43	16.42	16.96
2020	7837	4804	1.63	1.58	54.74	64.68	15.07	9.33	12.03	7.85	15.82	15.15
2021	9635	7764	2.82	2.74	49.87	56.92	20.99	16.80	11.56	7.14	14.29	14.82
2022	10704	9825	3.30	2.93	42.78	55.22	25.12	18.84	11.31	4.42	17.11	17.31
2023	11097	10292	3.65	3.39	46.33	45.66	4.15	6.18	13.45	5.89	31.73	37.56

Table A4b: Filing status: Percentage of registered taxpayers (Accra Dataset), 2010 – 2023

	Total number of registered taxpayers		NIL-FILERS		NON-FILERS		LATE-FILERS		STOP-FILERS		FILERS	
	CIT	PIT	CIT	PIT	CIT	PIT	CIT	PIT	CIT	PIT	CIT	PIT
2010	73	48	1.37	0.00	65.75	95.83	31.51	4.17	0.00	0.00	1.37	0.00
2011	113	140	0.00	0.00	54.87	92.86	40.71	7.14	0.00	0.00	4.42	0.00
2012	1281	1006	0.55	0.70	74.63	91.75	5.70	4.47	11.40	1.89	7.42	0.60
2013	1601	1338	0.44	0.52	69.21	90.96	5.93	3.66	13.99	2.47	10.06	1.20
2014	2040	1640	0.34	1.10	60.98	90.55	10.93	3.48	11.91	2.38	15.44	1.46
2015	3253	1985	0.92	0.60	64.46	90.48	8.61	3.07	10.54	2.32	15.06	2.02
2016	3896	2260	1.33	0.62	58.62	89.51	11.11	3.27	10.63	1.95	17.99	2.96
2017	4742	2509	2.24	0.80	56.28	87.68	10.84	3.19	12.82	2.03	17.10	4.03
2018	5498	2777	1.69	0.79	58.31	86.24	9.60	3.75	13.93	3.46	15.84	3.85
2019	6309	2978	1.71	0.91	57.31	84.82	12.54	5.00	13.27	3.59	14.72	3.83
2020	7076	3898	1.63	1.90	53.58	71.01	15.55	9.62	13.23	8.98	15.25	6.75
2021	8230	6484	2.76	2.81	49.87	62.68	19.66	13.80	13.45	8.04	13.72	10.76
2022	9050	7174	3.26	3.50	48.65	56.16	23.49	17.08	13.26	5.53	10.88	15.97
2023	9371	7558	3.48	4.02	51.96	56.69	3.86	7.29	15.80	7.54	24.07	22.65

**Table A4c: Filing status: Percentage of registered taxpayers (Northern Region Dataset), 2010
– 2023**

	Total number of registered taxpayers		NIL-FILERS		NON-FILERS		LATE-FILERS		STOP-FILERS		FILERS	
	CIT	PIT	CIT	PIT	CIT	PIT	CIT	PIT	CIT	PIT	CIT	PIT
2010	351	616	1.14	0.00	97.15	2.76	1.71	0.81	0.00	0.00	0.00	96.43
2011	353	623	1.13	0.00	96.88	2.89	1.70	0.96	0.00	0.00	0.28	96.15
2012	373	685	1.34	0.00	96.25	11.53	1.61	1.17	0.27	0.88	0.54	86.42
2013	379	702	1.58	0.00	12.66	15.81	2.64	2.14	0.26	1.00	82.85	81.05
2014	383	729	1.83	0.00	15.40	20.03	2.61	3.02	0.52	1.51	79.63	75.45
2015	390	746	1.54	0.00	16.41	23.86	2.82	2.95	0.77	1.61	78.46	71.58
2016	401	771	1.50	0.00	23.44	28.02	3.99	3.50	0.75	1.69	70.32	66.80
2017	423	815	1.65	0.00	28.84	34.36	6.38	4.29	1.42	2.21	61.70	59.14
2018	453	848	1.77	0.00	37.75	38.33	7.51	5.07	1.32	2.12	51.66	54.48
2019	480	873	2.29	2.63	47.29	27.26	10.21	5.50	1.46	2.86	38.75	61.74
2020	761	906	1.71	0.22	65.57	37.42	10.64	8.06	0.92	2.98	21.16	51.32
2021	1405	1280	3.20	2.42	49.89	27.73	28.75	31.95	0.50	2.58	17.65	35.31
2022	1654	2651	3.51	1.40	10.64	52.66	34.04	23.61	0.67	1.40	51.15	20.94
2023	1726	2734	4.58	1.65	15.76	15.14	5.68	3.11	0.70	1.32	73.29	78.79

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