FONDATION POUR LES ÉTUDES ET RECHERCHES SUR LE DÉVELOPPEMENT INTERNATIONAL

Working Paper 348 February 2025 Development Policies

Effective Tax Burden on Mobile Network Operators in Africa

Daouda Bamba, Alou Adessé Dama, Grégoire Rota-Graziosi

Daouda Bamba, FERDI, Clermont-Ferrand, France.

Alou Adessé Dama, FERDI, Clermont-Ferrand, France.

Grégoire Rota-Graziosi, FERDI and University Clermont Auvergne, CNRS, CERDI, Clermont-Ferrand, France.
Corresponding author: gregoire.rota-graziosi@uca.fr

Abstract

This study presents a comprehensive analysis of the tax burden on the mobile telecommunications sector across twenty-nine African countries, encompassing both general taxation and sector-specific levies. To conduct this assessment, we develop a model of a representative mobile network operator, referred to as TELCO, and compute its Average Effective Tax Rate (AETR) by incorporating both standard tax obligations and industry-specific fiscal charges. The average AETR is significantly high, ranging from 77 percent to 116 percent (or 44 percent to 83 percent when excluding license fees), depending on the assumed indirect tax incidence. Notably, the AETR exhibits a regressive pattern, whereby the relative tax burden decreases as gross profitability rises. This regressivity is largely attributable to the structural design of the tax system, which relies predominantly on indirect taxation. .../...

Keywords: taxation, telecommunication sector, project analysis, developing countries.
JEL Codes : H25, L96, O22, O55.

This document has been produced as part of the Digital Trust Chair (FERDI and Be-Ys).

LA FERDI EST UNE FONDATION RECONNUE D'UTILITÉ PUBLIQUE.
CETTE PUBLICATION A BÉNÉFICIÉ D'UNE AIDE DE L'ÉTAT FRANÇAIS AU TITRE DU PLAN D'INVESTISSEMENT FRANCE 2030 PORTANT LA RÉFÉRENCE ANR-16-IDEX-0001.

.../... A comparative analysis of the AETR across three sectors—telecommunications, a standard firm, and the gold mining industry—reinforces these findings. TELCO's AETR is higher in each studied country except in Botswana. This excessive tax burden is primarily driven by mobile-specific taxation, particularly ad quantum taxes levied on telecommunications usage, such as per-minute charges on voice calls or per-megabyte fees on data consumption. Given the sector's critical role in economic development and digital inclusion, these findings raise concerns regarding the long-term implications of such a tax structure on investment, market expansion, and consumer affordability.[1]

Contents

1 Introduction 1

2 The AETR methodology 5

2.1 TELCO's accounting data 7

2.2 Assumptions 7

2.3 Tax data 11

2.4 Tax incidence scenarios 16

3 Results 18

4 Conclusion 32

5 References 37

6 Appendices 41

Appendix A: Some characteristics of the studied countries in 2023 41

Appendix B: Tax advantages (exemption and reduced rates) in 2023 42

Appendix C: Summary of assumptions 43

Appendix D: Sensitivity analysis 47

Appendix E: The case of Mali 50

[1] A web application (*under construction*) allows the reader to replicate our analysis or to modify TELCO financial data and countries' tax parameters.

1 Introduction

The mobile telecommunications sector has emerged as a pivotal catalyst for development in economically emerging nations, with particular significance in the African continent, where conventional infrastructure has historically proved inadequate for sustaining comprehensive economic expansion. The exponential proliferation of mobile telecommunications technology has transcended mere communicative functionality, serving as a fundamental driver of economic growth (Mensah, 2023) and of socioeconomic transformation through multiple mechanisms: the enhancement of market efficiency dynamics (Aker and Mbiti, 2010), the facilitation of broader financial inclusion initiatives (Jack and Suri, 2014), and the generation of novel entrepreneurial ecosystems. Despite the pervasive influence of globalization, telecommunications markets remain highly fragmented, characterized by heterogeneous national regulatory frameworks and tax systems. Numerous studies (e.g., Noll, 2000; Li and Xu, 2004; Howard and Mazaheri, 2009; Faccio and Zingales, 2017) have explored the roles of privatization, competition, and regulation within the telecommunications sector, particularly in developing countries. Notably, Howard and Mazaheri (2009) analyze internet usage and mobile phone adoption across 154 countries during the period 1990–2007, concluding that the independence of regulatory agencies (RAs) significantly mitigates the "digital divide" by enhancing access to information and communication technologies. However, they also observe that full depoliticization and deregulation of the sector exert adverse effects.

While a significant portion of the literature has focused on regulatory reforms such as privatization, market liberalization, and the establishment of independent RA, this analysis underscores the pivotal role of taxation in shaping the telecommunications sector. The complexity of telecommunications taxation stems from the multifaceted array of special taxes and regulatory fees, which are often levied not only by Ministries of Finance but also by telecommunications RAs. This dual-layered taxation structure introduces unique challenges to the sector, necessitating more nuanced scholarly and policy attention (OECD, 2019; ITU, 2021).

This analysis contributes to the ongoing debate regarding the appropriate level and structure of taxation within the telecommunications industry. On one side, Matheson and Petit (2020) argue that mobile phone companies generate significant rents by operating under exclusive licenses, suggesting that the tax regime for the telecommunications sector should adopt principles akin to those used in extractive industries. Their argument is grounded in the idea that such rents, if taxed effectively, can contribute significantly to public revenue without distorting market operations. Conversely, other perspectives emphasize the critical role of telecommunications firms in bridging the digital divide, particularly in developing economies. Scholars and organizations, including Mistry (2005), Koutroumpis *et al.* (2011) and GSMA (2017), advocate for tax incentives such as exemptions or reduced rates to enhance the affordability of mobile devices and services, thereby promoting digital inclusion and economic participation. These proponents contend that such tax policies can stimulate long-term growth by expanding access to telecommunications infrastructure and services, which are often

considered essential for socio-economic development (World Bank, 2016; GSMA, 2020). This debate reflects a broader trade-off, particularly prominent in developing countries, between using tax incentives to foster economic activity and collecting sufficient revenues to fund public services. Similar dilemmas are observed in other critical sectors, such as renewable energy and agriculture, where balancing developmental priorities with fiscal sustainability remains a key policy challenge (Besley and Persson, 2014; IMF, 2022).

This article contributes to the ongoing debate on the taxation of the mobile telephony sector in Africa by evaluating the fiscal burden borne by this industry. The analysis extends the work of Rota-Graziosi and Sawadogo (2022) by broadening the scope to include a larger number of African countries and an extended study period (2000-2023), while also differentiating between voice and data activities of mobile network operators MNOs. Furthermore, it complements the research of Katz and Jung (2023), which examines the tax burden by considering taxes levied across the sector's value chain. These authors consider four empirical equations to model the determinants of investment decisions, network coverage, service pricing, and demand for 108 countries over the period 2009–2018. They conclude that removing sector-specific taxation would improve investments, coverage, and adoption. Previous studies on the taxation of telecommunication, in particular these provided by GSMA Intelligence (Pedros and Sivakumaran, 2019) and the International Telecommunication Union (ITU, 2013) analyze the affordability of the mobile phone services especially in developing countries. Consequently, they focus mainly on indirect taxation such as Value Added Tax, excise, and special mobile networks taxes, such as fees or surtax on SMS, Sim cards, and international incoming calls. In contrast, we consider here all the taxes a firm has to pay to operate its mobile network license. These include direct taxation such as Corporate Income Tax (CIT) and some indirect taxes, which increase unambiguously the production cost of mobile phone services.

Due to the absence of publicly available financial data for individual firms, we construct a representative entity, TELCO, based on data from the GSMA Intelligence database. The analysis focuses on the tax regime in place in 2023, applying this regime over the assumed license period. To model the evolution of final consumption and subscriber growth over the 15-year span, we use observed market data since 2000 rather than speculative projections.

We analyze the tax burden borne by MNOs in selected African countries by calculating the Average Effective Tax Rate (AETR). The AETR provides a comprehensive measure of all taxes and fees imposed on an MNO over the duration of a telecommunications license, assumed to be 15 years. Our methodology adopts the forward-looking AETR framework established in the literature, leveraging the approach of Devereux and Griffith (1998), Djankov *et al.* (2010), and

Steinmüller *et al.* (2019) for general economic activity, as well as Daniel *et al.* (2010) for the extractive industry.[2]

We conduct a comprehensive review of all direct and indirect taxes and fees imposed on TELCOs across the studied countries. The taxation framework specific to the telecommunications sector is predominantly composed of indirect taxes,[3] raising critical questions regarding their incidence—namely, the extent to which the actual tax burden falls on consumers versus telecommunications operators. Due to the absence of empirical studies assessing the effective incidence of indirect taxation in the telecommunications sector, we adopt a range of five tax incidence scenarios, varying from full pass-through to consumers (incidence of 1) to full absorption by TELCOs (incidence of 0). Furthermore, we differentiate between ad valorem and ad quantum tax incidence, drawing upon empirical findings from other sectors, such as tobacco, fuel, and alcohol taxation, where similar taxation mechanisms have been analyzed extensively. This distinction allows for a more nuanced assessment of the economic impact of sector-specific taxes on both market operators and end-users.

We estimate the AETR for a standard representative firm, TELCO, in thirty countries using a cash flow model over the length of a telecommunication license. The tax burden varies significantly from one country to another depending on the weight and the characteristics of special taxes and license fees applied to telecommunications companies. The analysis reveals unsustainably high Average Effective Tax Rates (AETRs) close or even exceeding 100 percent in several countries, indicating financial losses for investors. The average AETR across the sample ranges from 77 percent to 116 percent. The cost of license fees, which has been recently reviewed across all countries, varies significantly and accounts for a substantial portion of the AETR in several cases (see Table 4). For instance, the fees exceed €720 million in Ethiopia, €411 million in Egypt, and €376 million in Nigeria. Considering license fees as an entry cost, the AETR across the sample remains high, ranging from 44 percent to 83 percent depending on tax incidence assumptions.

Under the assumption of a high indirect tax incidence, nearly all countries exhibit relatively moderate AETRs below 50 percent, with the exceptions of Gabon, Guinea-Bissau, Jordan, Morocco, and Tunisia. When tax incidence decreases to 50 percent, or equivalently when firms absorb half of the burden of indirect taxes, the AETR remains moderate (around or below 50 percent) in South Africa (36 percent), Botswana (41 percent), Burkina Faso (50 percent), Egypt or Nigeria (51 percent), Niger (53 percent), and Ghana or Mali (54 percent).

Assuming a conservative assumption of a tax incidence of 0.75 for all ad quantum taxes and

[2] Our findings are incorporated into an interactive web application (*under construction*), enabling replication and customization of the analysis. The platform supports modifications to TELCO's parameters, adjustments to national tax systems, and the inclusion of additional countries to expand the scope of the study.

[3] For instance, licensing fees, universal service obligations, numerical resource charges, and taxation of domestic and international telecommunications traffic.

0.5 for all ad valorem taxes,[4] we appreciate how the AETR varies with respect to its before-tax profitability. Assessing the AETR of TELCOs relative to their before-tax profitability highlights the regressive nature of the telecommunications tax regime: the more profitable a firm, the lower its relative tax burden. The AETR decreases significantly as profitability rises, averaging 86 percent for a gross profitability of 30 percent and declining to 54 percent for a gross profitability of 75 percent. This regressivity is primarily driven by the prominent role of indirect taxes within the telecommunications tax regime, even when the assumed tax incidence is moderate.

Upon examination of the AETR's constituent elements—namely, general and sector-specific taxation—whilst maintaining our aforementioned conservative postulation, we observe that the elevated AETRs stem predominantly from mobile-specific levies, which place a large fiscal burden upon telecommunications entities. The telecommunications-specific taxation exhibits a mean value of 56.5 percent, with marked heterogeneity across countries. This ranges from a comparatively modest 10.5 percent in Botswana to an extraordinary 342 percent in Ethiopia, the latter being substantially attributed to the pecuniary magnitude of licensing fees. Such sector-specific impositions constitute, on average, 59 percent of the aggregate tax burden as measured by the AETR. These empirical findings underscore the predominant role of specialized fiscal instruments, encompassing levies on domestic and international telecommunications traffic, numerical resource fees, universal service fund contributions, and regulatory assessments.

This result is further corroborated by a comparison of AETRs between TELCO, a standard firm (which is not subject to any sector-specific taxes), and the gold mining sector. In all the studied countries, TELCO bears a significantly higher tax burden than the gold mining sector and, unsurprisingly, the standard firm. The higher AETR for TELCO reflects the disproportionate impact of sector-specific taxation, including special levies on telecommunications activities such as license fees, universal service contributions, numbering fees, and taxes on national and international traffic. In contrast, while the gold mining sector also faces additional taxation—such as royalties and, in some cases, windfall profit taxes—its overall tax burden remains comparatively lower.

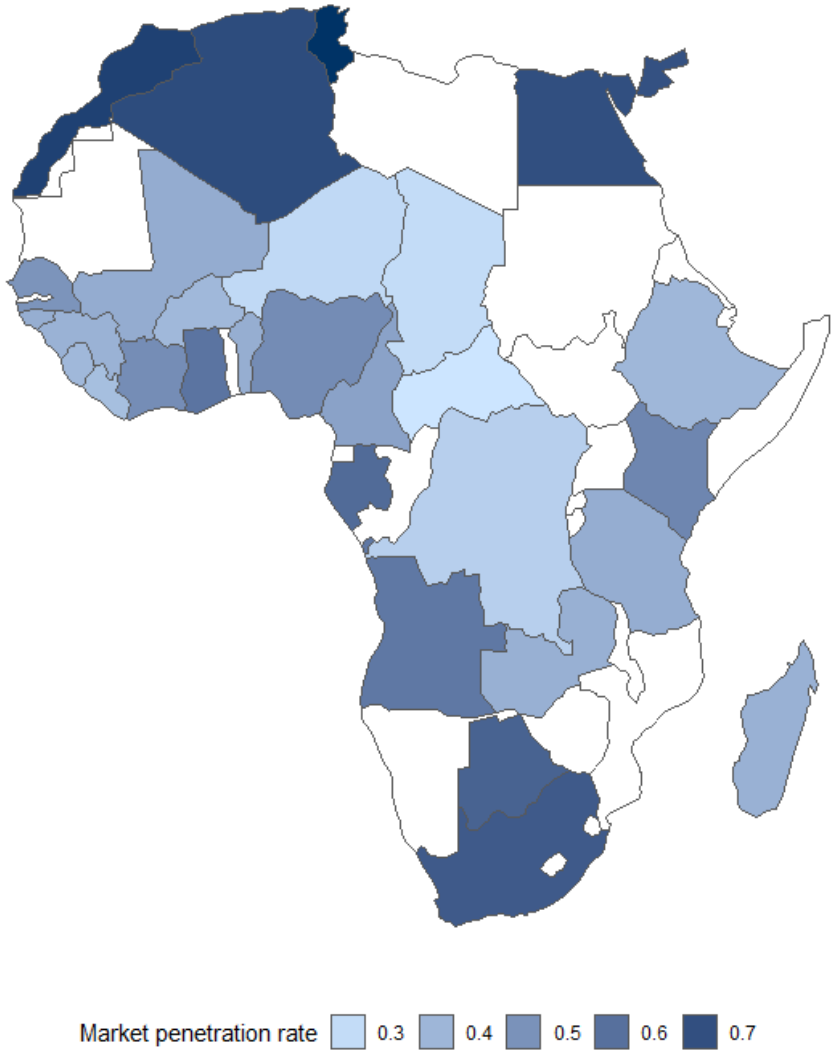
The remainder of the paper is structured as follows: **Section 2** outlines the methodology used to compute the Average Effective Tax Rates (AETRs). **Section 3** discusses the primary findings in detail. **Section 4** concludes the paper by presenting key insights and analyzing correlations between the computed AETRs, market penetration rates, and Gross National Income (GNI) per capita in 2023.

[4] In other words, we consider that producers absorb 25 percent of ad quantum taxes and 50 percent of ad valorem taxes.

2 The AETR methodology

We analyze the tax regime of MNOs in 29 African countries: Algeria, Angola, Benin, Botswana, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, the Democratic Republic of Congo (DRC), Egypt, Ethiopia, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Mali, Morocco, Niger, Nigeria, Senegal, Sierra Leone, South Africa, Tanzania, Tunisia, and Zambia.[5] Collectively, these countries account for 67 percent of Africa's total GDP, 80 percent of its population, and 83 percent of the continent's unique mobile subscribers in 2023. While 3G coverage is relatively extensive, averaging approximately 91 percent, market penetration rates exhibit significant variation, ranging from 31 percent in Niger to 79 percent in Tunisia (see Figure 1).

Figure 1: Market penetration (unique subscribers in 2023) of the studied countries.



Source: Authors.

[5] We added also Jordan to our analysis.

We examine a representative Mobile Network Operator (MNO), referred to as TELCO. This firm operates under a telecommunications license with a 15-year duration. This hypothetical entity generates financial flows that are distributed between the investor (TELCO's owner) and the government, as well as other Ras through taxation. The Average Effective Tax Rate (AETR) serves as a metric to measure the effective tax burden imposed on the telecommunications sector.

The analytical framework comprehensively integrates multiple taxation dimensions, encompassing both standard and sector-specific fiscal instruments. The general taxation system comprises elements such as Corporate Income Tax (CIT), capital income taxation, and customs-related duties. Concurrently, the analysis incorporates telecommunication-specific taxes; These are numerous and their respective bases diverse. We consider then levies on international and national telecommunications traffic, telecommunication network access tax, numbering fees or Over-The-Top (OTT) taxation. Furthermore, we incorporate quasi-tax levies, such as pre-shipment inspection fees and contributions to the RA.

Methodologically, we exclude certain categories of taxes, notably Value Added Tax (VAT) and Personal Income Tax (PIT). Although these taxes are collected by TELCO, their economic incidence is ultimately borne by consumers, through expenditure, or by employees, through income, and therefore do not constitute a direct fiscal burden on the telecommunications operator. Nevertheless, our computation of the AETR incorporates certain excise duties which, while legally imposed on consumers, are partially borne by producers in accordance with the principles of economic incidence theory. The issue of the incidence of these taxes is further addressed in subsequent sections of the text.

Our approach aligns with prior studies that have calculated the Average Effective Tax Rate (AETR) for both general economic sectors and specific industries, such as the extractive sector. For example, Djankov *et al.* (2010) investigate the impact of CIT on investment and entrepreneurship by constructing a five-year business plan for a representative firm, referred to as "TaxpayerCo," which produces and sells ceramic pots. This hypothetical firm forms the basis of the World Bank's *Doing Business* survey, used annually to rank countries. Similarly, Blake and Roberts (2006), Daniel *et al.* (2010), Luca and Mesa Puyo (2016) adopt the AETR framework to analyze the extractive industries, specifically mining and petroleum. Notably, Daniel *et al.* (2010) and Luca and Mesa Puyo (2016) introduce the Fiscal Analysis of Resource Industries (FARI) model, which has been extensively utilized by the International Monetary Fund (IMF) to simulate tax policy reforms in the extractive industry.

The cash flow allocation model is structured around the concept of Net Present Value (NPV). The AETR is given by:

$$AETR = \frac{\sum_{t=1}^{15} \frac{T_t}{(1+d)^t}}{\sum_{t=1}^{15} \frac{R_t - C_t - K_t}{(1+d)^t}}, \qquad (eq.1)$$

where T_t denotes total tax revenues in year t, R_t total turnover, C_t total OPEX, K_t total CAPEX, and d is the discount rate. A rate of 50 percent would mean that tax payment is 50 percent of before-tax cash flows over the license life length.

2.1 TELCO's accounting data

Considering the availability of data and the heterogeneity of market structures, we construct TELCO, a standardized representative Mobile Network Operator (MNO), [6] which acquires its operating license in 2023 for a duration of 15 years. TELCO's financial statements throughout the license period are modeled using the GSMA Intelligence database, which spans 237 countries and territories. This comprehensive dataset includes market indicators (e.g., market shares, subscriber numbers, penetration rates), financial metrics (e.g., income, OPEX, CAPEX, and their detailed breakdowns), and communication volumes (e.g., outbound and inbound national and international minutes, SMS, and data usage).

To construct the TELCO profile, we analyze the two largest firms in terms of turnover within each studied country[7], expressed in Euros. Only firms for which the GSMA database provides at least 15 years of data on three key variables—turnover, OPEX, and CAPEX—are included in the analysis. A simple average of the respective turnover, CAPEX, and OPEX values for these firms is calculated, implicitly reflecting the size of national markets. These averages are then aggregated across our sample of countries using another simple average.

The TELCO profile for turnover, CAPEX, and OPEX is derived by dividing this aggregated average by the mean penetration rate. This approach enables us to establish a generic profile, which is subsequently adapted for each studied country by multiplying it by the respective national penetration rate for the relevant year. Furthermore, the R-Shiny application offers users the flexibility to modify any of the three primary variables—turnover, CAPEX, and OPEX—within the profile.

We add a parameter that allows us modifying TELCO's pre-tax Internal Rate of Return (IRR). We consider a pre-tax IRR varying from 30 to 75 The R-Shiny application allows us to modify the profile of TELCO and to apply the profile of actual Mobile Network Operators.

2.2 Assumptions

We make several assumptions regarding the accounting and financial details of TELCO (see Appendix C). First, we adopt a straight-line depreciation method to calculate CAPEX depreciation charges.[8] Second, we assume that TELCO finances its operations through a combination of debt and equity, applying a debt-to-capital ratio of 60 percent with a

[6] This approach is similarly employed by Djankov *et al.* (2010) in the definition of their representative firm (TaxpayerCO).
[7] Except Jordan
[8] We consider that tangible CAPEX represents 95 percent of total CAPEX.

repayment period of five years. The borrowings are subject to an interest rate of 10 percent, which is also used as the discount rate for annual cash flows.[9] Additionally, we perform a sensitivity analysis by considering a lower interest rate of 6 percent to assess the robustness of our findings. (See Appendix D).

We consider two measures of the AETR, depending on how the upfront license cost is treated. This license cost can be regarded as part of tax revenue, as it represents a payment made by the investor to the government. Alternatively, it can be classified as a market entry expense, representing a necessary investment for establishing and operating a mobile phone network. Accordingly, we calculate two versions of the AETR: one that includes the license cost and another that excludes it.

For employer-related costs, such as social security contributions, we assume that wages and salaries account for 70 percent of total labor costs. Regarding professional or business licensing taxes, we estimate the rental value of business property to be equivalent to 5 percent of the total operating expenses (OPEX), excluding personnel and equipment costs. These assumptions aim to provide a consistent framework for analyzing the fiscal and operational dynamics of the telecommunications sector.

While our approach aligns closely with the framework developed by the IMF for rent sharing in the extractive sector,[10] it diverges significantly in its assumptions regarding price structures. In the extractive industries, such as oil and mineral resources, global commodity prices are well-established and determined by global supply and demand dynamics. These prices are exogenous to any single project, regardless of its size, as extractive firms are price takers with no influence on the global market price.[11] Furthermore, national tax systems, particularly in African countries, exert no influence on international commodity prices.

In contrast, price determination in the telecommunications sector is not exogenously fixed at an international level but is instead shaped by the interplay between mobile network operators and consumer demand. Telecommunications markets are predominantly national in scope and exhibit oligopolistic characteristics (see Faccio and Zingales, 2017). Mobile network operators formulate pricing strategies based on national demand conditions and the strategic behavior of competing firms within the market. On the supply side, competitive dynamics may involve either pure price competition or price-quality competition—encompassing factors such as network coverage, data transmission speed, latency. These kinds of competitions may

[9] For comparison purpose, these parameters are chosen in line with Ferdi's gold mining representative firm borrowing parameters.
[10] Fiscal Analysis of Resource Industries: www.imf.org/external/np/fad/fari/.
[11] This hypothesis can be discussed for some minerals such as uranium or some mining deposits such as Simandou's in Guinea for iron. The production capacity of the latter would represent a significant volume of the worldwide production.

significantly constrain profit margins of mobile phone operators.[12] Industrial economics provides extensive frameworks to analyze the nature of competition in markets and its effects on pricing strategies and consumer surplus (Tirole, 1988, Schmalensee and Willig, 1989). However, for our purposes, we rely on historical data to define TELCO's turnover profile during its license period.

The discount rate reflects the opportunity cost of invested capital for TELCO from the perspective of investors. Simultaneously, it represents the government's time preference, which can lead to differences between the discount rates of investors and the state. These differences can vary across countries, influenced by factors such as risk levels and stakeholder preferences. For instance, higher discount rates might be expected in developing countries due to the short-term liquidity preferences often exhibited by their governments. Determining the appropriate discount rate is a complex task, as it must account for the divergent preferences of governments and investors. Various analyses have highlighted factors such as uncertainty levels, the valuation of capital expenditures, and broader risk elements in shaping the discount rate (Boadway and Bruce, 1984; Fane, 1987; Bonds and Devereux, 1995). For simplicity, we apply a uniform discount rate of 10 percent for both investors and governments in our baseline analysis.[13]

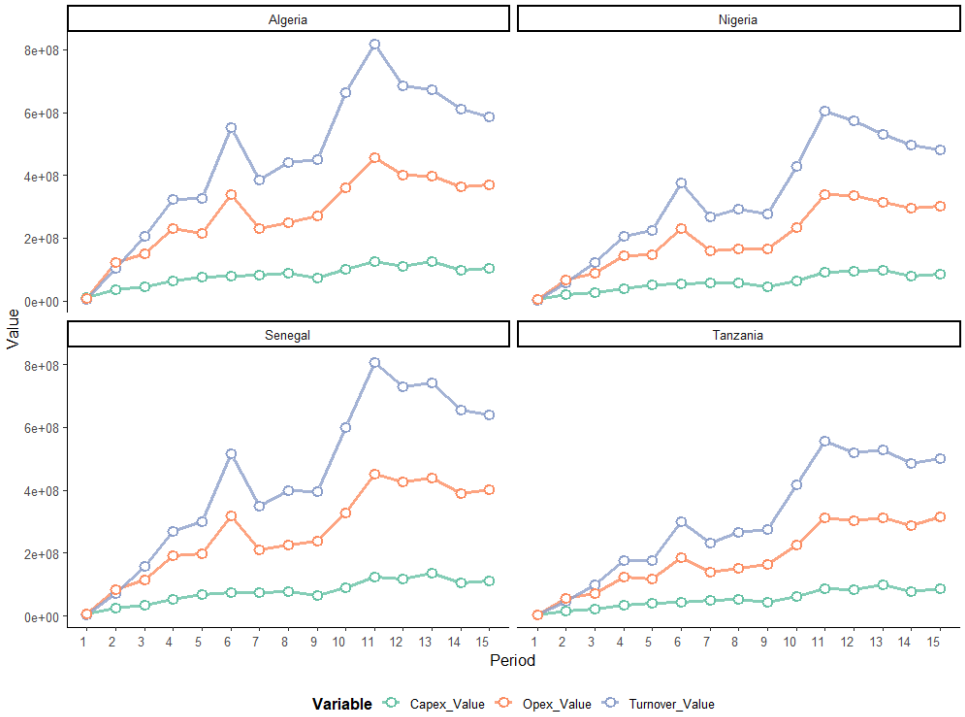
Following Chennells and Griffith (1997), we account for exchange rates and inflation in the computation of the AETR. All tax variables are converted into Euro, aligning with the currency used in the GSMA database. Whether the data are presented in nominal or real terms does not affect the AETR calculation, as the exchange rate applies uniformly to both the numerator and denominator of the AETR formula. The potentially significant upfront license payment, which occurs in Year 0, remains unaffected by inflation. As a result, we choose to retain the data in nominal terms, as expressed in the GSMA database, to maintain consistency with the original data source and simplify the computation process.

Figure 2 illustrates the profile of turnover, CAPEX, and OPEX for the representative firm over the 15-year license duration in some countries. We compare this profile with actual MNOs operating in these countries in Figure 3. This profile corresponds to a pre-tax profit margin of 50%. As a robustness check, we examine several alternative gross profitability rates ranging from 30% to 75%.

[12] A classical result in the economic literature is the equivalence between the Bertrand's duopoly equilibrium and the pure and perfect competition one. In both equilibrium, price equals the marginal cost and profits are zero.

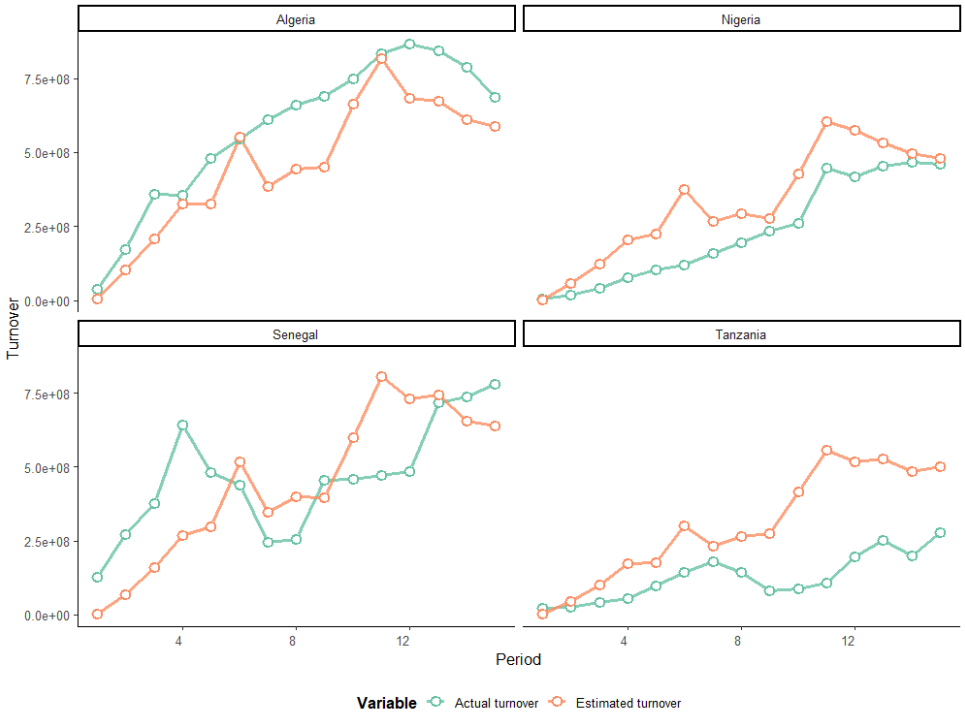
[13] Chennells and Griffith (1997), Djankov *et al.* (2010), and Luca and Mesa Puyo (2016) consider a discount rate of 10 percent. However, Luca and Mesa Puyo (2016) differentiate their discount rate for government (10 percent) and for contractor (12.5 percent).

Figure 2: Profile of TELCO's turnover, CAPEX and OPEX in selected countries



Source: Authors.

Figure 3: Actual versus predicted turnover in selected countries



Source: Authors.

2.3 Tax data

This study investigates the tax regimes applicable to MNOs in 29 African countries as of 2023.[14] These regimes encompass general direct and indirect taxes as well as sector-specific taxes and fees levied by the RA. Tax and Customs Codes (or equivalent legal provisions) establish the general taxation framework, that applies uniformly to all businesses operating within these countries, forming the standard tax regime. In contrast, sector-specific taxes and fees are defined by specialized laws, acts, or decrees designed exclusively to the telecommunications sector.

General taxation encompasses direct and indirect taxes as well as tariff duties collected at borders. Direct taxation includes Corporate Income Tax (CIT), minimum taxes (usually based on turnover), employer contributions on wages, and professional taxes calculated based on rental or fixed asset values (see Table 1). CIT rates vary from 20 percent in Madagascar and Jordan to 35 percent in Chad. Some countries have a higher CIT rate of 5 to 10 percentage points for the telecommunications sector: Angola, Guinea, and Tunisia (35 percent instead of 25 percent), Côte d'Ivoire (30 percent instead of 25 percent), Jordan (24 percent instead of 20 percent), and Zambia (35 percent instead of 30 percent). Higher corporate tax rates in specific sectors are often justified on economic, social, and political grounds. One key rationale is the capture of economic rents, particularly in extractive industries, where profits are derived from the exploitation of scarce natural resources (Daniel *et al.*, 2010). Additionally, higher tax rates in industries associated with negative externalities, such as mining or gambling, serve to internalize societal costs in accordance with the polluter-pays principle. Public investment recovery also supports higher taxation in regulated sectors like energy or pharmaceuticals, where firms benefit from substantial state-funded infrastructure or research. Furthermore, sectors characterized by high market concentration and limited competition, such as telecommunications and finance, often achieve greater profitability due to their oligopolistic structures, providing a rationale for imposing higher tax rates.[15]

Many African countries have an alternative mechanism for CIT, known as a minimum tax applied to turnover. The rates for this mechanism range from 0.2 percent in Tunisia to 2 percent in Sierra Leone and 2.2 percent in Cameroon. Apprenticeship tax rates, imposed on wages, range from 0.5 percent in Gabon and in Tanzania to 7.5 percent in Guinea. Higher rates may be applied to foreign employees. Professional taxes are structured in various ways. In Burkina Faso, Guinea, and Niger, professional taxes consist of two components: a fixed lump sum, which ranges from €1062 in Guinea up to €45,734 in Niger,[16] and a proportional component based on the rental value of business properties, with rates ranging from 8 percent in Burkina Faso to 15 percent in Guinea. In other countries, professional taxes are calculated as a percentage of turnover (e.g., in

[14] We add Jordan for this study.

[15] However, the relationship between market concentration and profitability remains contested, with recent studies offering varying perspectives (see Autor *et al.*, 2020; Covarrubias *et al.*, 2019).

[16] In Niger, the fixed lump sum is determined depending to the value of the turnover going from 4,573 Euro to 45,734 Euro.

Algeria and Senegal) or asset values. Niger also imposes a commercial tax on advertising, which is determined by the number and type of billboards and other advertising activities.

Appendix B outlines the tax incentives available to MNOs in the studied countries. Several nations offer CIT exemptions of varying durations: Burkina Faso and the Algeria, Democratic Republic of Congo, Gabon, and Morocco (3 year); Guinea (2 years, with reduced rates for the four successive years); Ethiopia (4 years); Benin, Chad, Nigeria, Tanzania, and Zambia (5 years); Niger (7 years). In contrast, some countries, including Botswana, Egypt, Ghana, Senegal, Sierra Leone, South Africa and Tunisia, do not provide any direct tax incentives. Côte d'Ivoire, however, offers a tax credit. Additionally, loss carry-forward provisions in many countries significantly extend the effective duration of CIT exemptions. Almost all the analyzed countries apply reduced or zero customs duties on the importation of equipment and capital goods, further enhancing the fiscal benefits available to MNOs. These incentives collectively contribute to reducing the operational costs and encouraging investments in the telecommunications sector.

Beyond direct taxes, we consider also some indirect taxes that may increase TELCO's production costs (see Table 2). [17] These taxes consist of customs duties, non-deductible VAT on oil products, and various levies associated with import operations. VAT rates range from 7.5 percent in Nigeria to 20 percent in Madagascar and Morocco, while customs duties vary between zero and 30 percent. [18] Additionally, we account for specific fees or levies collected at borders. For instance, customs unions such as the Eastern African Community (EAC) and the Western African Economic and Monetary Union (WAEMU) impose fees or quasi-taxes to support the budgets of their respective Commissions. Moreover, several African countries employ private firms to assist their customs administrations through Pre-Shipment Inspection (PSI) programs, which provide detailed valuation of imported goods. Importers bear the cost of this service through a fee, effectively functioning as a quasi-tariff on imports (see Dequiedt *et al.*, 2012).

Special taxation in the telecommunications sector arises from specific laws and decrees regulating the industry (see Table 3). The taxes and fees considered include taxes on national and international traffic, telecommunication network access taxes, numbering fees, contributions to the Universal Service Fund, research and development funds, RAs' levies, and other specific charges. These taxes may be *ad valorem* (based on turnover) or *ad quantum* (a nominal amount determined by activity metrics such as minutes, data usage, or SMS consumption). License fees are the main component of regulatory fees. Table 3 displays an estimation of these fees in terms of turnover, which is based on the average relevant payment reported in the GSMA database. However, spectrum fees vary significantly in their form across countries and from one year to another.[19]

[17] The AETR computation does not take into account VAT or sales tax on telecommunication services.
[18] These are collected on network equipment and mobile device imports for TELCO.
[19] Appendix E provides a detailed review of general and specific tax laws applied to the special case of Mali.

Table 1: Direct taxes in 2023

Direct taxes	Corporate Income Tax (CIT)		CIT minimum perception	Apprenticeship tax	Other direct taxes				Social Security contribution
					Professional tax	Property tax	Commercial publicity tax	Other taxes	
Taxable base	Profits	Profits (Telecom.)	Turnover	Wages	Turnover, lump sum, rental value of property or turnover	Fixed assets value inclusive of all taxes	Number or area of advertising mediums days or operations	Turnover	Wages
Algeria	0.26	0.26	-	0.02	0.015	-	-	-	0.25
Angola	0.25	0.35	-	-	-	0.15	-	-	0.08
Benin	0.30	0.30	0.01	0.04	0.05	-	-	-	0.164
Botswana	0.22	0.22	-	0.002	-	-	-	-	-
Burkina Faso	0.275	0.275	0.005	0.03	610 euros ; 0.08	-	-	-	0.16
Cameroon	0.25	0.33	0.022	-	0.00159 [1]	0.001	0.03	-	0.1295
CAR	0.30	0.30	0.0185	-	0.002	-	-	0.10 [2]	0.19
Chad	0.35	0.35	0.015	0.012	0.0035 [1]	-	-	-	0.165
Cote d'Ivoire	0.25	0.30	-	0.035 [3] ; 0.15	0.007 [1]	-	30 euros/h ; 0.03	0.001 [4]	0.1545
DRC	0.30	0.30	0.01	0.012	-	-	-	-	0.13
Egypt	0.225	0.225	-	-	-	0.068	-	-	0.1875
Ethiopia	0.30	0.30	-	-	-	-	-	-	0.11
Gabon	0.30	0.30	0.01	0.005	411.61 euros	-	-	0.01 [5]	0.201
Ghana	0.25	0.25	0.05	-	-	-	-	0.05 [6]	0.13
Guinea	0.25	0.35	0.005	0.075 [7]	1,062 euros ; 0.15 [1]	-	-	-	0.18
Guinea Bissau	0.25	0.25	0.01	-	-	-	0.05	-	0.16
Jordan	0.20	0.24	-	-	-	0.15	0.05	0.02 [8]	0.1425
Kenya	0.30	0.30	0.01	[9]	1,419.15 euros [10]	-	-	-	0.075 [11]
Liberia	0.25	0.25	0.02	-	-	-	-	-	0.06
Madagascar	0.20	0.20	0.01	0.01	-	-	0.01	-	0.13
Mali	0.30	0.30	0.01	0.02	1,524 euros ; 0.10	-	-	-	0.189
Morocco	0.32 - 0.35 [12]	0.32 - 0.35 [12]	0.0025	0.016	0.10	-	0.0025	0.05 [13]	0.1949
Niger	0.30	0.30	0.015	0.03 ; 0.05 [14]	45,734 euros ; 0.10	0.10	0.3 to 7.6 euros	-	0.169
Nigeria	0.30	0.30	0.005	0.01 [15]	-	-	-	0.0425 [16]	0.10
Senegal	0.30	0.30	0.005	0.03	0.15	-	-	0.003 [17]	0.195
Sierra Leone	0.25	0.25	0.02	-	0.15	-	-	-	0.10
South Africa	0.27	0.27	-	0.01 [18]	-	-	-	-	0.01
Tanzania	0.30	0.30	0.005	0.04 [19]	-	-	-	0.003 [20]	0.10
Tunisia	0.25	0.35	0.002	0.02	-	-	-	[21]	0.1707
Zambia	0.30	0.35	0.04	0.005 [18]	-	0.10	-	-	0.06

Source: Countries' General tax codes and finances acts.

[1] Business licence tax.

[2] Contribution for social development.

[3] Including the apprenticeship tax (0.5%), Tax for continuous pprofessional formation (1.5%) and National contribution for economic, cultural and social development (1.5%).

[4] Equipment special tax at the rate of 0.1%.

[5] Special solidarity levy.

[6] National fiscal stabilisation levy. Runs from 2023 to 2025. Applicable on the Profit Before Tax.

[7] Includes the apprenticeship tax (1.5%) and the lump-sum tax on wages (6%).

[8] National contribution tax.

[9] KES 50/month/employee.

[10] Business permit fees: KES 200,000 for a mega communications company.

[11] Including the employer's social security contribution of 6% and the affordable housing levy of 1.5%.

[12] The CIT rate increases by 1% per annum, from 32% in 2023 to the target of 35% starting 2026.

[13] Social contribution for solidarity. Applicable until 2025, unless renewal.

[14] Apprenticeship tax rate of 3% for national and 5% for foreigners.

[15] Industrial training cost.

[16] Including the Education Tax of 3%, National Information Technology Development Levy of 1% and the National Agency for Science and Engineering

[17] Contribution on added value.

[18] Skills development levy.

[19] Skills development levy (3.5%) and Workers compensation fund tariff (0.5%).

[20] Local service tax.

[21] Includes the Social lodging tax (1% of the gross amount of salaries), the Local authority tax (LAT) (0.2% of turnover) and the Social solidarity contribution (SSC) (1% of the CITable income). For companies subject to CIT at the rate of 35%, the SSC to be paid over the years FY22 to FY24 will be due at the rate of 4% of the CITable income, with a minimum of TND 500.

Table 2: Indirect taxes, customs duties and fees in 2023

Indirect taxes	Custom duties	Non deductible VAT	Community Solidarity levy	Statistical import charge	Community levies [1]	OHADA levy [2]	Pre-shipment inspection tax
Taxable base	CIF imports value	Before tax Goods and services value	CIF imports value				
Algeria	0.05; 0.15; 0.30; 0.60	0.19	-	0.02 [3]	-	-	-
Angola	0.02 - 0.50	0.14	-	-	-	-	-
Benin	0.05; 0.10; 0.20; 0.35	0.18	0.008	0.01	0.005	-	0.01
Botswana	0.00 - 0.30	0.14	-	-	-	-	-
Burkina Faso	0.05; 0.10; 0.20; 0.35	0.18	0.008	0.01	0.005	-	0.01
Cameroon	0.05; 0.10; 0.20; 0.30	0.1925	0.01	-	0.004	0.0005	0.0095
CAR	0.05; 0.10; 0.20; 0.30	0.19	0.01	0.01	0.004	0.0005	0.002
Chad	0.05; 0.10; 0.20; 0.30	0.18	0.01	0.01	0.004	0.0005	0.002
Cote d'Ivoire	0.05; 0.10; 0.20; 0.35	0.18	0.008	0.01	0.005	-	0.01
DRC	0.05; 0.10; 0.20	0.16	-	0.0608 [4]	-	0.0005	0.015
Egypt	0.00 - 0.60	0.08	-	-	-	-	-
Ethiopia	0.00 - 0.35	0.15	-	-	-	-	-
Gabon	0.05; 0.10; 0.20; 0.30	0.18	0.01	0.01	0.004	0.0005	0.002
Ghana	0.05; 0.10; 0.20; 0.35	0.15	0.06 [5]	0.01	0.005	-	-
Guinea	0.05; 0.10; 0.20; 0.35	0.18	-	0.01	0.005	-	0.0228 [6]
Guinea Bissau	0.05; 0.10; 0.20; 0.35	0.19	0.008	0.01	0.005	-	0.01
Jordan	0.00 - 0.30	0.16	-	0.02	-	-	-
Kenya	0.00 - 0.35	0.16	0.015 [7]	0.025 [8]	-	-	-
Liberia	0.05 - 0.20	0.15	-	0.012; 0.015 [9]	0.005	-	0.015
Madagascar	0.05 - 0.20	0.20	-	-	-	-	0.005 [10]
Mali	0.05; 0.10; 0.20; 0.35	0.18	0.008	0.01	0.005	-	0.01
Morocco	0.025 - 0.30	0.20	-	0.0025	-	-	-
Niger	0.05; 0.10; 0.20; 0.35	0.19	0.008	0.01	0.005	-	0.01
Nigeria	0.05; 0.10; 0.20; 0.35	0.075	-	0.01	0.005	-	-
Senegal	0.05; 0.10; 0.20; 0.35	0.18	0.008	0.01	0.005	-	0.024 [11]
Sierra Leone	0.05; 0.10; 0.20; 0.35	0.15	-	-	0.005	-	0.01 [12]
South Africa	0.03 - 0.43	0.14	-	-	-	-	-
Tanzania	0.00; 0.10; 0.25; 0.35	0.18	0.02 [7]	-	-	-	0.006
Tunisia	0.00 - 0.50	0.19	-	-	-	-	0.03
Zambia	0.00 - 0.40	0.16	-	-	-	-	-

Source: Countries' General tax codes and finances acts.

[1] Community integration levy: Communauté des Etats d'Afrique Centrale (CEMAC), Eastern Africa Community (EAC), Economic Community of West African States (ECOWAS), South Africa Custom Union (SACU), Western African Economic and Monetary Union (WAEMU).

[2] Organisation pour l'Harmonisation en Afrique du Droit des Affaires (OHADA).

[3] Solidarity contribution levy.

[4] Including the Administrative payment (2%), Congolese Control Office (OCC) levy (1.5%), the Office de Gestion du Fret Maritime (OGEFREM) levy (0.58%) and the Funds for the Promotion of Industry (FPI) charge (2%).

[5] Including the National Health Insurance Levy (2.5%), the Ghana Education Trust Fund (2.5%) and the COVID-19 Health Recovery Levy (1%).

[6] Including the Liquidation processing fees (RTL; 2%) and the Additional cents (CA; 0.28%).

[7] Railway development levy.

[8] Import declaration fee.

[9] BIVAC fees: 1.20% of FOB value for sea cargo and 1.50% of CIF value for air cargo.

[10] GasyNet fee.

[11] Including the Senegalese Shippers Council (COSEC) royalty (0.4%), the Customs Modernisation Program Levy (1.5%) and the levy added to the fees due for commercial operations (0.5%).

[12] Customs Evaluation and Inspection Fee (1%).

Table 3: Special taxation in 2023

Special taxes	Tax on national traffic	Tax on international inbound traffic	Telecom. network access tax	Numbering fees	Spectrum fees (estimated)	Universal service fund	Research and development fund	Regulatory agency financing levy	Annual fees on turnover [5]	Interconnect. activities management fees	Excise taxation	Tax on mobile money	Over-the-top taxation
Taxable base	Number of interconnected national minutes (Euro/minute)	Number of international inbound minutes (Euro/minute)	Pre-tax turnover	Number of assigned/booked phone numbers (Euro/number)			Pre-tax turnover			Pre-tax cost of the national interconnected minutes	Pre-tax turnover	Pre-tax turnover	Megaoctet
Type	ad quantum	ad quantum	ad valorem	ad quantum			ad valorem			ad valorem	ad valorem	ad valorem	ad quantum
Algeria	-	0.0410	0.005	0.002 [2]	0.0074	0.03	0.005	0.02	0.01	-	-	-	-
Angola	-	-	-	0.2060	0.0074	0.01	-	-	-	-	-	-	-
Benin	0.0500	0.1187	0.02	0.2286	0.0074	0.01	0.005	0.01	-	-	0.05	0.05	0.0076€/mega; 0.05
Botswana	-	-	-	-	0.0074	-	-	0.01	0.03	-	-	-	-
Burkina Faso	-	-	0.07 [3]	0.6100	0.015	0.02	0.005	0.01	-	-	-	-	-
Cameroon	-	-	0.02	0.3049	0.016	-	-	0.015	0.03 [4]	-	-	0.002	-
CAR	-	-	0.02	0.3353	0.0074	0.02	0.005	0.015	-	0.07	-	0.01	0.07
Chad	-	0.0305 [5]	-	0.2515	0.0074	0.035	0.01	0.03 [6]	-	-	0.18 [3]	0.002	-
Cote d'Ivoire	-	-	0.05	0.1524	0.017	0.02 [4]	0.005	0.005	0.022 [7]	-	0.03 [8]	0.002	0.03 [8]
DRC	0.0067	0.0714	-	0.4018	0.025	-	-	-	0.03	0.15	0.10	-	0.000045€/mega; 0.10
Egypt	-	-		0.0293	0.02	0.005	0.005	-	0.06	-	-	-	-
Ethiopia	-	-	-	-	0.0074	0.015	-	-	0.05	-	0.05	-	0.05
Gabon	-	0.0716	-	0.6860	0.016	0.02	0.02	0.03	-	-	0.05 [9]	0.005	-
Ghana	-	0.0109 [10]	-	0.4238	0.0061	0.01	-	0.01	-	0.05 [11]	-	0.01 [12]	-
Guinea	0.0064 [13]	0.0445	0.03	0.0800	0.03	0.015	0.01	-	-	-	0.05 [13]	0.03	0.05
Guinea Bissau	0.0076	-	0.01	-	0.0074	0.01	-	-	-	-	-	0.005	0.05
Jordan	-	-	-	-	0.0074	-	-	0.06	0.10	-	0.26	0.02	-
Kenya	-	-	-	-	0.0185	0.01	-	-	0.004	-	0.20 [14]	0.12 [15]	0.20 [14]
Liberia	0.0071	0.1250	-	0.0625	0.0074	0.01	-	0.09	-	-	-	-	0.0058€/mega
Madagascar	-	-	-	-	0.03	0.02 [16]	-	0.02	-	-	0.08	-	0.08
Mali	-	-	0.05	0.3049	0.011	0.02	-	0.01	-	-	-	-	-
Morocco	-	-	-	-	0.016	0.02	0.01	0.01	-	-	-	-	-
Niger	-	0.1341	0.03	0.1520	0.013	0.04	0.01	0.02	-	-	-	-	-
Nigeria	-	-	-	0.0235	0.0017	0.025	-	-	-	-	0.05 [17]	-	-
Senegal	-	-	0.045	0.3049	0.02	0.01	-	0.015	-	-	-	-	-
Sierra Leone	-	0.1187	0.005	0.0602	0.035	0.0075	-	-	0.005	-	-	0.02	-
South Africa	-	-	-	-	0.0074	0.002	-	-	0.0035	-	-	-	-
Tanzania	-	0.057 [18]	-	0.1785	0.0047	0.015	-	0.011	-	-	0.17	0.10	-
Tunisia	-	-	0.05	0.1614	0.0074	-	-	-	-	-	-	-	-
Zambia	-	0.0763	-	0.0244	0.0074	-	-	-	0.03	-	0.175	-	-

Source: National legislations.

[1] Telecommunication special levy.

[2] Numbering fees, applied on the tunover (0.2%).

[3] Specific tax on telecommunication companies.

[4] Telecommunication special fund levy.

[5] Maximum fees to pay on each international incoming call.

[6] ARCEP administration fee.

[7] Including the tax for new technology development in rural areas (2%) and the tax for culture promotion (0.2%).

[8] Specific tax on communications.

[9] Excise tax only on calls.

[10] Applicable to telecommunication operators and internet providers.

[11] CST on interconnection.

[12] Electronic Transfer Levy.

[13] Tax on all calls. interconnexions. roaming. SMS. and internet access.

[14] Excise duty on mobile and internet [data] services.

[15] Excise duty on fees charged for money transfer services by cellular phone service providers.

[16] Contribution to the development of telecommunication fund.

[17] Telecommunication Services Surcharges. Runs from 2022 to 2024.

[18] Share to be returned to the government.

Source: Authors.

2.4 Tax incidence scenarios

Sector-specific taxes and fees are analogous to excise duties. In the terminologies of the OECD and the United Nations, excise duties refer to special taxes imposed on specific categories of goods or services. These taxes form part of the broader category of consumption taxes and, more generally, the indirect tax system. Unlike direct taxes, such as CIT, indirect taxes are collected by firms but are legally borne by consumers.

However, beyond this legal designation of the taxpayer, a substantial body of academic literature, as reviewed by Fullerton and Metcalf (2002) and Benzarti (2024),[20] examines the incidence of these taxes—that is, how the economic burden of the tax is ultimately distributed among economic agents, particularly between producers and consumers. The foundational work of Harberger (1962) and subsequent studies highlight that the economic burden of an indirect tax depends primarily on the relative price elasticities of supply and demand. When demand is inelastic relative to supply, consumers bear a larger share of the tax burden; conversely, when supply is inelastic, producers absorb more of the tax. In competitive markets, the extent to which a tax is passed on to consumers in the form of higher prices depends on market conditions. Weyl and Fabinger (2013) provide a general framework to quantify pass-through rates, emphasizing that in imperfectly competitive markets, firms with pricing power can adjust prices asymmetrically in response to tax changes. Adachi and Fabinger (2022) generalize this approach to accommodate more complex market structures and analyze the effect of ad valorem and specific taxes in oligopolistic markets such as MNOs' sector.

A significant literature following Besley and Rosen (1999) focuses on the differentiated impact of the incidence of ad valorem and ad quantum taxes. The former is proportional to the value of the taxed good or service, while the latter is fixed per unit such as kilogram, liter, minutes, or giga octets. In line with some previous results in the literature, Adachi and Fabinger (2022) establish the following theoretical results: Ad valorem taxes tend to distribute the burden more evenly across consumers and producers, while the burden of ad quantum tax is more concentrated on consumers. In consequence of these differentiate impact on price, ad valorem tax induces a lower reduction in consumed quantity with respect to ad quantum tax. The authors conclude that ad valorem taxes are more efficient to raise revenue, while ad quantum taxes may be more appropriate to target externalities tied directly to quantities, such as pollution or health costs from tobacco consumption.

Empirical evidence on tax incidence in the telecommunications sector remains an underexplored area warranting further research. Existing analyses predominantly focus on tobacco, fuels, and broader categories of general-purpose consumption goods. For instance, Besley and Rosen (1999) examine the incidence of sales taxes on retail prices in the United

[20] Fullerton and Metcalf (2002) primarily offer a theoretical review of tax incidence, whereas Benzarti (2024) focuses on empirical analyses that highlight anomalies in tax incidence—instances where empirical findings deviate from theoretical predictions.

States, finding that for many product categories, the tax burden is fully shifted to consumers. Notably, in certain cases—particularly in markets characterized by limited competition—prices increase by more than the amount of the tax, a phenomenon referred to as over-shifting. Delipalla and Keen (1992) provide an analysis of ad valorem and specific (ad quantum) taxes within the European tobacco market. Their findings indicate that ad quantum taxes have a stronger impact on consumer prices and lead to more significant reductions in quantities compared to ad valorem taxes, particularly in imperfectly competitive market structures. Similarly, Marion and Muehlegger (2011) report analogous results for fuel taxes in the U.S. downstream market, further underscoring the differential effects of tax types under varying market conditions.

Given the lack of current analysis of tax incidence in the telecommunications sector, we will consider this effect by assuming four levels of tax pass-through: 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent. In other words, we successively consider that sector-specific taxes are either fully or partially passed on to consumer prices, or equivalently, that they are fully or partially absorbed within producers' profit margins. Additionally, we examine scenarios where the incidence of ad quantum taxes exceeds that of ad valorem taxes. However, we do not account for cases of over-shifting, where taxes result in consumer price increases exceeding the tax amount.

3 Results

Table 4 reports the results for the AETR under five different assumptions regarding tax incidence parameters. In several countries, the tax burden on TELCO exceeds 100 percent, signaling untenable conditions for investors, who would face financial losses based on the assumed turnover, CAPEX, and OPEX profiles. The AETR is evidently inversely related to the assumed indirect tax incidence coefficient: a lower tax incidence results in a higher tax burden on TELCO. Particularly notable cases include Ethiopia (356–393 percent), Nigeria (128–137 percent), Egypt (113–147 percent), and Jordan (106–161 percent). These results are higher than those reported by Rota-Graziosi and Sawadogo (2022), where the simple average AETR was approximately 64 percent. The primary factors contributing to this increase are a widespread rise in tax rates and license fees.

The cost of license fees, which has been recently reviewed across all countries, varies significantly and accounts for a substantial portion of the AETR in several cases (see Table 4). For instance, the fees exceed €720 million in Ethiopia, €411 million in Egypt, and €376 million in Nigeria. The weight of license fees in the AETR amounts to 80 percent in Ethiopia and 60 percent in Egypt or Nigeria. When adjusted for population size or the number of subscribers, the cost of licenses appears particularly burdensome in certain countries. In the Central African Republic, it amounts to €13.41 per inhabitant or €47.84 per subscriber, while in Jordan, it reaches €18.36 per inhabitant and €26.34 per subscriber. These figures underscore the considerable financial strain imposed by license fees on telecommunications operators, especially in smaller or less populous markets.

The unweighted average AETR across the sample is notably high, ranging from 77 percent to 116 percent when license fees are included, and from 44 percent to 83 percent when license fees are excluded. By contrast, Botswana demonstrates a comparatively restrained AETR, remaining below 50 percent. When license fees are excluded from the AETR calculation and assuming a high indirect tax incidence, nearly all countries exhibit relatively moderate AETRs below 50 percent, with the exceptions of Gabon, Guinea-Bissau, Jordan, Morocco, and Tunisia. When tax incidence decreases to 50 percent, or equivalently when firms absorb half of the burden of indirect taxes, the AETR remains moderate (below 50 percent) in Botswana, Burkina Faso, and South Africa.

Table 4: AETR including and excluding license fees (percentage)

Country	AETR					AETR exluding license fees					Licence Fees[1]	Licence Fees per inhabitant	Licence Fees per subscriber
Incidence	100	75	50	25	0	100	75	50	25	0			
Algeria	0,530	0,600	0,670	0,738	0,806	0,438	0,508	0,577	0,646	0,714	58 903 280	1,29	1,80
Angola	0,893	0,912	0,931	0,950	0,970	0,529	0,548	0,567	0,586	0,606	101 709 840	2,77	4,75
Benin	0,590	0,689	0,788	0,887	0,986	0,429	0,528	0,627	0,725	0,824	76 224 625	5,56	12,96
Botswana	0,334	0,375	0,416	0,457	0,498	0,334	0,375	0,416	0,457	0,498	32 905	0,01	0,02
Burkina Faso	0,493	0,607	0,721	0,835	0,948	0,269	0,383	0,497	0,611	0,724	121 959 214	5,25	13,15
Cameroon	0,719	0,797	0,874	0,951	1,030	0,470	0,548	0,625	0,703	0,782	114 336 763	3,99	8,65
Central African Rep.	0,946	1,016	1,087	1,158	1,226	0,488	0,559	0,629	0,700	0,769	76 986 754	13,41	47,84
Chad	0,508	0,706	0,903	1,108	1,347	0,449	0,646	0,843	1,049	1,287	15 244 925	0,83	2,74
Cote d'Ivoire	0,692	0,822	0,950	1,080	1,212	0,480	0,609	0,738	0,868	1,000	84 758 200	0,83	2,45
Congo, DR	0,782	0,989	1,197	1,424	1,672	0,450	0,657	0,865	1,093	1,341	152 906 597	5,30	10,18
Egypt	1,132	1,216	1,299	1,383	1,467	0,343	0,427	0,510	0,594	0,678	411 077 270	3,65	5,16
Ethiopia	3,567	3,659	3,751	3,843	3,935	0,396	0,488	0,580	0,671	0,763	720 444 700	5,69	14,12
Gabon	0,534	0,669	0,800	0,935	1,072	0,514	0,650	0,781	0,915	1,053	15 244 902	6,26	10,09
Ghana	0,563	0,600	0,638	0,677	0,718	0,465	0,502	0,540	0,580	0,620	76 282 380	2,24	3,78
Guinea	0,568	0,716	0,864	1,011	1,163	0,486	0,633	0,781	0,928	1,080	46 617 010	3,29	7,87
Guinea Bissau	0,529	0,624	0,718	0,813	0,910	0,523	0,617	0,712	0,807	0,903	3 048 980	1,42	3,31
Jordan	1,056	1,194	1,332	1,471	1,612	0,662	0,800	0,939	1,077	1,219	207 657 590	18,32	26,34
Kenya	0,484	0,659	0,833	1,016	1,217	0,423	0,598	0,772	0,955	1,156	33 903 280	0,62	1,14
Liberia	0,385	0,566	0,748	0,938	1,135	0,349	0,530	0,712	0,902	1,100	13 815 587	2,55	6,68
Madagascar	0,526	0,658	0,789	0,920	1,056	0,383	0,515	0,647	0,778	0,914	30 000 000	0,99	2,35
Mali	0,768	0,846	0,924	1,003	1,081	0,382	0,460	0,538	0,617	0,695	243 918 428	10,47	24,05
Morocco	0,655	0,697	0,737	0,778	0,819	0,546	0,588	0,628	0,669	0,710	76 234 587	2,01	2,69
Niger	0,581	0,696	0,811	0,931	1,059	0,299	0,413	0,528	0,648	0,776	70 126 548	2,58	8,22
Nigeria	1,281	1,304	1,328	1,351	1,374	0,466	0,489	0,513	0,536	0,559	376 495 924	1,68	3,22
Senegal	0,734	0,797	0,860	0,924	0,987	0,476	0,539	0,602	0,666	0,729	165 407 184	9,31	18,54
Sierra Leone	0,381	0,451	0,522	0,593	0,662	0,372	0,443	0,514	0,584	0,654	3 934 862	0,45	1,12
South Africa	0,666	0,677	0,688	0,699	0,710	0,342	0,353	0,364	0,376	0,387	276 057 457	4,57	6,84
Tanzania	0,888	1,070	1,253	1,436	1,612	0,387	0,569	0,752	0,935	1,111	205 199 602	3,04	7,05
Tunisia	0,755	0,789	0,822	0,856	0,890	0,604	0,638	0,671	0,705	0,739	141 343 866	11,35	14,25
Zambia	0,515	0,558	0,602	0,646	0,689	0,471	0,515	0,558	0,602	0,646	20 765 759	1,01	2,39

[1] In Euro

Source: Authors.

The pre-tax profitability of TELCOs is assumed to be 50 percent over the duration of the license exploitation period. Table 5 presents AETR computations under alternative gross profitability rates, ranging from 30 to 75 percent. Regarding tax incidence, we assume the following "conservative" assumptions: 0.75 percent for all ad quantum taxes and 0.5 percent for all ad valorem taxes (the producer support 25% of ad quantum taxes and half of the ad valorem taxes).

The AETR, both with and without license fees, declines as gross profitability increases. This trend highlights the regressive nature of the tax regime applied to TELCO: the more profitable the firm, the lower its relative tax burden. This regressivity arises from the structure of the tax system, which relies heavily on indirect taxes that increase production costs, even when the tax incidence is low (see Dama *et al.*, 2024 for a general discussion of this issue). Furthermore, the regime lacks any progressive elements in direct taxation, which are commonly observed in the extractive industry.

In the extractive sector, many jurisdictions adopt progressive taxation mechanisms to ensure that the state captures a fair share of profits, especially during periods of high commodity prices. These mechanisms frequently include surtaxes or additional profit-based taxes that increase as profitability rises. For example, Australia introduced the Mineral Resource Rent Tax in 2012, applying a 30 percent tax on "super profits," defined as profits exceeding a 7 percent return. Similarly, Zambia and Ghana have implemented mining windfall taxes, which raise effective tax rates when commodity prices, such as those for copper or gold, surpass predefined thresholds.

Beyond the extractive sector, some countries, such as Morocco or South Korea, have a progressive CIT structure. Historically, the United States also maintained a progressive CIT system.[21] These examples illustrate the varying approaches to introduce potential progressive elements in the taxation of the telecommunications sector, an area that warrants further research.

[21] However, the Tax Cuts and Jobs Act of 2017 replaced this structure with a flat federal CIT rate of 21 percent, eliminating the progressivity previously embedded in the tax system.

Table 5: AETR varying in the gross profitability

Country	AETR					AETR excl. License fees				
Gross Profitability	30	40	50	60	75	30	40	50	60	75
Algeria	0,952	0,779	0,658	0,608	0,558	0,787	0,657	0,566	0,527	0,489
Angola	1,389	1,114	0,925	0,851	0,777	0,730	0,629	0,561	0,534	0,507
Benin	1,146	0,928	0,773	0,711	0,649	0,863	0,717	0,612	0,570	0,528
Botswana	0,568	0,477	0,416	0,392	0,369	0,568	0,477	0,416	0,392	0,369
Burkina Faso	1,059	0,864	0,716	0,654	0,591	0,693	0,579	0,492	0,456	0,419
Cameroon	1,302	1,050	0,870	0,797	0,723	0,879	0,728	0,621	0,578	0,535
Chad	1,294	1,058	0,893	0,830	0,768	1,189	0,980	0,834	0,778	0,723
Cote d'Ivoire	1,399	1,139	0,949	0,872	0,793	1,041	0,864	0,737	0,685	0,632
DRC	1,629	1,339	1,118	1,030	0,939	1,087	0,917	0,787	0,736	0,685
Egypt	2,246	1,673	1,297	1,155	1,016	0,740	0,600	0,508	0,474	0,440
Ethiopia	5,881	4,679	3,751	3,362	2,963	0,742	0,650	0,580	0,550	0,520
Gabon	1,154	0,932	0,783	0,727	0,669	1,119	0,906	0,764	0,710	0,655
Ghana	0,899	0,741	0,626	0,583	0,539	0,744	0,618	0,528	0,496	0,463
Guinea	1,101	0,936	0,811	0,759	0,706	0,965	0,831	0,729	0,686	0,643
Guinea Bissau	0,941	0,770	0,649	0,600	0,551	0,930	0,762	0,643	0,595	0,546
Jordan	2,204	1,678	1,332	1,199	1,070	1,466	1,147	0,939	0,859	0,781
Kenya	1,175	0,978	0,833	0,777	0,722	1,072	0,899	0,772	0,724	0,676
Liberia	0,956	0,777	0,651	0,601	0,550	0,895	0,731	0,615	0,569	0,523
Madagascar	1,188	0,953	0,789	0,724	0,657	0,942	0,768	0,647	0,599	0,550
Mali	1,374	1,115	0,922	0,843	0,763	0,726	0,618	0,536	0,503	0,469
Morocco	1,039	0,861	0,737	0,689	0,641	0,841	0,715	0,628	0,594	0,561
Niger	1,171	0,941	0,777	0,712	0,646	0,697	0,576	0,494	0,462	0,431
Nigeria	2,090	1,645	1,325	1,197	1,068	0,674	0,579	0,510	0,483	0,455
RCA	1,737	1,347	1,086	0,982	0,880	0,900	0,735	0,628	0,584	0,541
Senegal	1,231	1,016	0,858	0,794	0,729	0,792	0,682	0,600	0,567	0,534
Sierra Leone	0,659	0,562	0,494	0,466	0,438	0,644	0,551	0,486	0,458	0,432
South Africa	1,034	0,828	0,688	0,633	0,580	0,441	0,395	0,364	0,352	0,341
Tanzania	1,940	1,528	1,235	1,119	1,003	1,054	0,868	0,734	0,681	0,628
Tunisia	1,086	0,938	0,822	0,773	0,722	0,846	0,748	0,671	0,638	0,605
Zambia	0,792	0,671	0,585	0,551	0,516	0,718	0,614	0,542	0,512	0,483

Source: Authors.

Table 6 presents the decomposition of the AETR with and without license fees, based on the previous similar tax incidence assumptions.[22] Columns 1 and 6 display the AETR with and without license fees with an average 90 percent and 40 percent. The analysis differentiates between the Average Effective General Tax Rate (AEGTR) and the Average Effective Specific Tax Rate (AESTR), offering a detailed breakdown of the tax burden under varying assumptions. Figures 4 and 5 depict the AETR by type of tax. We distinguish special telecommunication taxes from standard general taxes. It provides an alternative presentation of our main results.

Columns 2 and 3 offer a detailed breakdown of the AETR into general taxation (AEGTR) and special taxation (AESTR). The AEGTR reflects the burden of general taxation in each country, as stipulated by national Tax and Customs Codes (or Acts). It includes also any potentially higher CIT rates specifically applied to the telecommunications sector. Conversely, the AESTR consolidates the impact of sector-specific taxes and levies imposed on telecommunications. These include taxes on national and international traffic, network access taxes, numbering fees, contributions to the Universal Service Fund, Research and Development funds, as well as levies imposed by RA, among others. This distinction underscores the diverse fiscal pressures faced by telecommunications operators across jurisdictions.

The high levels of AETRs primarily stem from mobile-specific taxation. Specifically, the AESTR averages 56.5 percent, ranging from 10.5 percent in Botswana or 14.2 percent in Zambia to 100.2 percent in Egypt 342 percent in Ethiopia given the cost of license fees. Among the thirty countries analyzed, the AESTR significantly exceeds the AEGTR in 20 cases. On average, the AESTR accounts for 59 percent of the total tax burden as reflected in the AETR. This proportion varies widely, from 24 percent in Zambia to 77 percent in Egypt and Tanzania.

We also differentiate specific taxes based on their respective bases: *ad valorem* or *ad quantum*. *Ad valorem* taxes include levies such as the telecom network access tax, Universal Service Fund contributions, Research and Development Fund contributions, RA financing levies, annual fees on turnover, interconnection management fees, and some excise taxes. These are generally calculated on pre-tax turnover. By contrast, *ad quantum* taxes are applied to specific units of measurement, such as minutes (national and international traffic taxes), call numbers (numbering fees), or megabytes (OTT taxes).

The *ad valorem* AESTR (column 4 in Table 5) averages approximately 22 percent, ranging from 3 percent in South Africa to 49 percent in Kenya. The *ad quantum* AESTR (column 5 in Table 5) is significantly lower on average, at 2 percent. While some countries, including Botswana, Ethiopia, Jordan, Kenya, Morocco, and South Africa, do not impose any *ad quantum* tax, their burden can be substantial in others, such as DRC and Liberia. This significant variation

[22] Appendix E displays the detailed results for the case of Mali. The web application (under construction) provides similar analysis for the other countries of the sample. It allows to choose tax incidence and pre-tax profitability parameters.

underscores the diverse fiscal landscapes confronting the telecommunications sector across the studied countries.

Column 6 displays the AETR for a standard firm operating without any special tax regime and potentially subject to the standard (lower) CIT rate. The average AETR for such firms is 40.8 percent. The gap, or alternatively the overtaxation rate, representing the relative difference between the AETR of TELCOs and that of standard firms, is high, averaging 220 percent if we include license fees (144 percent without license fees). This significant over taxation is primarily driven by sector-specific taxes imposed on telecommunications operators (see Figure 8).

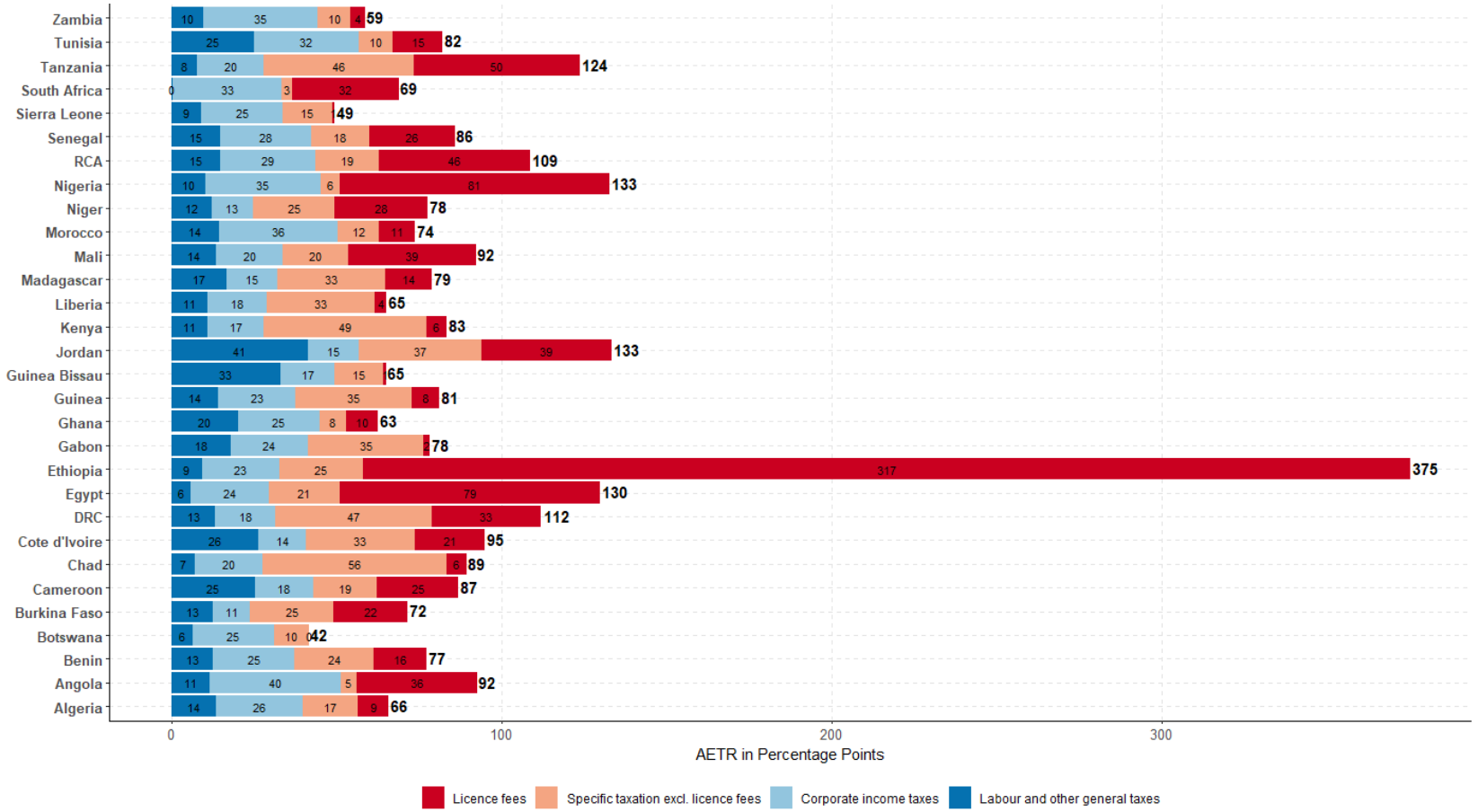
Table 6: Decomposition of the AETR *

Country	AETR	AEGTR	AESTR	AESTR Ad Valorem	AESTR Ad Quantum	AETR for a standard firm	AETR exluding license fees	AETR CIT	AETR when no Deduction	AETR exluding license fees when no Deduction
	1	2	3	4	5	6	7	8	9	10
Algeria	0,658	0,397	0,261	0,153	0,016	0,438	0,566	0,261	0,699	0,606
Angola	0,925	0,512	0,413	0,040	0,010	0,410	0,561	0,397	0,942	0,578
Benin	0,773	0,372	0,401	0,220	0,019	0,429	0,612	0,246	0,829	0,668
Botswana	0,416	0,311	0,105	0,105	0,000	0,334	0,416	0,248	0,439	0,439
Burkina Faso	0,716	0,238	0,477	0,248	0,006	0,273	0,492	0,112	0,747	0,523
Cameroon	0,870	0,430	0,439	0,186	0,005	0,470	0,621	0,179	0,910	0,661
Chad	0,893	0,275	0,618	0,545	0,014	0,449	0,834	0,205	1,067	1,007
Cote d'Ivoire	0,949	0,407	0,542	0,328	0,002	0,457	0,737	0,143	1,018	0,806
DRC	1,118	0,314	0,804	0,366	0,106	0,450	0,787	0,182	1,254	0,922
Egypt	1,297	0,296	1,002	0,210	0,003	0,343	0,508	0,237	1,345	0,556
Ethiopia	3,751	0,326	3,425	0,253	0,000	0,396	0,580	0,234	3,821	0,649
Gabon	0,783	0,415	0,369	0,325	0,024	0,514	0,764	0,236	0,883	0,864
Ghana	0,626	0,449	0,177	0,065	0,014	0,465	0,528	0,248	0,642	0,545
Guinea	0,811	0,375	0,436	0,279	0,075	0,390	0,729	0,232	0,922	0,839
Guinea Bissau	0,649	0,495	0,154	0,064	0,084	0,523	0,643	0,166	0,677	0,670
Jordan	1,332	0,566	0,766	0,372	0,000	0,624	0,939	0,154	1,428	1,034
Kenya	0,833	0,278	0,555	0,494	0,000	0,446	0,772	0,168	0,977	0,916
Liberia	0,651	0,288	0,364	0,212	0,116	0,349	0,615	0,178	0,713	0,677
Madagascar	0,789	0,321	0,468	0,326	0,000	0,383	0,647	0,154	0,852	0,710
Mali	0,922	0,338	0,584	0,195	0,003	0,382	0,536	0,203	0,966	0,580
Morocco	0,737	0,504	0,234	0,125	0,000	0,549	0,628	0,360	0,779	0,670
Niger	0,777	0,247	0,530	0,204	0,043	0,303	0,494	0,126	0,828	0,545
Nigeria	1,325	0,450	0,875	0,057	0,003	0,466	0,510	0,349	1,341	0,526
RCA	1,086	0,436	0,649	0,189	0,002	0,488	0,628	0,289	1,137	0,679
Senegal	0,858	0,423	0,435	0,174	0,003	0,482	0,600	0,276	0,908	0,650
Sierra Leone	0,494	0,337	0,157	0,112	0,037	0,372	0,486	0,247	0,529	0,521
South Africa	0,688	0,334	0,354	0,031	0,000	0,342	0,364	0,331	0,696	0,373
Tanzania	1,235	0,278	0,957	0,433	0,023	0,387	0,734	0,200	1,344	0,843
Tunisia	0,822	0,567	0,255	0,103	0,001	0,505	0,671	0,318	0,859	0,708

Source: Authors

* Assuming an incidence of 0.75 percent for ad quantum taxes and 0.5 percent for ad valorem taxes.

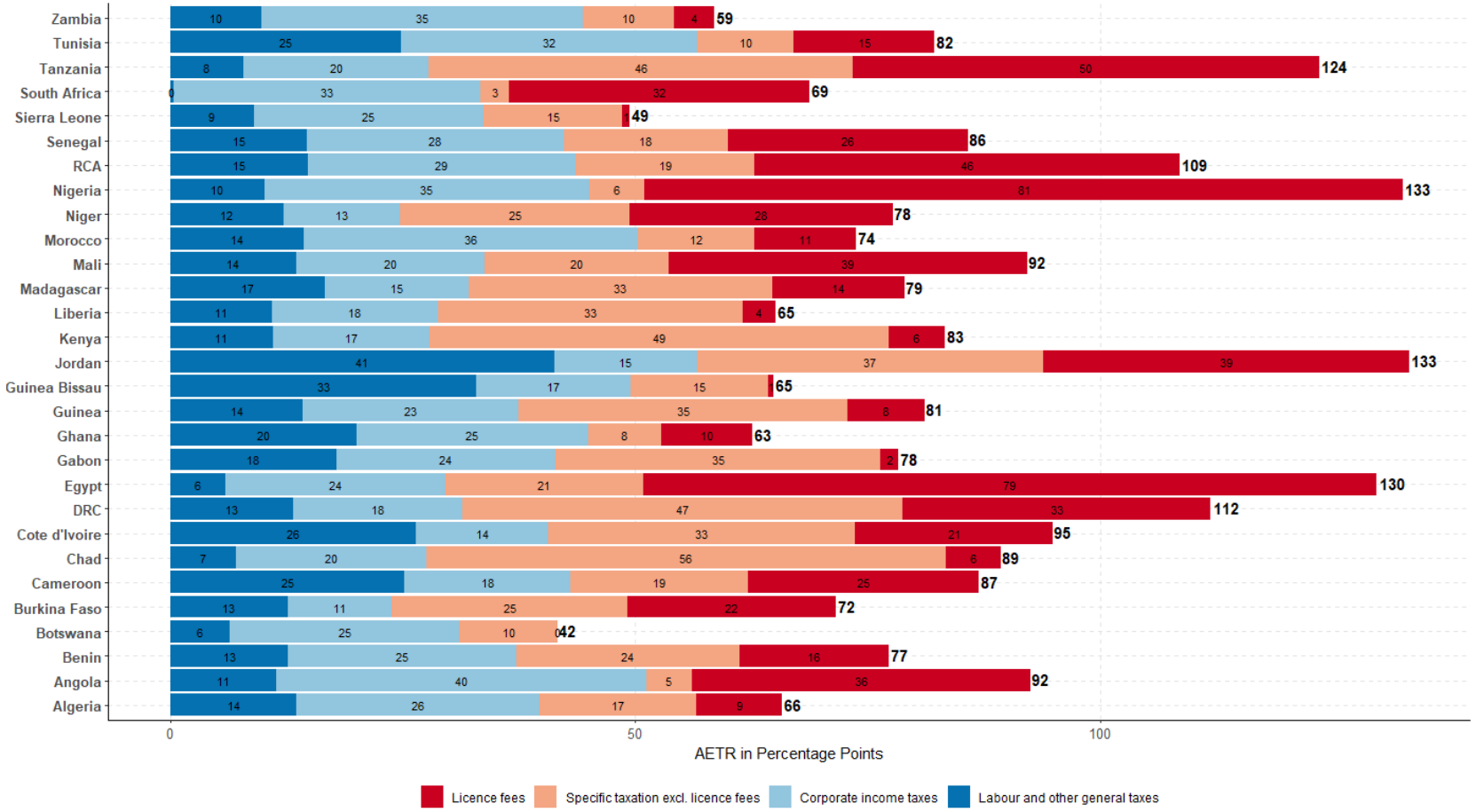
Figure 4: AETR breakdown by taxation type *



Source: Authors

* Assuming an incidence of 0.75 percent for ad quantum taxes and 0.5 percent for ad valorem taxes.

Figure 5: AETR breakdown by taxation type (excluding Ethiopia) *



Source: Authors

* Assuming an incidence of 0.75 percent for ad quantum taxes and 0.5 percent for ad valorem taxes.

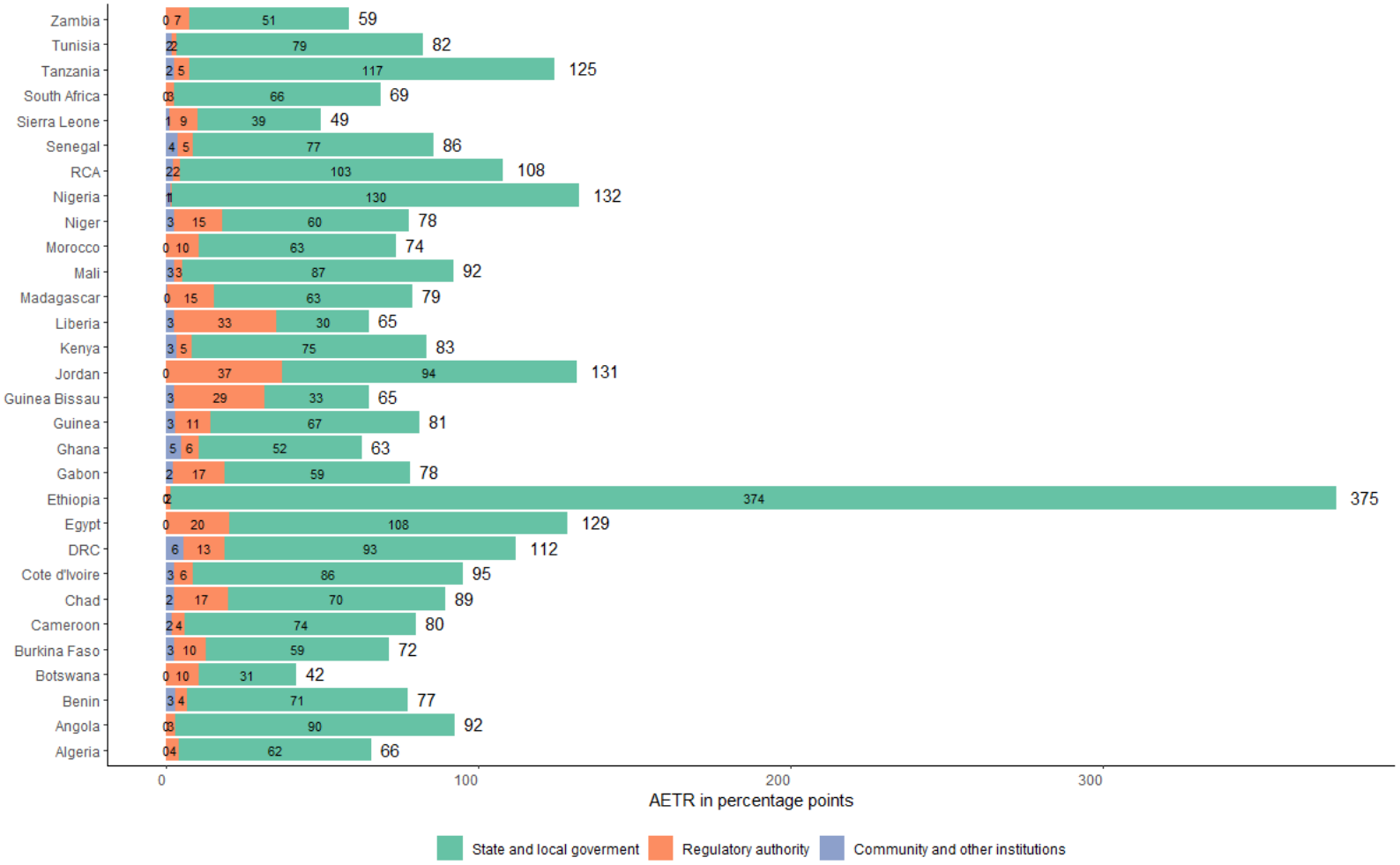
We extend our analysis by breaking down the AETR across all beneficiary institutions, namely States and Local Governments (SLCs), Regulatory Agencies (RAs), and other stakeholders such as Customs Unions (CIs) or pre-shipment inspection firms (PIs) (see Figures 6 and 7). SLCs emerge as the primary beneficiaries of tax revenues. This category includes revenues from direct taxes, non-deductible VAT on petroleum products, custom duties, and a portion of special telecommunications taxes. Regulatory authorities are the second-largest recipients, benefiting from the remaining portion of special telecommunications taxes, including contributions to universal service funds, regulatory taxes and fees, and research and development contributions.

The autonomy or independence of Telecommunications Regulatory Authorities (RAs) can lead to a "race to the top" with Ministries of Finance, resulting in an excessive tax burden. Keen and Kotsogiannis (2002) formalize this dynamic as vertical tax competition, where multiple levels of government simultaneously tax the same base in a federal or decentralized system. This lack of coordination among authorities drives higher aggregate tax rates, diverging from the conventional "race to the bottom" commonly associated with horizontal tax competition, as described by Wilson (1986), Zodrow and Mieszkowski (1986), and Rota-Graziosi (2018).

In addition to vertical tax competition, Berkowitz and Li (2000) propose the concept of tax rights, defined as the property rights held by a government or agency over a particular tax base. Their analysis highlights how the over-exploitation of a shared tax base by multiple tax agencies leads to excessive aggregate tax rates. Such over-taxation discourages investment, reduces the efficiency of public expenditures, and ultimately hinders economic performance.

In the context of telecommunications, the interaction between RAs and Ministries of Finance plays a crucial role in determining the Average Effective Tax Rate (AETR) faced by TELCOs. Competitive behavior between these entities often results in higher taxes, as both institutions seek to maximize revenue from the same base. Conversely, cooperative or well-coordinated interactions can help mitigate excessive taxation and foster a more sustainable fiscal environment. The observed significant variation in AETR across countries can be attributed to the differing degrees of coordination and institutional interplay between these authorities, highlighting the importance of institutional frameworks in shaping tax policy outcomes.

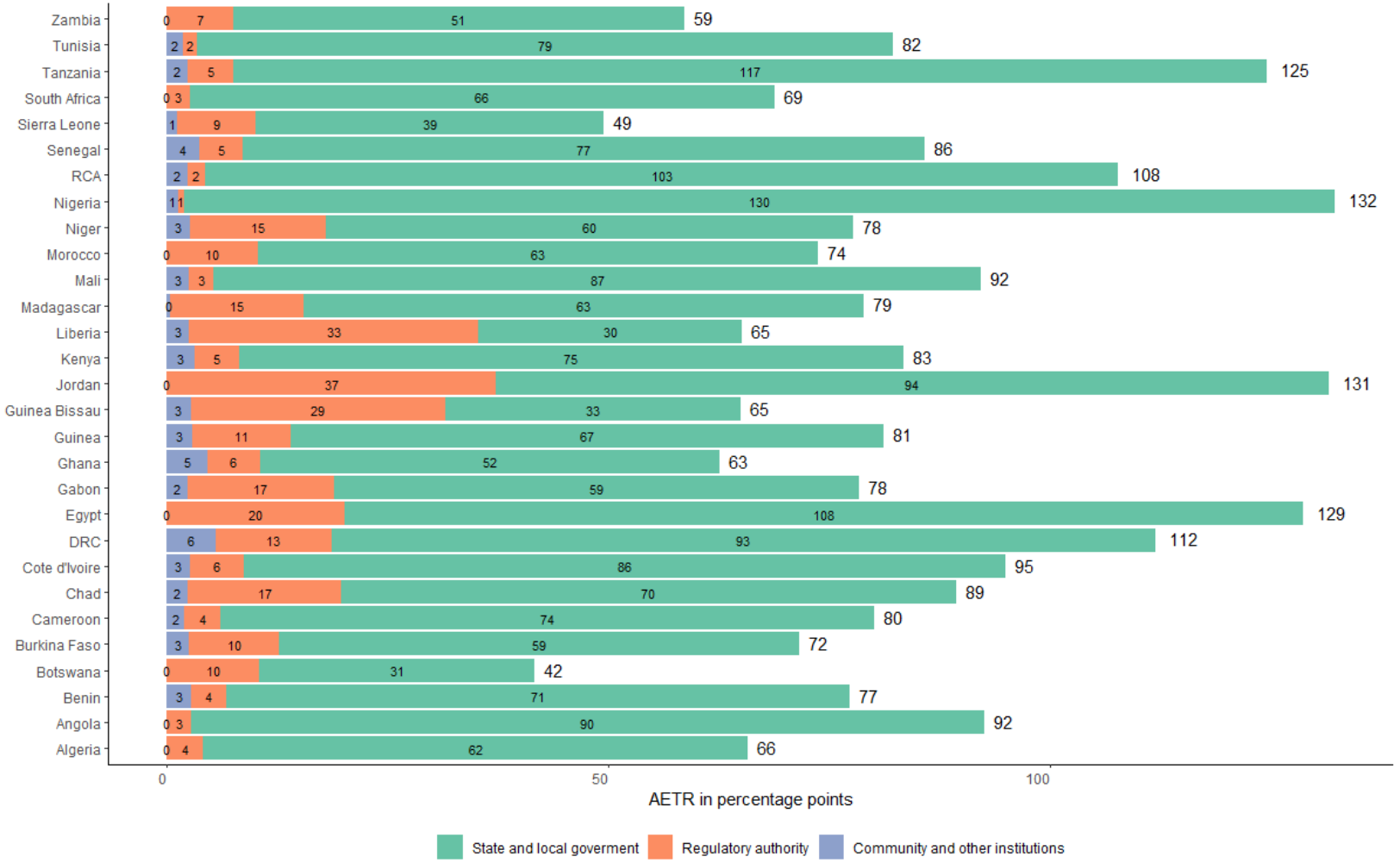
Figure 6: AETR breakdown by beneficiary institution *



Source: Authors

* Assuming an incidence of 0.75 percent for ad quantum taxes and 0.5 percent for ad valorem taxes.

Figure 7: AETR breakdown by beneficiary institution (excluding Ethiopia) *



Source: Authors

* Assuming an incidence of 0.75 percent for ad quantum taxes and 0.5 percent for ad valorem taxes.

We now compare the AETRs of three sectors across each country: telecommunications, gold mining,[23] and a standard economic sector. A striking result (see Figure 6) is that mobile telecommunications companies bear a higher tax burden than the gold mining sector in all the studied countries. The AETR for the gold mining sector ranges from 27 percent in Jordan to 61 percent in Chad and Nigeria, with an average of approximately 46 percent, compared to 68 percent for the telecommunications sector. In several countries, the special taxation imposed on telecommunications alone exceeds the total tax burden applied to the mining sector. Meanwhile, the mining sector is generally taxed more heavily than the standard economic sector, except in Gabon, Guinea Bissau, and Nigeria.

The disparity in tax burdens between the telecommunications and mining sectors stems largely from the number and rates of special taxes imposed on each. This discrepancy may seem counterintuitive given the tax bases: on one hand, a non-renewable resource with finite reserves (gold mining), and on the other, a limited but renewable resource offering significant positive externalities (telecommunications). One explanation for this difference is better coordination—or equivalently, less tax competition—between the Ministry of Finance and the Ministry responsible for the mining and petroleum sectors compared to the relationship between the Ministry of Finance and the Telecommunications Regulatory Authority (RA). Another potential explanation is the superior lobbying influence of the extractive industry, which may translate into a relatively lighter tax burden.

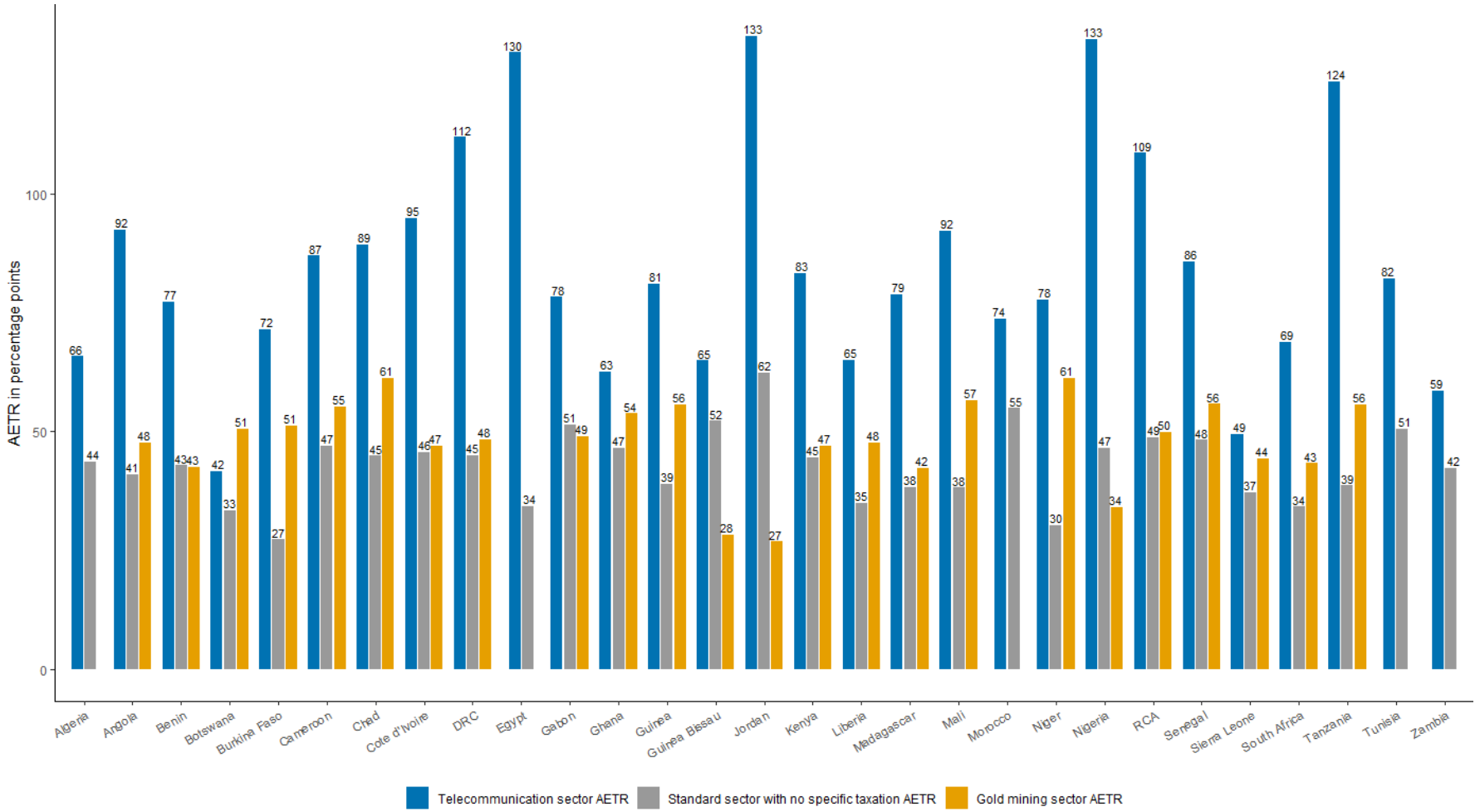
For instance, the mining sector often benefits from tax stability clauses, which protect investors against changes in both general and sector-specific tax rates. These clauses are justified by the risky nature of mining investments, which require substantial upfront capital expenditures to develop mining infrastructure. Such investments are irreversible and tied to specific deposits, making the sector vulnerable to partial or complete expropriation through tax increases or nationalization.

However, the telecommunications sector also requires significant initial investment, which is similarly irreversible and tied to a specific territory. In fact, for representative firms, these upfront investments can account for over 50 percent of total capital expenditures. Despite this similarity, telecommunications companies face higher tax burdens, which may reflect historical factors. The extractive industry has operated for a much longer time in most of the countries studied, allowing its tax regime to stabilize over time, whereas the telecommunications sector is relatively new and may still be subject to evolving regulatory and tax frameworks.

In conclusion, the higher tax burden borne by the telecommunications sector highlights inconsistencies in tax policy that may stem from differences in sector-specific lobbying, historical evolution, and coordination among government entities. These factors warrant further scrutiny to ensure that taxation reflects the economic and social contributions of each sector.

[23] The FERDI database of the gold mining projects does not cover some countries such as Algeria, Egypt, Morocco, Tunisia, and Zambia.

Figure 8: AETRs across sectors.



Source: Authors

4 Conclusion

We estimate the AETR for a standard representative firm, TELCO, in twenty-nine African countries using a cash flow model over the length of a telecommunication license. The tax burden varies significantly from one country to another depending on the weight and the characteristics of special taxes and license fees applied to telecommunications companies. Since the particular taxation applied to the telecommunication is mainly indirect, and given the lack of any empirical evidences, we consider several tax incidence rates, i.e. several scenarios regarding how these taxes are shared between TELCO and final consumers.

In several countries, the tax burden on TELCO exceeds 100 percent, signaling untenable conditions for investors, who would face financial losses based on the assumed turnover, CAPEX, and OPEX profiles. A large part of this excessive taxation results from licenses fees, which amount to 411 million USD in Egypt and 720 million USD in Ethiopia raising the AETR respectively above 113 and 350 percent.

If license fees are excluded from the AETR computation, treating them as an entry cost, the average AETR amounts to 42 percent, ranging from 26 percent in Botswana to 62 percent in Jordan, under the assumption of a full pass-through to consumer prices (or equivalently, a 100 percent tax incidence). The AETR increases significantly as the assumed indirect tax incidence decreases. Specifically, when the tax incidence is assumed to be zero—meaning all indirect taxes are absorbed into the TELCO's margin—the average AETR rises to 79 percent, with values ranging from 47.5 percent in Botswana to 129 percent in the Democratic Republic of Congo (DRC). This trend highlights the sensitivity of the AETR to the distribution of tax incidence and the significant burden borne by TELCOs under low pass-through scenarios.

Appreciating the AETR of TELCO with respect to its before-tax profitability allows us to emphasize the regressive nature of telecommunication tax regime: the more profitable the firm, the lower its relative tax burden. Under 'conservative' tax incidence assumptions (0.25 for ad quantum taxes and 0.5 for ad valorem taxes), the average AETR decreases from 86 percent for a gross profitability of 30 percent to 54 percent for a gross profitability of 75 percent. This regressivity is explained by the important role of indirect taxes in TELCO tax regime even with moderate tax incidence.

The heavy reliance on indirect taxes disproportionately affects firms with lower profitability since such taxes are not linked to net income but instead increase production costs regardless of financial performance. As profitability improves, these fixed or cost-based taxes represent a smaller share of the firm's overall tax burden, thereby reducing the relative AETR. This structure contrasts with more progressive tax systems in other industries, such as the extractive sector, where surtaxes or profit-based levies adjust dynamically with profitability to ensure equitable revenue capture.

These findings underscore the structural limitations of the telecommunications tax regime in terms of equity and efficiency, as the lack of progressivity amplifies the tax burden on less profitable operators while favoring highly profitable firms. Such a regime may inadvertently hinder competition and innovation, particularly for smaller or emerging operators, who face disproportionately higher relative tax obligations.

We then examine the decomposition of the AETR into general and specific taxation, applying a conservative assumption of a tax incidence of 0.75 for all ad quantum taxes and 0.5 for all ad valorem taxes, meaning that producers absorb 25 percent of ad quantum taxes and 50 percent of ad valorem taxes. The analysis reveals that the elevated levels of AETRs are primarily driven by mobile-specific taxation, which imposes a disproportionate burden on telecommunications operators. Telecommunications-specific taxation averages 56.5 percent, with substantial variation across countries. For instance, it ranges from a relatively low 10.5 percent in Botswana to an exceptionally high 342 percent in Ethiopia, largely attributable to the significant cost of license fees. On average, this sector-specific taxation accounts for 59 percent of the total tax burden, as captured in the AETR. These figures highlight the outsized role of special levies, including taxes on national and international traffic, numbering fees, contributions to universal service funds, and regulatory charges.

This disproportionate reliance on sector-specific taxation not only inflates the overall tax burden but also introduces significant disparities across jurisdictions. Countries with excessively high AESTRs may inadvertently stifle investment and innovation in their telecommunications sectors, particularly when these taxes are not aligned with firms' ability to pay or the economic benefits they generate.

This result is further corroborated by a comparison of AETRs between TELCO, a standard firm (which is not subject to any sector-specific taxes), and the gold mining sector. In all the studied countries, TELCO bears a significantly higher tax burden than the gold mining sector and, unsurprisingly, the standard firm. The higher level of TELCO AETR reflects the disproportionate impact of sector-specific taxation, including special levies on telecommunications activities such as license fees, universal service contributions, numbering fees, and taxes on national and international traffic. In contrast, while the gold mining sector also faces additional taxation—such as royalties and, in some cases, windfall profit taxes—its overall tax burden remains comparatively lower. This is often due to some tax stability clauses.

Figure 9 presents correlation analyses between the computed AETRs and two key variables: market penetration and Gross National Income (GNI) per capita. The results show a weak negative correlation between AETR and these variables, suggesting that countries with lower market penetration rates and lower GNI per capita tend to experience higher AETRs, while those with higher market penetration and GNI per capita generally face lower AETRs.

This trend is primarily driven by telecommunications-specific taxation, as evidenced by the stronger and more negative correlations between the AESTR and the two variables under

consideration. In contrast, the correlations between standard taxes, measured through the AEGTR, and these variables are positive. This implies that standard taxation systems are more closely aligned with economic capacity and market development, whereas telecommunications-specific taxes impose disproportionate burdens on less developed markets.

These findings highlight the structural disparities in the tax regimes applied to the telecommunications sector. Standard tax systems, as reflected in the AEGTR, tend to be more neutral in their economic impact, while special taxation regimes—often involving levies such as fixed charges per minute of use or per subscriber—can create significant economic distortions. This is consistent with Hausman's (1998) analysis under the U.S. Telecommunications Act of 1996, which found that specific taxes on telecommunications services introduced inefficiencies that hindered market development and consumer welfare.

Moreover, the observed negative correlations between AESTR and market penetration may indicate that more advanced countries, with higher penetration rates and incomes, rely less on special telecommunications taxes, possibly due to a broader revenue base or a strategic focus on fostering telecommunications growth. Conversely, countries with less developed telecommunications markets appear to rely more heavily on specific taxes, which may inhibit further market expansion.

Future research could explore the efficiency and economic impact of these special taxes, building on Hausman's (1998) findings, to better understand how such levies influence market development and fiscal sustainability. By evaluating the trade-offs between revenue generation and economic distortions, policymakers can design tax regimes that better balance fiscal needs with telecommunications sector growth.

Figure 9: Correlation analyses.

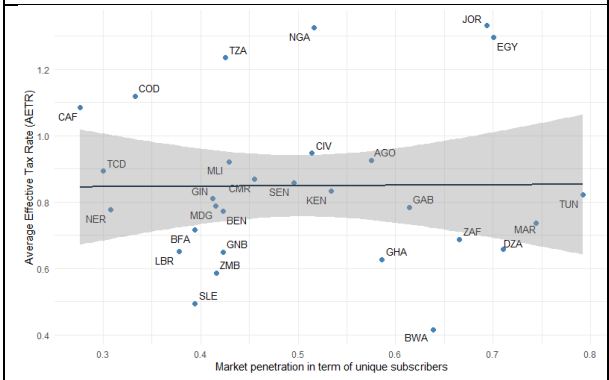
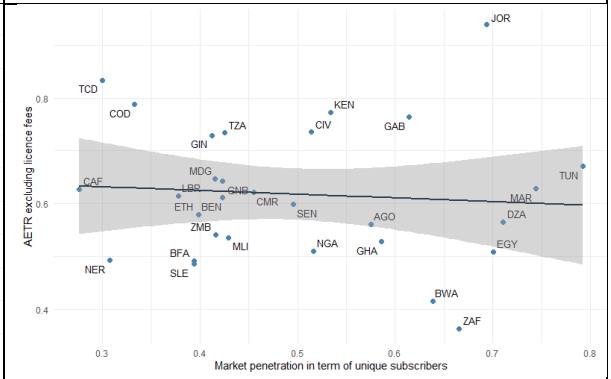
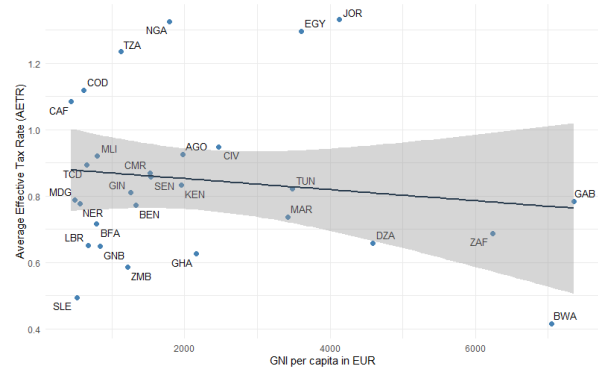
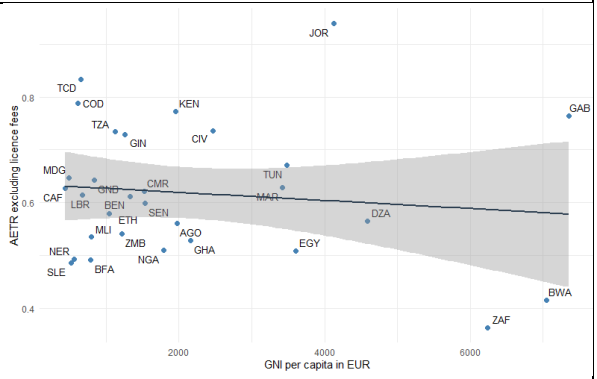
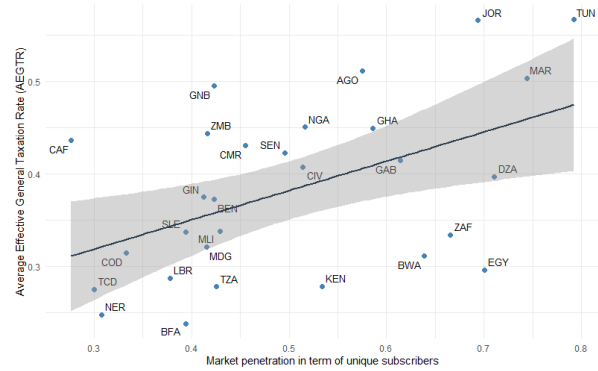
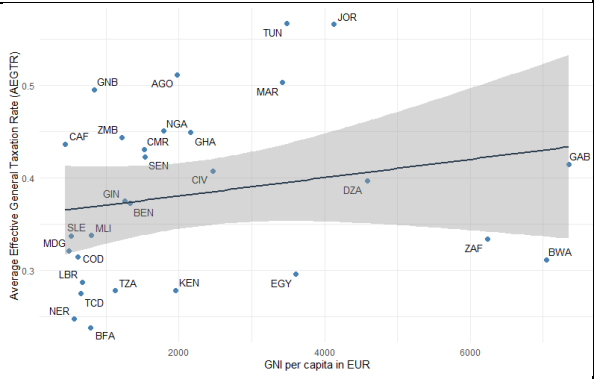
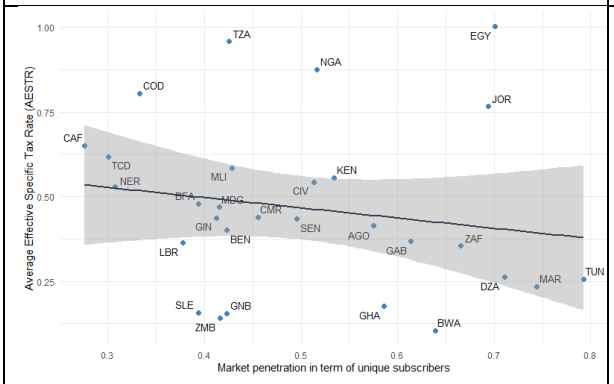
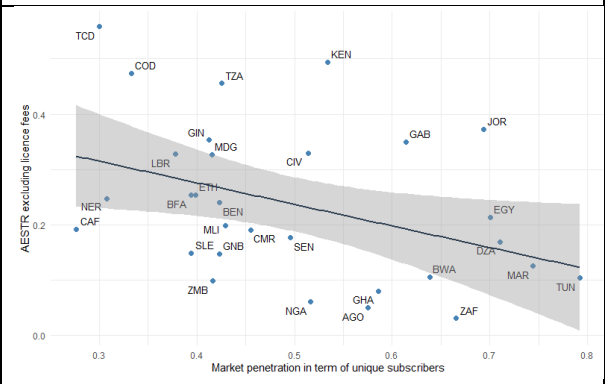
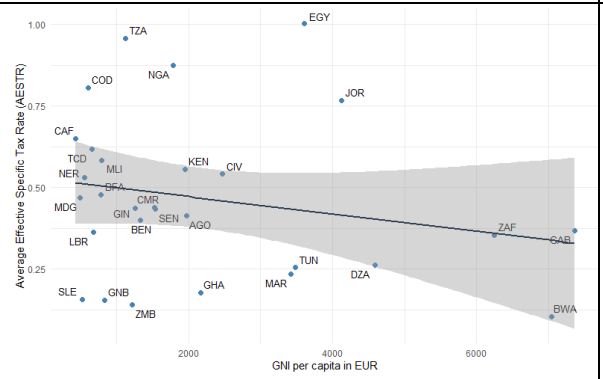
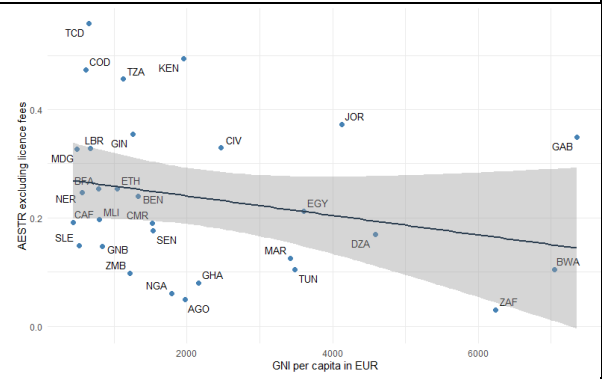
Panel A: AETR and market penetration rate	Panel B: AETR (excl. license fees) and market penetration rate
	
Panel C: AETR and GNI	**Panel D: AETR (excl. license fees) and GNI**
	
Panel E: AEGTR and market penetration rate	**Panel F: AEGTR and GNI**
	

Figure 9: Correlation analyses (continued).

Panel G: AESTR and GNI	Panel H: AESTR (excl. license fees) and GNI
	
Panel I: AESTR and GNI	**Panel J: AETSR (excl. license fees) and GNI**
	

Source: Authors.

5 References

Adachi, T. and M. Fabinger, (2022), "Pass-through, welfare, and incidence under imperfect competition," *Journal of Public Economics*, 211, 104589.

Aker, J. and I. Mbiti, (2010). "Mobile phones and economic development in Africa." *Journal of Economic Perspectives*, 24 (3), 207-232.

Auerbach, A. and D. Jorgenson, (1980). "Inflation-Proof Depreciation of Assets." *Harvard Business Review*, 58(5), 113-118.

Autor, D., Dorn, D., Katz, L. F., Patterson, C., and J. van Reenen, (2020). "The Fall of the Labor Share and the Rise of Superstar Firms." *The Quarterly Journal of Economics*, 135(2), 645-709.

Baltagi, B. (2008). *Econometric analysis of panel data*. John Wiley and Sons, Chichester.

Benzarti, Y. (2024), "Tax Incidence Anomalies," National Bureau of Economic Research WP 32819.

Berkowitz, D. and L. Wei. (2000). "Tax rights in transition economies: a tragedy of the commons?". *Journal of Public Economics*, 76(3), 369-397.

Besley, T. and T. Persson, (2014). *Pillars of Prosperity: The Political Economics of Development Clusters*. Princeton, NJ: Princeton University Press.

Besley, T. and H. S., Rosen, (1999). "Sales taxes and prices: An empirical analysis," *National Tax Journal*, 52(2), pp. 157–178.

Blake, A. and M. Roberts, (2006). "Comparing petroleum fiscal regimes under oil price uncertainty. *Resources Policy*," 31(2), 95-105.

Boadway, R. and N. Bruce, (1984). "A general proposition on the design of a neutral business tax." *Journal of Public Economics*, 24(2), 231-239.

Bonds, S. and M. Devereux, (1995). "On the design of a neutral business tax under uncertainty." *Journal of Public Economics*, 58(1), 57-71.

Buys, P., S. Dasgupta, T. Thomas, and D. Wheeler. **(**2009). "Determinants of a Digital Divide in Sub-Saharan Africa: A Spatial Econometric Analysis of Cell Phone Coverage." *World Development*, 37(9): 1494–1505

Chennells, L. and R. Griffith, (1997). *Taxing profits in a changing world*, The Institute for Fiscal Studies, London.

Covarrubias, M., Gutiérrez, G., and T. Philippon, (2019). "From Good to Bad Concentration? U.S. Industries over the Past 30 Years." *National Bureau of Economic Research* Working Paper No. 25983.

Dama, A., Rota-Graziosi, G. and F. Sawadogo, (2024). "The regressivity of CIT exemptions in Africa," *International Tax and Public Finance*, vol. 31(3), pages 909-934.

Daniel, P., Keen, M., and C. McPherson, (2010). *The taxation of petroleum and minerals: Principles, problems and practice*. Routledge.

Dequiedt, V., Geourjon, A-M., and G. Rota-Graziosi, (2012) "Mutual supervision in preshipment inspection programs,' *Journal of Development Economics*, 99, 282-291.

Delipalla, S. and M., Keen, (1992), The Comparison Between Ad Valorem and Specific Taxation under Imperfect Competition**",** *Journal of Public Economics*, 49(3), pp. 351–367.

Devereux, M. and R. Griffith, (1998). "Taxes and the location of production: Evidence from a panel of US multinationals." *Journal of Public Economics*, 68(3), 335-367.

Djankov, S., T. Ganser, C. McLiesh, R. Ramalho, and A. Shleifer. (2010). "The Effect of Corporate Taxes on Investment and Entrepreneurship." *American Economic Journal: Macroeconomics*, 2 (3): 31-64.

Driscoll, J. C. and A. C. Kraay, (1998). "Consistent covariance matrix estimation with spatially dependent panel data." *Review of economics and statistics*, 80(4), 549-560.

Djankov, S., Ganser, T., McLiesh, C., Ramalho, R., and A. Shleifer, (2010). "The Effect of Corporate Taxes on Investment and Entrepreneurship." *American Economic Journal: Macroeconomics*, *2*(3), 31-64.

Faccio, M., and L. Zingales, (2017). "Political determinants of competition in the mobile telecommunication industry." Working Paper, National Bureau of Economic Research.

Fane, G. (1987). "Neutral taxation under uncertainty." *Journal of Public Economics*, *33*(1), 95-105.

Fullerton, D. and G. E. Metcalf, (2002). Tax incidence. in: A. J. Auerbach & M. Feldstein, eds. *Handbook of Public Economics*. Amsterdam: Elsevier, pp. 1787–1872.

GSMA, (2017). *Mobile Taxation: A Handbook for Policymakers*. London: GSMA.

GSMA, (2020). *The Mobile Economy 2020*. London: GSMA.

Hausman, J. A., and W. E. Taylor, (1981). "Panel data and unobservable individual effects." *Econometrica*, 49(6), 1377-1398.

Hausman, J., (1998). "Taxation by telecommunication regulation." In Poterba, J. (ed.) *Tax Policy and the Economy*, Vol. 12, p. 29-48, MIT Press.

Henisz, W., Zelner B., and M. Guillén, (2005). "The Worldwide Diffusion of Market-Oriented Infrastructure Reform, 1977-1999." *American Sociological Review*, 70(6), 871-897.

Howard, P. and N. Mazaheri, (2009). "Telecommunications reform, internet use and mobile phone adoption in the developing world." *World Development*, 37(7), 1159-1169.

IMF, (2022). *Fiscal Policies for Inclusive Growth in the Digital Era*. Washington, DC: International Monetary Fund.

ITU, (2021). *Telecommunications Regulatory Frameworks and Fiscal Policies*. Geneva: International Telecommunication Union.

ITU. (2013). *Taxing telecommunication/ICT services: An overview*. https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Taxation%20Study-final-en.pdf

Howard, Philip N. and Mazaheri, Nimah, (2009), Telecommunications Reform, Internet Use and Mobile Phone Adoption in the Developing World, *World Development*, **37**(7): 1159-1169.

Jack, W. and T. Suri. (2014), "Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution." *American Economic Review*, 104 (1): 183–223.

Katz, R. and J. Jung, (2023). "The impact of taxation in the telecommunications industry," *Information Economics and Policy*, 62(C).

Keen, M. and C. Kotsogiannis. (2002) "Does federalism lead to excessively high taxes?". *American Economic Review*, 92(1):363-370.

Koutroumpis, P., Lekatsas, A., Giaglis, G. and P. Kourouthanasis, (2011), "Between a rock and a hard place: Recession and telecoms taxation," *Telecommunications Policy*, 35(7): 681-688,

Laporte, B., de Quatrebarbes, C., and Y. Bouterige, (2019). *Partage de la rente et progressivité des régimes fiscaux dans le secteur minier: Une analyse sur 21 pays africains producteurs d'or*. FERDI Working Paper.

Li, W., and L. C. Xu, (2004). "The Impact of Privatization and Competition in the Telecommunications Sector around the World." *The Journal of Law & Economics*, 47(2), 395–430.

Luca, O., and D. M. Puyo, (2016). Fiscal Analysis of Resource Industries: (FARI Methodology). *Technical Notes and Manuals*.

Marion, J. and E. Muehlegger, (2011), "Fuel Tax Incidence and Supply Conditions," *Journal of Public Economics*, 95(9–10), pp. 1202–1212.

Matheson, T. and P. Petit, (2020). "Taxing telecommunications in developing countries," *International Tax and Public Finance*,. 28: 248-280.

Mensah, J. T., (2023), "Mobile Phones and Local Economic Development," World Bank, Washington, DC.

Mistry, J. J. (2005). "A conceptual framework for the role of government in bridging the digital divide." *Journal of Global Information Technology Management*, *8*(3), 28–47.

Noll, R. G. (2000). "Telecommunications reform in developing countries." in A. O. Krueger (Ed.), *Economic policy reform: The second wave*. Chicago, IL: University of Chicago Press.

OECD, (2019). *Tax Challenges in the Digital Economy*. Paris: Organisation for Economic Co-operation and Development.

Pedros, X. and M. Sivakumaran, (2019). *Rethinking mobile taxation to improve connectivity*, GSMA Intelligence.

Rota-Graziosi, G. (2018). "The supermodularity of the tax competition game." *Journal of Mathematical Economics*, 82: 25-35.

Rota-Graziosi, G. and F. Sawadogo (2022). "The tax burden on mobile network operators in Africa," *Telecommunications Policy*, 46(5).

Schmalensee, R. and R. D. Willig, (1989). *Handbook of Industrial Organization*. Vol. 1. Amsterdam: North-Holland.

Steinmüler, E., Thunecke, G. and G. Wasmer, (2019), "Corporate Income Taxes around the World: a survey on forward-looking tax measures and two applications," *International Tax and Public Finance*, 26(2), 418-459.

Summers, L. H., Bosworth, B. P., Tobin, J., and P. M. White, (1981). "Taxation and corporate investment: A q-theory approach." *Brookings Papers on Economic Activity*, (1), 67-140.

Tirole, J., (1988). *The Theory of Industrial Organization*. Cambridge, MA: MIT Press.

Weyl, E. G. and M. Fabinger, (2013). Pass-through as an economic tool: Principles of incidence under imperfect competition. *Journal of Political Economy*, 121(3), pp. 528–583.

Wilson, J. D. (1986). "A theory of interregional tax competition." *Journal of Urban Economics* 19(3), 296-315.

World Bank, (2016). *World Development Report 2016: Digital Dividends*. Washington, DC: World Bank.

6 Appendices

Appendix A: Some characteristics of the studied countries in 2023

Country	Population	GDP per capita in[1]	Unique subscribers Market penetration[2]	Number of Operators	Date of liberalization	ARPU by subscriber[1]	3G network coverage by population[2]	SIM cards per subscriber
Algeria	45 606 480	4 865	71,1	3	2002	5,24	99,25	1,59
Angola	36 684 202	2 136	57,5	3	2001	4,73	93,92	1,26
Benin	13 712 828	1 327	42,3	3	2000	7,81	99	2,59
Botswana	2 675 352	6 705	63,9	3	1998	14,09	98,99	2,56
Burkina Faso	23 251 485	808	39,4	4	2000	5,78	81	2,87
Cameroon	28 647 293	1 548	45,5	4	1998	6,89	94	1,91
Central African Reput	5 742 315	412	27,6	3	2004	5,07	50	1,17
Chad	18 278 568	665	30,0	3	1998	4,77	68	2,36
Congo, Democratic R	102 262 808	600	33,3	7	2001	3,82	75	1,56
Cote d'Ivoire	28 873 034	2 524	51,4	3	1997	8,25	95,96	2,94
Egypt	112 716 598	3 248	70,1	4	2003	1,88	99,5	1,38
Ethiopia	126 527 060	1 197	39,8	2	2021	1,16	98,35	1,51
Gabon	2 436 566	7 787	61,4	2	2000	16,1	95	2,02
Ghana	34 121 985	2 070	58,6	5	1990	3,93	99,5	1,78
Guinea	14 190 612	1 539	41,3	3	2005	8,97	93,5	2,37
Guinea-Bissau	2 150 842	846	42,3	2	2003	6,8	84,6	2,5
Jordan	11 337 052	4 145			2001			
Kenya	55 100 586	1 803	53,4	4	2000	7,61	97,5	2,2
Liberia	5 418 377	739	37,8	3	2009	6,31	85,4	2,32
Madagascar	30 325 732	489	41,5	4	1998	1,8	79,7	1,31
Mali	23 293 698	830	42,9	3	2003	7,45	98,1	2,27
Morocco	37 840 044	3 396	74,4	3	2000	7,24	99	1,85
Niger	27 202 843	572	30,8	4	2002	3,63	78,13	2,02
Nigeria	223 804 632	1 499	51,7	9	1999	2,24	99	1,77
Senegal	17 763 163	1 615	49,6	4	1997	8,28	99,5	2,43
Sierra Leone	8 791 092	401	39,4	4	2003	3,59	96	2,3
South Africa	60 414 495	5 783	77,1	5	1994	11,5	99	2,55
Tanzania	67 438 106	1 120	42,5	6	2005	2,83	91	2,34
Tunisia	12 458 223	3 603	79,3	3	2002	5,61	99,5	1,66
Zambia	20 569 737	1 266	41,6	4	1995	3,63	90	2,32

[1] In Euro

[2] In Percentage

Source: Authors.

Appendix B: Tax advantages (exemption and reduced rates) in 2023

				Custom duties on equipment			Other advantages
Country	Advantage	Number of years	Losses carry forward (Nb. Years)	Advantage	Number of years	Allowance for special taxes on turnover (% of turnover)	Other taxes
Algeria	Exemption	3	4	Exemption		0,15	Professional tax (exempt.), 3 years
Angola	Reduced rate: at 20%	2	3			0,15	
Benin	Exemption	5	3	Exemption	5	0,15	
Botswana			5				
Burkina Faso	Exemption 7 years, then reduced rates at 15% from Year 8 to 15	15	5	Reduced rate: 7.3%	7	0,15	Business Licence tax, Professional and Apprenticeship tax and IRVM exemption, 7 years.
Cameroon	Reduced rate: by 75% for the first 5 years, then by 50% from Year 6 to 10	10	4	Reduced rate: 5%			Bussiness licensing fees (exempt.), 2 years.
Central African Republic	Exemption	3	3				
Chad	Reduced rate: by 50%	5	3	Exemption		0,15	50% reduction of tax base for Business Licence, CIT min. and Apprenticeship tax, 5 years
Cote d'Ivoire	Tax credit of 25%	15	5			0,05	Tax credit (25%) on Bussiness License fees and payroll charges for national employees.
DRC	Exemption	3	Infinite	Exemption	3	0,15	Property tax, 3 years.
Egypt			5	Reduced rate: 2%		0,15	
Ethiopia	Exemption	4	5	Exemption	5	0,15	
Gabon	Exemption	3	5	Reduced rate: 5%		-	
Ghana			5			0,15	
Guinea	Exemption Year 1 and 2, then Reduced rate by 50% for Year 3 and 4, then by 25% for Year 5 and 6	6	3			0,15	Lump-sum levy on salaries, Apprenticeship tax: Reduction by 100% for the first 2 years, 50% for Year 3 and 4, 25% for Year 5 to 8.
Guinea-Bissau	Exemption Reduced rate by 90%, 80%, 70%, 60%, 40%, 20%	Year 1 and 2 Year 3, 4, 5, 6, 7	5	Exemption			
Jordan	Reduced rate: 5% in 2023		5	Exemption	4		
Kenya			Infinite	Reduced rate: 10%		0,15	
Liberia			5	Exemption	5		For investment exceeding USD$10 million, incentives may be allowed for a period up to 15 years.
Madagascar			5				
Mali	Reduce rate of 25%	15	3	Exemption	3	0,10	CIT min. exemption for any loss-making year during the first 10 years of operation.
Morocco	Exemption	3	4			0,15	Local taxes (exempt.), 5 years.
Niger	Exemption	7	3	Exemption	7	0,22	
Nigeria	Exemption	5	Infinite			0,15	Apprenticeship tax reduced by 50%.
Senegal			3	Exemption	3	0,20	Free Apprenticeship tax, 3 years. Tax on Added Value exemption, first year.
Sierra Leone			10	Exemption	3	0,15	
South Africa			Infinite			0,15	
Tanzania	Exemption	5	Infinite	Exemption		-	
Tunisia			5			0,15	
Zambia	Exemption	5	5	Exemption	5	0,15	

Source: Discussions with financial services of some telecommunication companies, investment and general tax codes, and authors assumptions.

Appendix C: Summary of assumptions

Table C.1: TELCO' s accounting and financial assumptions

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Turnover	**66010**	**1134241**	**2202473**	**3331308**	**3251886**	**5172616**	**3447341**	**3859566**	**3882510**	**5770088**	**7454520**	**6554398**	**6419493**	**5689249**	**5313265**
Turnover_Voice	64075	1100990	2151593	3180180	3077530	4767018	3217756	3496206	3529534	5061298	6349123	5541801	5140036	4341962	3882087
Non-voice	1935	33252	50880	151128	174356	405598	229585	363360	352976	708790	1105397	1012597	1279457	1347287	1431178
Turnover_Data	0	0	0	0	0	1426	13381	31839	39443	461767	646100	724935	812977	855500	925889
Capex	**118223**	**400664**	**493604**	**654268**	**753987**	**743980**	**743950**	**763877**	**628358**	**865161**	**1139789**	**1066400**	**1187036**	**913515**	**933097**
Tangible	112312	380630	468923	621554	716287	706781	706753	725683	596940	821903	1082799	1013080	1127684	867839	886442
Intangible	5911	20033	24680	32713	37699	37199	37198	38194	31418	43258	56989	53320	59352	45676	46655
Opex	**104061**	**1337417**	**1589451**	**2363431**	**2153967**	**3189870**	**2070708**	**2185562**	**2334575**	**3144257**	**4177886**	**3826665**	**3794795**	**3391647**	**3336808**
Cost of equipements	37845	42635	22677	49013	35249	51737	11072	15172	76147	1049426	745864	1052629	25936	111733	421317
Cost of personnel	55781	62841	72708	101269	37378	29513	50560	52497	87871	574690	474626	539395	331251	260609	305330
Of which wages and salaries	39047	43989	50896	70888	26165	20659	35392	36748	61510	402283	332238	377576	231876	182426	213731
Rental value of business property occupation	522	61597	74703	110657	104067	155431	100454	105895	108528	76007	147870	111732	171880	150965	130508
Other	10436	1231941	1494066	2213148	2081340	3108620	2009076	2117893	2170557	1520140	2957396	2234641	3437608	3019305	2610161
Of which sales commission on phone top-ups	1044	123194	149407	221315	208134	310862	200908	211789	217056	152014	295740	223464	343761	301930	261016
Of which petroleum products	522	61597	74703	110657	104067	155431	100454	105895	108528	76007	147870	111732	171880	150965	130508
Financial charges	**1252**	**147833**	**179288**	**265578**	**249761**	**373034**	**241089**	**254147**	**260467**	**182417**	**354888**	**268157**	**412513**	**362317**	**313219**
Depreciation charges	**4696**	**554374**	**672330**	**995917**	**936603**	**1398879**	**904084**	**953052**	**976751**	**684063**	**1330828**	**1005588**	**1546924**	**1358687**	**1174572**
Minutes	**22754681**	**25634809**	**7543492**	**63105054**	**60215827**	**35964371**	**6986657**	**70723390**	**37231002**	**4455184**	**32297108**	**43320824**	**121076391**	**94303140**	**80398053**
Data[1]	**0**	**0**	**0**	**0**	**0**	**43**	**195**	**314**	**364**	**498**	**1099**	**776**	**645**	**1065**	**1684**
Traffic SMS	**2028695**	**2285473**	**574864**	**4237810**	**2445713**	**5937622**	**7212198**	**22390254**	**20209418**	**50942979**	**29260374**	**35319980**	**39489909**	**57446968**	**81235976**

[1] in Megabyte

Source: Authors.

Table C.2: Summary of assumptions.

Parameters	Percentage
Rental value of business property occupation in Other* Opex	5
Wages and salaries in cost of personnel	70
Sales commission on phone top-ups in Other* Opex	10
Petroleum products share in other Opex	5
Discount rate	10
Imported capex in total capex	80
Share of tangible capex in total capex	95
Debt to capital ratio	60
Equity to capital ratio	40
Interest rate	10
Repayment period	5
Share of salaries paid to foreign workers	5

Source : Authors assumptions.

* Other OPEX = Total OPEX minus costs of personnel and equipment.

Table C.3: Tangible CAPEX breakdown and details on depreciation charges determination

	First year % in tangible capex	Other year % in tangible capex	Duration	Straight line depreciation allowance rate
Civil engineering Photovoltaic machines Pylon	50%	30%	10 years	10%
Network hardware Base transceiver station Transmitting devices Waveguide devices	35%	55%	10 years	10%
VSAT equipment Cold equipment Computer equipment Software licences Rolling equipment Others	15%	15%	5 years	20%

Source : Authors.

Table C.4: TELCO's assets composition.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Civil engineering Photovoltaic machines Pylon	56156	114189	140677	186466	214886	212034	212026	217705	179082	246571	324840	303924	338305	260352	265933
Network hardware	39309	209347	257908	341855	393958	388729	388714	399126	328317	452046	595540	557194	620226	477311	487543
Base transceiver station Transmitting devices Waveguide devices															
VSAT equipment Cold equipment Computer equipment Software licences Rolling equipment Others	16847	57095	70339	93233	107443	106017	106013	10885289541		123285	162420151962		169153	130176132966	

Source: Authors calculations based on GSMA Intelligence database.

Appendix D: Sensitivity analysis

Table D.1: Interest rate 6 percent

Country	AETR	AETR for a standard firm	AEGTR	AESTR	AESTR Ad Quantum	AESTR Ad Valorem	AETR exluding license fees	AETR CIT	AETR when no Deduction	AETR exluding license fees when no Deduction
	1	2	3	4	5	6	7	8	9	10
Algeria	0.67	0.45	0.41	0.26	0.02	0.15	0.58	0.27	0.71	0.62
Angola	0.94	0.42	0.53	0.41	0.01	0.04	0.58	0.42	0.96	0.60
Benin	0.79	0.44	0.39	0.40	0.02	0.22	0.63	0.26	0.84	0.68
Botswana	0.43	0.35	0.32	0.10	0.00	0.10	0.43	0.26	0.45	0.45
Burkina Faso	0.72	0.28	0.24	0.48	0.01	0.25	0.50	0.12	0.75	0.53
Cameroon	0.88	0.48	0.44	0.44	0.01	0.19	0.63	0.19	0.92	0.67
Chad	0.91	0.47	0.29	0.62	0.01	0.54	0.85	0.22	1.08	1.02
Cote d'Ivoire	0.96	0.47	0.42	0.54	0.00	0.33	0.75	0.15	1.03	0.82
DRC	1.13	0.46	0.33	0.80	0.11	0.37	0.80	0.20	1.27	0.94
Egypt	1.31	0.36	0.31	1.00	0.00	0.21	0.52	0.25	1.36	0.57
Ethiopia	3.76	0.41	0.34	3.42	0.00	0.25	0.59	0.25	3.83	0.66
Gabon	0.80	0.53	0.43	0.37	0.02	0.33	0.78	0.25	0.90	0.88
Ghana	0.64	0.48	0.46	0.18	0.01	0.07	0.54	0.26	0.65	0.55
Guinea	0.83	0.40	0.39	0.44	0.08	0.28	0.74	0.25	0.94	0.85
Guinea Bissau	0.66	0.53	0.51	0.15	0.08	0.06	0.65	0.18	0.69	0.68
Jordan	1.35	0.64	0.58	0.77	0.00	0.37	0.95	0.17	1.44	1.05
Kenya	0.85	0.46	0.29	0.55	0.00	0.49	0.79	0.18	0.99	0.93
Liberia	0.66	0.36	0.30	0.36	0.12	0.21	0.63	0.19	0.72	0.69
Madagascar	0.80	0.39	0.33	0.47	0.00	0.33	0.66	0.16	0.86	0.72
Mali	0.93	0.39	0.35	0.58	0.00	0.19	0.55	0.21	0.98	0.59
Morocco	0.76	0.57	0.52	0.23	0.00	0.12	0.65	0.38	0.80	0.69
Niger	0.79	0.31	0.26	0.53	0.04	0.20	0.50	0.14	0.84	0.56
Nigeria	1.34	0.48	0.47	0.87	0.00	0.06	0.53	0.36	1.36	0.54
RCA	1.10	0.50	0.45	0.65	0.00	0.19	0.64	0.30	1.15	0.69
Senegal	0.87	0.50	0.44	0.43	0.00	0.17	0.61	0.29	0.92	0.66
Sierra Leone	0.51	0.38	0.35	0.16	0.04	0.11	0.50	0.26	0.54	0.53
South Africa	0.70	0.36	0.35	0.35	0.00	0.03	0.38	0.35	0.71	0.39
Tanzania	1.25	0.40	0.29	0.96	0.02	0.43	0.75	0.21	1.36	0.86
Tunisia	0.84	0.52	0.58	0.25	0.00	0.10	0.69	0.33	0.87	0.72
Zambia	0.60	0.44	0.46	0.14	0.02	0.07	0.56	0.36	0.63	0.58

Source: Authors.

Table D.2: Sensitivity analysis: Robustness: License to investment Interest rate 10%

Country	AETR	AETR for a standard firm	AEGTR	AESTR	AESTR Ad Quantum	AESTR Ad Valorem	AETR exluding license fees	AETR CIT	AETR when no Deduction	AETR exluding license fees when no Deduction
	1	2	3	4	5	6	7	8	9	10
Algeria	0.62	0.48	0.44	0.19	0.02	0.17	0.62	0.29	0.67	0.67
Angola	0.88	0.65	0.80	0.08	0.02	0.06	0.88	0.62	0.91	0.91
Benin	0.73	0.51	0.44	0.29	0.02	0.26	0.73	0.29	0.80	0.80
Botswana	0.42	0.33	0.31	0.10	0.00	0.10	0.42	0.25	0.44	0.44
Burkina Faso	0.63	0.35	0.31	0.33	0.01	0.32	0.63	0.14	0.67	0.67
Cameroon	0.83	0.63	0.57	0.25	0.01	0.25	0.83	0.24	0.88	0.88
Chad	0.89	0.48	0.29	0.59	0.01	0.58	0.89	0.22	1.07	1.07
Cote d'Ivoire	0.94	0.58	0.52	0.42	0.00	0.42	0.94	0.18	1.02	1.02
DRC	1.18	0.67	0.47	0.71	0.16	0.55	1.18	0.27	1.38	1.38
Egypt	2.41	1.63	1.40	1.01	0.01	1.00	2.41	1.12	2.64	2.64
Ethiopia										
Gabon	0.78	0.52	0.42	0.36	0.02	0.33	0.78	0.24	0.88	0.88
Ghana	0.59	0.52	0.50	0.09	0.02	0.07	0.59	0.28	0.60	0.60
Guinea	0.79	0.42	0.41	0.39	0.08	0.30	0.79	0.25	0.91	0.91
Guinea Bissau	0.65	0.53	0.50	0.15	0.08	0.06	0.65	0.17	0.67	0.67
Jordan	1.55	1.03	0.93	0.61	0.00	0.61	1.55	0.25	1.71	1.71
Kenya	0.82	0.47	0.30	0.53	0.00	0.53	0.82	0.18	0.98	0.98
Liberia	0.64	0.36	0.30	0.34	0.12	0.22	0.64	0.18	0.70	0.70
Madagascar	0.75	0.45	0.37	0.38	0.00	0.38	0.75	0.18	0.83	0.83
Mali	0.87	0.62	0.55	0.32	0.01	0.32	0.87	0.33	0.94	0.94
Morocco	0.71	0.62	0.57	0.14	0.00	0.14	0.71	0.40	0.75	0.75
Niger	0.69	0.42	0.34	0.34	0.06	0.28	0.69	0.18	0.76	0.76
Nigeria	2.76	2.52	2.43	0.32	0.02	0.31	2.76	1.89	2.84	2.84
RCA	1.16	0.90	0.80	0.35	0.00	0.35	1.16	0.53	1.25	1.25
Senegal	0.81	0.65	0.57	0.24	0.00	0.23	0.81	0.37	0.88	0.88
Sierra Leone	0.49	0.38	0.34	0.15	0.04	0.11	0.49	0.25	0.53	0.53
South Africa	0.54	0.51	0.49	0.05	0.00	0.05	0.54	0.49	0.55	0.55
Tanzania	1.47	0.77	0.56	0.91	0.05	0.87	1.47	0.40	1.69	1.69
Tunisia	0.79	0.60	0.67	0.12	0.00	0.12	0.79	0.37	0.83	0.83
Zambia	0.57	0.44	0.46	0.10	0.02	0.08	0.57	0.36	0.60	0.60

Source: Authors.

Table D.3: Sensitivity analysis: Robustness: License to investment Interest rate 6%

Country	AETR	AETR for a standard firm	AEGTR	AESTR	AESTR Ad Quantum	AESTR Ad Valorem	AETR exluding license fees	AETR CIT	AETR when no Deduction	AETR exluding license fees when no Deduction
	1	2	3	4	5	6	7	8	9	10
Algeria	0.64	0.50	0.45	0.19	0.02	0.17	0.64	0.30	0.68	0.68
Angola	0.91	0.67	0.83	0.08	0.02	0.06	0.91	0.65	0.94	0.94
Benin	0.75	0.53	0.46	0.29	0.02	0.26	0.75	0.31	0.81	0.81
Botswana	0.43	0.35	0.32	0.10	0.00	0.10	0.43	0.26	0.45	0.45
Burkina Faso	0.64	0.36	0.32	0.33	0.01	0.32	0.64	0.15	0.68	0.68
Cameroon	0.84	0.64	0.59	0.25	0.01	0.25	0.84	0.25	0.89	0.89
Chad	0.90	0.50	0.31	0.59	0.01	0.58	0.90	0.24	1.09	1.09
Cote d'Ivoire	0.95	0.59	0.53	0.42	0.00	0.42	0.95	0.20	1.04	1.04
DRC	1.20	0.69	0.49	0.71	0.16	0.55	1.20	0.29	1.40	1.40
Egypt	2.47	1.69	1.46	1.01	0.01	1.00	2.47	1.18	2.69	2.69
Ethiopia										
Gabon	0.79	0.54	0.44	0.36	0.02	0.33	0.79	0.26	0.90	0.90
Ghana	0.60	0.53	0.51	0.09	0.02	0.07	0.60	0.29	0.61	0.61
Guinea	0.81	0.44	0.43	0.39	0.08	0.30	0.81	0.27	0.93	0.93
Guinea Bissau	0.66	0.54	0.51	0.15	0.08	0.06	0.66	0.18	0.69	0.69
Jordan	1.57	1.05	0.96	0.61	0.00	0.61	1.57	0.28	1.73	1.73
Kenya	0.84	0.49	0.31	0.53	0.00	0.53	0.84	0.19	0.99	0.99
Liberia	0.65	0.37	0.31	0.34	0.12	0.22	0.65	0.20	0.71	0.71
Madagascar	0.77	0.46	0.39	0.38	0.00	0.38	0.77	0.19	0.84	0.84
Mali	0.89	0.64	0.57	0.32	0.01	0.32	0.89	0.35	0.96	0.96
Morocco	0.73	0.64	0.59	0.14	0.00	0.14	0.73	0.42	0.77	0.77
Niger	0.70	0.44	0.36	0.34	0.06	0.28	0.70	0.19	0.78	0.78
Nigeria	2.84	2.60	2.52	0.32	0.02	0.31	2.84	1.97	2.93	2.93
RCA	1.19	0.93	0.83	0.35	0.00	0.35	1.19	0.56	1.28	1.28
Senegal	0.83	0.67	0.59	0.24	0.00	0.23	0.83	0.39	0.90	0.90
Sierra Leone	0.50	0.39	0.35	0.15	0.04	0.11	0.50	0.26	0.54	0.54
South Africa	0.56	0.53	0.52	0.05	0.00	0.05	0.56	0.51	0.57	0.57
Tanzania	1.50	0.80	0.59	0.91	0.05	0.87	1.50	0.43	1.72	1.72
Tunisia	0.81	0.61	0.69	0.12	0.00	0.12	0.81	0.39	0.85	0.85
Zambia	0.58	0.46	0.48	0.10	0.02	0.08	0.58	0.38	0.61	0.61

Source: Authors.

Appendix E: The case of Mali

Mali is a Western African country with a GDP of approximately EUR 19.32 billion at the end of 2023. The telecommunications sector contributes nearly 4% of this GDP. Three telecommunications companies operate on its market: Orange, Moov and Telecel. The market penetration rate is estimated at around 42%, indicating growth potential, with coverage reaching nearly 32%. The country's GDP per capita stood at EUR 829.96 as of 2023.
We utilize the original language of tax laws and decrees, which, in the case of Mali, is French.

Appendix E.1: General Taxation Law

Impôt sur les bénéfices industriels et commerciaux (BIC)

2012, BIC, Taux
« Article 85 (nouveau) :
Le taux de l'impôt [sur les bénéfices industriels et commerciaux] est fixé à 30%.
La base taxable est arrondie au millier de francs inférieurs. »
MLI 2012 LF Loi 2011-078 AnnexeFiscale Part1 Art3
Modifie – MLI 2012 CGI Loi 2006-067 Art85
MLI 2014 CGI Loi 2006-067 Art85
MLI 2015 CGI Loi 2006-067 Art85
MLI 2016 CGI Loi 2006-067 Art85
MLI 2021 CGI Loi 2060-067 Art85 complet+
Régimes d'imposition
Régime de l'impôt synthétique :
2007 (CGI) et 2014 (CGI) :
Sont soumis à ce régime :
– Exploitants individuels au CA/an inférieur à 30 000 000 XOF ht.
Ne peuvent pas être soumis à ce régime :
– Personnes morales.
– Titulaires de charges et offices, avocats, conseils juridiques et fiscaux, comptables et experts comptables.
– Entreprises d'importation/exportation.
– Personnes redevables de la patente.
– Personnes exploitant plusieurs établissements.
Sont exonérés de l'impôt synthétique :
– Exploitants individuels durant leur première année civile d'activité.
Les exploitants individuels soumis à l'impôt synthétique deviennent soumis au régime réel dès que leur CA passe au-dessus du seuil. Ils ne redeviennent soumis à l'impôt synthétique que si leur CA repasse en-dessous du seuil durant les 2 années suivantes.
Les exploitants individuels soumis à l'impôt synthétique peuvent opter pour le régime réel simplifié avant le 1er novembre de chaque année. L'option prend effet à compter du 1er janvier de l'année suivant l'option. L'option n'est révocable qu'après 3 ans. La dénonciation de l'option doit alors intervenir durant le mois de janvier.
2014 (LF), 2015 (CGI) et 2016 (CGI) :
Sont soumises à ce régime :
– Entreprises au CA/an inférieur à 50 000 000 XOF HT.
Ne peuvent pas être soumises à ce régime :
– Conseils fiscaux, comptables agréés et experts comptables agréés.
– Entreprises agréées au Code des Investissements.
Sont exonérées de l'impôt synthétique :
– Entreprises durant leur première année civile d'activité.

Les personnes soumises à l'impôt synthétique deviennent soumises au régime réel dés que leur CA passe au-dessus le seuil. Elles ne redeviennent soumises à l'impôt synthétique que si leur CA repasse en-dessous du seuil durant les 2 années suivantes.
Les personnes soumises à l'impôt synthétique peuvent opter pour le régime réel simplifié avant le 1er novembre de chaque année. L'option prend effet à compter du 1er janvier de l'année suivant l'option. L'option n'est révocable qu'après 3 ans. La dénonciation de l'option doit alors intervenir durant le mois de janvier.
Régime du bénéfice réel simplifié :
2007 (CGI) et 2014 (CGI) :
Sont soumis à ce régime :
– Exploitants individuels, qui vendent des marchandises, objets, fournitures et denrées à emporter ou à consommer sur place, ou qui fournissent le logement, au CA/an compris entre 30 000 000 et 100 000 000 XOF hors TVA.
– Exploitants individuels, qui exercent d'autres activités, au CA/an compris entre 30 000 000 et 50 000 000 XOF hors TVA.
Les exploitants individuels soumis au régime réel simplifié deviennent soumis à l'impôt synthétique lorsque leur CA s'abaisse en-dessous du seuil durant 3 années consécutives.
2014 (LF), 2015 (CGI) et 2016 (CGI) :
Sont soumises à ce régime :
– Personnes au CA/an compris entre 50 000 000 et 250 000 000 XOF hors TVA.
Les personnes soumises au régime réel simplifié deviennent soumises à l'impôt synthétique lorsque leur CA s'abaisse en-dessous du seuil durant 3 années consécutives.
Régime du bénéfice réel normal :
2007 (CGI) et 2014 (CGI) :
Sont soumis à ce régime :
– Contribuables, qui vendent des marchandises, objets, fournitures et denrées à emporter ou à consommer sur place, ou qui fournissent le logement, au CA/an supérieur à 100 000 000 XOF hors TVA.
– Contribuables, qui exercent d'autres activités, au CA/an supérieur à 50 000 000 XOF hors TVA.
2014 (LF), 2015 (CGI) et 2016 (CGI) :
Sont soumises à ce régime :
– Personnes au CA/an supérieur à 250 000 000 XOF hors TVA.

Report des pertes ordinaires

2021 (CGI) : 3 ans.

Taux

2021 (CGI) : 30%.

Impôt minimum forfaitaire (IMF)

2015, IMF, Redevables, Assiette, Taux, Montant minimum

« Article 86 A :
Le montant de l'impôt dû par les contribuables imposés suivant le régime du bénéfice réel ne peut être inférieur à 1% du montant du chiffre d'affaires hors taxe arrondi au millier de francs inférieurs.
En ce qui concerne les entreprises soumises à l'impôt sur les sociétés, le chiffre d'affaires est le montant des produits d'exploitation et des produits accessoires.
Ce minimum forfaitaire est dû même en cas de déficit et quelle que soit l'importance du déficit.
Lorsque le chiffre d'affaires est supérieur ou égal au seuil d'assujettissement du bénéfice réel d'imposition, le minimum forfaitaire visé au premier alinéa du présent article ne peut être inférieur à la fraction de l'impôt sur les bénéfices industriels et commerciaux contenu dans le montant maximum des cotisations. »
MLI 2015 LF Loi 2014-056 Annexe Fiscale Part1 Art.3
Modifie – MLI 2015 CGI Loi 2006-067 Art86
MLI 2016 CGI Loi 2006-067 Art86
MLI 2021 CGI Loi 2006-067 Art86 complet+

Redevables :
2021 (CGI) : Contribuables soumis au régime du bénéfice réel.
Assiette :
2021 (CGI) : « Chiffre d'affaires hors taxe ».
Taux :
2021 (CGI) : 1%.
Montant minimum :
2021 (CGI) : « Fraction de l'impôt sur les bénéfices industriels et commerciaux contenu dans le montant maximum des cotisations ».

Contribution forfaitaire à la charge des employeurs (CFE)
2008, CFE, Assiette, Taux
Les dispositions de l'article 160 de la Loi n°06-067 du 29 décembre 2006 portant Code Général des Impôts sont abrogées et remplacées par celles qui suivent :
« Article 160 (nouveau) :
La contribution forfaitaire [à la charge des employeurs] dont le taux est fixé à 3,5% est calculée sur le montant brut des rémunérations, traitements, salaires, indemnités, payés à l'ensemble de leur personnel par les personnes et sociétés visées à l'article 159 [précédent] du présent Code, y compris la valeur réelle des avantages en nature.
La base taxable est arrondie aux mille francs inférieurs. »
MLI 2008 CGI Loi 2008-020 Art1
MLI 2014 CGI Loi 2006-067 Art160
MLI 2015 CGI Loi 2006-067 Art160
MLI 2016 CGI Loi 2006-067 Art160
MLI 2021 CGI Loi 2006-067 Art160 complet+
Redevables
2021 (CGI) :
Particuliers et sociétés redevables de l'impôt sur les sociétés (IS), de l'impôt sur les bénéfices industriels et commerciaux (BIC) et de l'impôt sur les bénéfices agricoles (BA).
Assiette, Taux
Assiette :
2021 (CGI) :
« Montant brut des rémunérations, traitements, salaires, indemnités […], y compris la valeur réelle des avantages en nature. »
Taux :
2021 (CGI) : 3,5%.

Taxe de formation professionnelle
2007, Taxe de formation professionnelle, Assiette, Taux
La taxe de Formation Professionnelle dont le taux est fixé à 2%, est calculée sur le montant brut des rémunérations, traitements, salaires, indemnités payées à l'ensemble de leur personnel par les personnes visées à l'article [précédent] 183 du présent Code, y compris la valeur réelle des avantages en nature.
La base taxable est arrondie aux mille francs inférieurs.
MLI 2007 CGI Loi 2006-067 Art184
MLI 2014 CGI Loi 2006-067 Art184
MLI 2015 CGI Loi 2006-067 Art184
MLI 2016 CGI Loi 2006-067 Art184
Redevables
2016 (CGI) :
Particuliers et sociétés redevables de l'impôt sur les sociétés (IS), de l'impôt sur les bénéfices industriels et commerciaux (BIC) et de l'impôt sur les bénéfices agricoles (BA).

Assiette, Taux

Assiette : 2016 (CGI) :
« Montant brut des rémunérations, traitements, salaires, indemnités […], y compris la valeur réelle des avantages en nature. »
Taux : 2016 (CGI) : 2%.

Contribution de Sécurité Sociale

2006, Contribution de Sécurité Sociale, Taux

Art.1.- Le présent Code comprend les régimes suivants :

- un régime de Prestations Familiales ;
- un régime de Réparation et de Prévention des Accidents du Travail et des Maladies Professionnelles ;
- un régime d'Assurance Vieillesse, Invalidité et Décès ;
- un régime de Protection contre la Maladie.

Loi n°99-041 du 12 août 1999 portant Code de prévoyance sociale
Modifié par :
- la loi n°03-036 du 30 décembre 2003
- la loi n°06-008 du 23 janvier 2006
Taux

Assiette : « Salaires, traitements et autres rémunérations, y compris les avantages en nature. »
Taux :
Prestations familiales : 8%.
Assurance maladie obligatoire : 3,5%.
Vieillesse, Invalidité et Décès : 5,4%.
Accidents du Travail et des Maladies Professionnelles : 1%.
Taxe au titre de l'ANPE (Agence Nationale pour l'Emploi) : 1%.

Contribution des patentes

2020, Taxe d'apprentissage et formation professionnelle, Assiette

Art.134.- La contribution des patentes se compose des éléments suivants :

- 1° un droit fixe ;
- 2° un droit proportionnel sur la valeur locative des locaux professionnels. Ces droits sont réglés conformément aux tableaux A, B et C annexés au présent chapitre.

Art.144.- Les droits fixes de patente et les taxes variables sont fixés par le tarif des patentes annexé au présent chapitre.
Le droit proportionnel est fixé à 10 % de la valeur locative déterminée conformément à l'article 140 du présent Code.
En aucun cas, le droit proportionnel ne peut être inférieur au quart du droit fixe.
Art.144-A.- Le tarif des patentes est fixé comme suit :

- 1ère zone : district de Bamako
- 2e zone : chefs-lieux de régions
- 3e zone : autres localités

Code des impôts, MAJ (L.F.2014, L.F.2015, L.F.R.2017)
Taux

Assiette : « valeur locative »
Droit fixe : Montant : 1 000 000 FCFA
Droit proportionnel : Taux : 0,35%.

Taxe sur la valeur ajoutée (TVA)

2012, TVA, Taux normal, Taux réduit

« Article 229 (nouveau) : Les taux de la taxe sur la valeur ajoutée sont fixés ainsi qu'il suit :

– 5% pour les produits visés au point D) de la Sous-Section I de la Section I du Chapitre I du Titre II du Code Général des Impôts ci-dessus ;
– 18% pour les autres produits et les services non exonérés en application des dispositions du point IV Produits (nouveau) de l'article 195 du Code Général des Impôts ci-dessus. »
MLI 2012 LF 2011-078 Annexe Fiscale Part1 Art7
Modifie – MLI 2012 CGI Loi 2006-067 Art229
MLI 2014 CGI Loi 2006-067 Art229
MLI 2015 CGI Loi 2006-067 Art229
MLI 2016 CGI Loi 2006-067 Art229
MLI 2021 CGI Loi 2006-067 Art229 complet+
Assujettissement de plein droit
2021 (CGI) :
– Personnes physiques ou morales au CA/an supérieur à 50 000 000 XOF ht.
– Importateurs.
Assiette
2007 (CGI), 2014 (CGI), 2015 (CGI) et 2016 (CGI) :
– **Livraisons de biens** : « toutes les sommes, valeurs, biens ou services reçus ou à recevoir par le fournisseur en contrepartie de la vente ».
– **Prestations de services** : « toutes les sommes, valeurs, biens ou services reçus ou à recevoir par le prestataire en contrepartie de sa prestation ».
– **Importations** : « valeur CAF franco frontière ».
– **Travaux immobiliers** : « montant des marchés, mémoires ou factures ».
– **Crédit-bail** : « prix de cession convenue au contrat » si l'option d'achat est levée ou « prix de cession » en cas de vente à un tiers.
– **Négociants en biens d'occasion** : « différence entre le prix de vente et le prix de revient » lorsque le bien d'occasion a été acquis auprès d'un non-assujetti.
– **Agences de voyage et organisateurs de circuits touristiques** : « différence entre le prix facturé au client et le prix payé par l'agence » lorsqu'il y a entremise.
– **Commissionnaires de transport et transitaires** : « rémunération brute, hors TVA et débours afférents au transport et dédouanement ».
– **Spectacles cinématographiques et autres** : « montant total de la recette issue de la vente des billets, hors TVA et droits de timbre ».
Dans tous les cas, sont inclus : « les impôts, taxes, droits et prélèvements de toute nature, hors TVA », « les frais accessoires (commissions, intérêts, frais d'emballage, de transport, d'assurance) », « les indemnités n'ayant pas le caractère de dommage et intérêt » et « les subventions ».
Dans tous les cas, sont exclus : « les escomptes de caisse, remises, rabais, ristournes et autres réductions de prix », « les indemnités ayant le caractère de dommage et intérêt », « les sommes perçues à titre de consignation lors de la livraison d'emballages », « les primes et subventions d'équipement », « les sommes versées aux intermédiaires, sauf agences de voyage et organisateurs de circuits touristiques » et « les débours ».
Taux
2021 (CGI) :
Taux normal : 18%.
Taux réduit : 5% sur le matériel informatique et le matériel de production d'énergie solaire, éolienne et la bioénergie. Voir la liste complète.

Douanes
2014, Tarif Extérieur Commun de l'UEMOA, Adoption, Taux
Article premier :
Les articles 5 ; 6 ; 7 ; 9 ; et 10 du Règlement n°02/97/97/CM/UEMOA du 28 novembre 1997, portant adoption du Tarif Extérieur Commun de l'UEMOA sont modifiés comme suit :
« ... »

Article 7 nouveau :
Les tarifs de Droit de Douanes (DD) … sont fixés comme suit : 0%, 5%, 10%, 20%, 35%.
« … »
Règlement n° 06/2014/CM/UEMOA du 25 septembre 2014 portant modification du Règlement n°02/97/97/CM/UEMOA portant adoption du Tarif Extérieur Commun
1997, Redevance statistique, Taux
Article 8 :
Le Taux de la Redevance Statistique (RS) est fixé à 1%, applicable à tous les produits exonérés ou non.
Règlement n°02/97/CM/UEMOA portant adoption du Tarif Extérieur Commun de l'Union Economique et Monétaire Ouest Africaine (UEMOA)
2018, Prélèvement Communautaire de Solidarité (PCS), Taux
Article premier :
Le Prélèvement Communautaire de Solidarité (PCS) institué par l'Acte additionnel n° 04/96 du 10 mai 1996 susvisé, est maintenu à 0,8% de la valeur en douane des marchandises importées des pays tiers par les Etats membres de l'Union pour compter du 1er janvier 2019, pour une période d'un an.
Acte additionnel n° 01/2018/CCEG/UEMOA fixant le taux du Prélèvement Communautaire de Solidarité (PCS)
1996, Prélèvement Communautaire CEDEAO, Instauration, Taux
Article 7 : Le taux du Prélèvement Communautaire est fixé à 0,5% de la valeur des marchandises importées des pays tiers. « … »
A/P1/7/96 protocole relatif aux conditions d'application du Prélèvement Communautaire

Appendix E.2: Specific Taxation of the telecommunication sector
Définitions
1999, Entreprise de Télécommunications/TIC, Définition
ARTICLE 8 : Définitions
Au sens de la présente ordonnance, on entend par :
Opérateur : toute personne physique ou morale de droit public ou privé exploitant un service de télécommunications soumis à licence ou à déclaration.
Réseau de télécommunications ouvert au public : tout réseau de télécommunications établi ou utilisé pour la fourniture au public de services de télécommunications.
Service de téléphonie mobile : le service de téléphonie pour lequel la connexion entre l'équipement terminal et le point de terminaison du réseau est assurée par radio.
ORDONNANCE N°99-043/P-RM du 30 sept. 1999 Régissant les télécommunications en République du Mali

Frais de spectres radioélectriques
1999, Spectres radioélectriques, Définition
ARTICLE 8 : Définitions :
Au sens de la présente ordonnance, on entend par :
Gestion du spectre des fréquences radioélectriques : l'ensemble des actions administratives et techniques visant à assurer une utilisation rationnelle du spectre des fréquences, radioélectriques par les utilisateurs.
ORDONNANCE N°99-043/P-RM du 30 sept. 1999 Régissant les télécommunications en République du Mali
2004, Redevances de spectres radioélectriques, Montant
ARTICLE 5 : Les montants des redevances calculés suivant la colonne 3 du tableau IV, et pour les rubriques 1 à 3 sont corrigés par un coefficient de dégressivité tenant compte du nombre de stations utilisant la même assignation de fréquences selon le tableau ci-après…
ARRETE N°04-2328/MCNT-MEF-SG du 22 octobre 2004 portant Barême Tarifaire des Redevances pour l'utilisation des Fréquences Radioélectrique

Droits fixes

Attribution : le montant varie en fonction de la bande de fréquence utilisée et de la couverture géographique.

Frais de Licence

2000, Licence, Contrepartie financière

Licence : autorisation d'établir et d'exploiter un réseau de télécommunications ouvert au public et/ou la fourniture d'un service de téléphonie dans le cadre prévu par l'article 10 de l'ordonnance.

DECRET N°00-228/P-RM du 10 mai 2000 Fixant les critères et les procédures d'octroi de licences de Télécommunication.

2021, Contrepartie financière, Licence neutre

Droits fixes

2021 :

– Attribution : 160 000 000 000 XOF.

– Durée : 15 ans.

Frais de l'organismes de réglementation

2017, Redevances et contributions financières, Instauration

ARTICLE 40 : Montants des redevances et contributions

40.1 La redevance de régulation du secteur vise à recouvrer, du titulaire de licence, sa part respective du coût annuel des activités de l'AUTORITE.

40.2 Le montant de la redevance de régulation du secteur est fixé à un pour cent (1%) du chiffre d'affaires du titulaire de licence pour l'année précédente. Aux fins du présent article, l'expression « chiffre d'affaires » signifie le chiffre d'affaires net de toute taxe d'interconnexion.

(…)

Décret n°2017-0595/P-RM du 21 juillet 2017

DECRET N°01-263/P-RM du 21 juin 2001 fixant la procédure d'octroi d'une licence d'établissement et d'exploitation de réseaux et services de télécommunications

Taux

Assiette : « Chiffre d'affaires ».

Montant :

140 000 000 francs CFA pour chacune des deux premières années.

Trois années suivantes, le montant de l'année N sera celui de l'année N-1 majoré de 15%.

Pour les années suivantes, le montant de la redevance est déterminé comme décrit à l'article 40.2 ci-dessus.

Taux : 1%.

Taxe d'accès aux réseaux de télécommunications

2013, Taxe sur les entreprises de télécommunication, Instauration

Art.253-AA. - (L.F.2013) Il est institué, au profit du budget de l'État, une taxe dénommée « Taxe sur l'Accès au Réseau des Télécommunications Ouvert au Public », en abrégé TARTOP.

Art.253-AC.- (L.F.2013, Loi n°2015-012) L'assiette de la taxe est constituée par le montant hors TVA du chiffre d'affaires réalisé par le titulaire d'une licence d'exploitation du réseau des télécommunications ouvert au public.

Art.253-AE. - Le taux de la taxe est fixé à 5 %.

Art.253-AF. - Les titulaires de licences d'exploitation du réseau des télécommunications ouvert au public fixes et/ou mobiles sont les redevables réels et légaux de la taxe.

CGI (L.F.2013, Loi n°2015-012)

Taux

Assiette : « montant hors TVA du chiffre d'affaires ».

Taux : 5%.

Droits de numérotation

2018, Utilisation de ressources de numérotation, Instauration

Article 1er : Les titulaires de ressources en numérotation téléphonique sont assujettis au paiement d'une redevance annuelle pour l'utilisation, la gestion et 1e contrôle desdites ressources. Les taux de cette redevance sont fixés comme suit :

- 200 francs CFA par numéro pour les numéros longs ; (…)

Arrêté N°08-0810MCNT-SG du 21 mars 2008

Droits

Service téléphonique, type de numéro long :
Redevance d'utilisation : 200 XOF.

Service universel de la télécommunication

2017, Redevances et contributions financières, Instauration

Article 40 : Montants des redevances et contributions (…)

40.6 Le montant de la contribution annuelle à un fonds de service ou d'accès universel, un fonds d'accès multisectoriel ou tout fonds équivalent, est fixé à deux pour cent (2%) du chiffre d'affaires du titulaire de licence pour l'année précédente.

Décret n°2017-0595/P-RM du 21 juillet 2017

DECRET N°01-263/P-RM du 21 juin 2001 fixant la procédure d'octroi d'une licence d'établissement et d'exploitation de réseaux et services de télécommunications

Taux

Assiette : « Chiffre d'affaires ».
Taux : 2%.

Appendix E.3: Results

TELCO's accounting data

This study evaluates the Average Effective Tax Rate (AETR) of a telecommunications company (TELCO) operating a license obtained in 2023 for a 15-year period in Mali, using a Net Present Value (NPV) model of cash flows. TELCO's financial statements over the license period are modeled based on the GSMA Intelligence database. For further details on the modeling of TELCO's financial statements, please refer to the section presenting the methodology.

Figure E.1: Profile of TELCO's turnover, CAPEX and OPEX in Mali

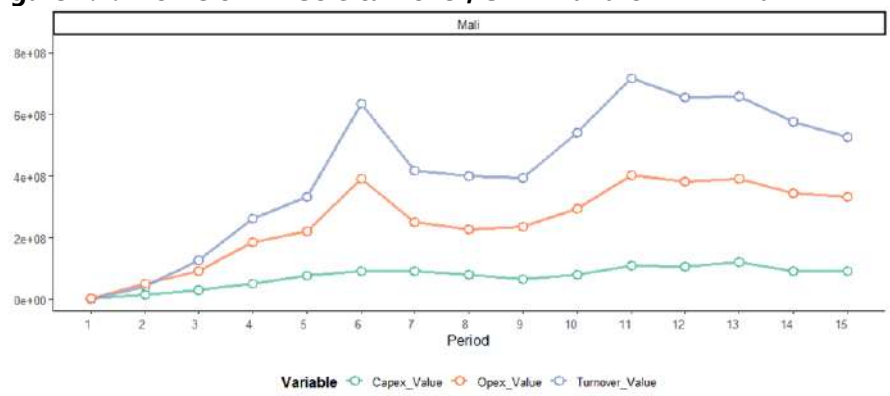


Figure E.2: Actual versus predicted turnover in Mali

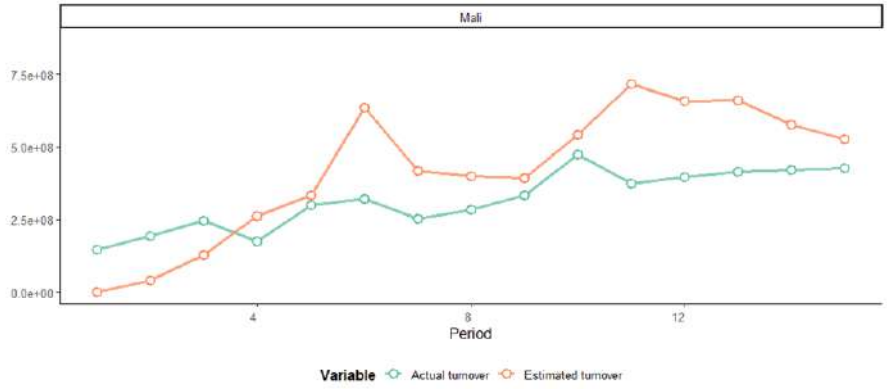


Table E.1: Key changes in tax rates

Taxes	General tax system			Special taxation	
	Corporate Income Tax (CIT)	Social Security contribution [*]	Non deductible VAT [*]	Universal service fund	Regulatory agency financing levy [*]
Taxable base	Profits	Wages	Before tax Goods and services value	Before tax turnover	
2018	0.25	-	-	0.01	-
2023	0.30	0.189	0.18	0.02	0.01

Source: General tax codes and finances acts.

[*] New added tax.

Table *E.2*: Direct taxes as of 2023

Direct taxes	Corporate Income Tax (CIT)	CIT minimum perception	Other direct taxes					Social Security contribution
			Apprenticeship tax	Professional tax	Property tax	Commercial publicity tax	Other taxes	
Taxable base	Profits	Turnover	Wages	Turnover, lump sum or rental value of property	Fixed assets value inclusive of all taxes	Costs, number or area of advertising mediums days or operations	Turnover	Wages
Rates	0.30	0.01	0.02	1,524 euros ; 0.10	-	-	-	0.189
Sample average	0.29	0.01	0.02	1.005,35 [*] ; 0.07	0.095	0.07	0.02	0.14

Source: General tax codes and finances acts.

[*] Average professional lump sum tax, excluding Niger.

Table *E.3*: Indirect taxes, customs duties and fees in 2023

Indirect taxes	Custom duties	Non deductible VAT	Community Solidarity levy	Statistical import charge	Community levies [1]	OHADA levy [2]	Pre-shipment inspection tax
Taxable base	CIF imports value	Before tax Goods and services value	CIF imports value				
Rates	0.05; 0.10; 0.20; 0.35	0.18	0.008	0.01	0.005	-	0.01
Sample average	0.16	0.17	0.013	0.015	0.005	0.0005	0.008

Source: General tax codes and finances acts.

[1] Community integration levy: Central African Economic and Monetary Community (CEMAC), Eastern Africa Community (EAC), Economic Community of West African States (ECOWAS), South Africa Custom Union (SACU), Western African Economic and Monetary Union (WAEMU).

[2] Harmonisation of Business Law in Africa (OHADA).

Table *E.4*: Special taxation in 2023

Special taxes	Latest paid licence fees by a MNO [*]	Tax on national traffic	Tax on international inbound traffic	Telecommunication network access tax	Numbering fees	Universal service fund	Research and development fund	Regulatory agency financing levy	Annual fees on turnover	Interconnection activities management fees	Excise taxation	Tax on mobile money	Over-The-Top taxation
Taxable base	Lump sum	Number of interconnected national minutes (Euro/minute)	Number of international inbound minutes (euro/minute)	Before tax turnover	Number of assigned/booked phone numbers (euro/number)	Before tax turnover				Before tax cost of the national interconnected minutes	Before tax turnover		Megaoctet
Tariff type	-	ad quantum	ad quantum	ad valorem	ad quantum	ad valorem				ad valorem	ad valorem	ad valorem	ad quantum
Rates	243.91	-	-	0.05	0.3049	0.02	-	0.01	-	-	-	-	-
Sample average	131.25	0.0156	0.0749	0.0311	0.2372	0.016	0.0085	0.022	0.03	0.09	0.096	0.03	0.0047€/mega; 0.08

Source: National legislations.

[*] In million EUR.

Table E.5: AETR by tax incidence and gross profitability scenarios

Panel A: AETR with equal incidence between Ad quantum and Ad valorem taxes

		I		II		III		IV		V		VI
	Tax incidence	100		75		50		25		0		For Memory : AETR Standard Firm
		AETR	AETR excl. License fees	AETR	AETR excl. License fees	AETR	AETR excl. License fees	AETR	AETR excl. License fees	AETR	AETR excl. License fees	
Gross Profitability of the firm	30	1.139	0.491	1.259	0.611	1.379	0.731	1.502	0.854	1.625	0.977	0.491
	40	0.926	0.428	1.022	0.525	1.119	0.621	1.214	0.717	1.311	0.813	0.428
	50	0.768	0.382	0.846	0.460	0.924	0.538	1.003	0.617	1.081	0.695	0.382
	60	0.704	0.364	0.774	0.434	0.845	0.505	0.916	0.575	0.987	0.647	0.364
	75	0.638	0.345	0.701	0.408	0.765	0.471	0.828	0.534	0.891	0.598	0.345

Panel B: AETR with differentiated incidence between Ad quantum and Ad valorem taxes

		I		II		III		IV		V
	Tax incidence	Ad quantum : 100 Ad valorem : 75		Ad quantum : 75 Ad valorem : 50		Ad quantum : 50 Ad valorem : 25		Ad quantum : 25 Ad valorem : 0		For Memory : AETR Standard Firm
		AETR	AETR excl. License fees	AETR	AETR excl. License fees	AETR	AETR excl. License fees	AETR	AETR excl. License fees	
Gross Profitability of the firm	30	1.255	0.607	1.374	0.726	1.497	0.849	1.621	0.973	0.491
	40	1.019	0.521	1.115	0.618	1.211	0.713	1.307	0.810	0.428
	50	0.844	0.458	0.922	0.536	1.000	0.614	1.079	0.693	0.382
	60	0.772	0.432	0.843	0.503	0.913	0.573	0.984	0.644	0.364
	75	0.700	0.406	0.763	0.469	0.826	0.532	0.889	0.596	0.345

Table E.6: AETR breakdown by tax incidence and gross profitability scenarios

Panel A: AETR breakdown with equal incidence between Ad quantum and Ad valorem taxes

		I		II		III		IV		V		VI
	Tax incidence	100		75		50		25		0		For Memory : AETR Standard Firm
		AEGTR	AESTR	AEGTR	AESTR	AEGTR	AESTR	AEGTR	AESTR	AEGTR	AESTR	
Gross Profitability of the firm	30	0.491	0.648	0.457	0.802	0.423	0.956	0.392	1.110	0.361	1.264	0.491
	40	0.428	0.498	0.401	0.621	0.374	0.744	0.347	0.868	0.320	0.991	0.428
	50	0.382	0.386	0.360	0.486	0.337	0.587	0.315	0.687	0.293	0.788	0.382
	60	0.364	0.340	0.343	0.431	0.323	0.522	0.302	0.613	0.282	0.704	0.364
	75	0.345	0.294	0.326	0.375	0.308	0.457	0.290	0.538	0.271	0.620	0.345

Panel B: AETR breakdown with differentiated incidence between Ad quantum and Ad valorem taxes

		I		II		III		IV		V
	Tax incidence	Ad quantum : 100 Ad valorem : 75		Ad quantum : 75 Ad valorem : 50		Ad quantum : 50 Ad valorem : 25		Ad quantum : 25 Ad valorem : 0		For Memory : AETR Standard Firm
		AEGTR	AESTR	AEGTR	AESTR	AEGTR	AESTR	AEGTR	AESTR	
Gross Profitability of the firm	30	0.458	0.797	0.424	0.951	0.392	1.105	0.362	1.259	0.491
	40	0.402	0.617	0.375	0.740	0.348	0.864	0.320	0.987	0.428
	50	0.360	0.483	0.338	0.584	0.316	0.684	0.294	0.785	0.382
	60	0.344	0.428	0.323	0.519	0.303	0.611	0.283	0.702	0.364
	75	0.327	0.373	0.309	0.454	0.290	0.536	0.272	0.617	0.345

In line with the paper, we adopt the conservative assumption of an incidence of 0.75 percent for all ad quantum taxes and 0.5 percent for all ad valorem taxes (the producer support 25% of ad quantum taxes and half of the ad valorem taxes) as the benchmark. These assumptions account for the empirically observed differences in tax incidence between the two types of taxes, providing a lower bound for the assessment of the AETR. Consequently, the remainder of the analysis is based on this scenario.

AETR breakdowns

Table E.7: Benchmark AETR breakdown

	AETR [1]	AETR	AEGTR		AESTR		AETR exluding license fees	AETR Standard Firm	Statutory CIT rate (CIT)		Effective CIT rate (Telecom)	
			Value	% of AETR	Value	% of AETR			Telecom	Standard	Value	% of AETR
Rates	0.93	0.92	0.33	0.36	0.58	0.63	0.53	0.38	0.30	0.30	0.20	0.21
Sample average	0.64	0.85	0.38	0.48	0.47	0.52	0.62	0.43	0.29	0.27	0.23	0.30

Sources: Authors calculations

[1] Previous AETR rate (rt.: The tax burden on mobile network operators in Africa by Gregoire Rota-Graziosi and Fayçal Sawadogo

[*] Average AETR, excluding Ethiopia.

Figure E.2: AETR breakdown by taxation type

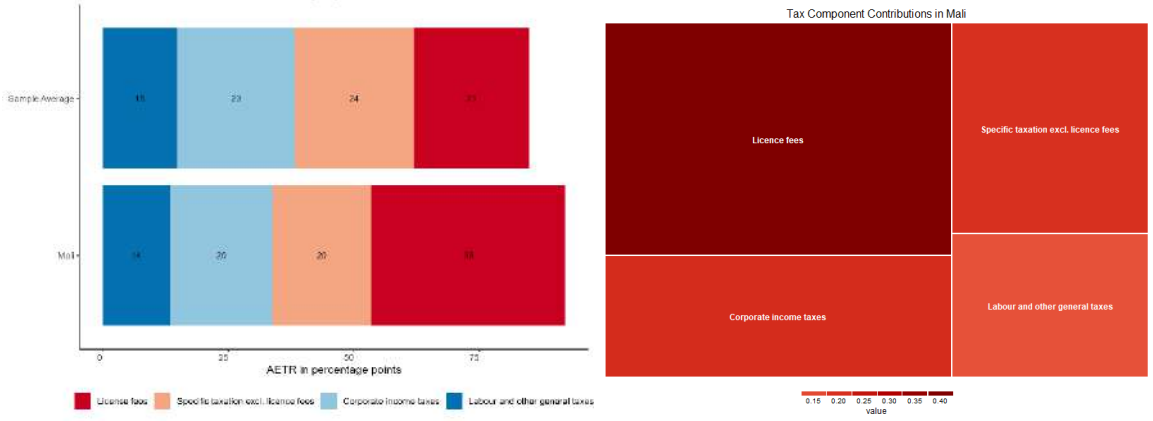
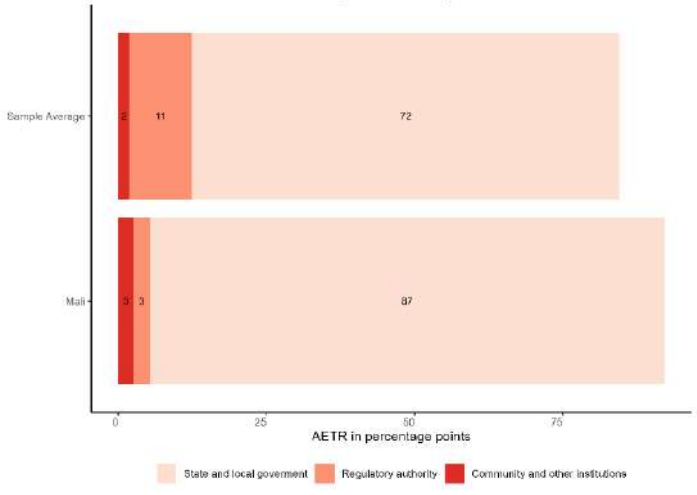


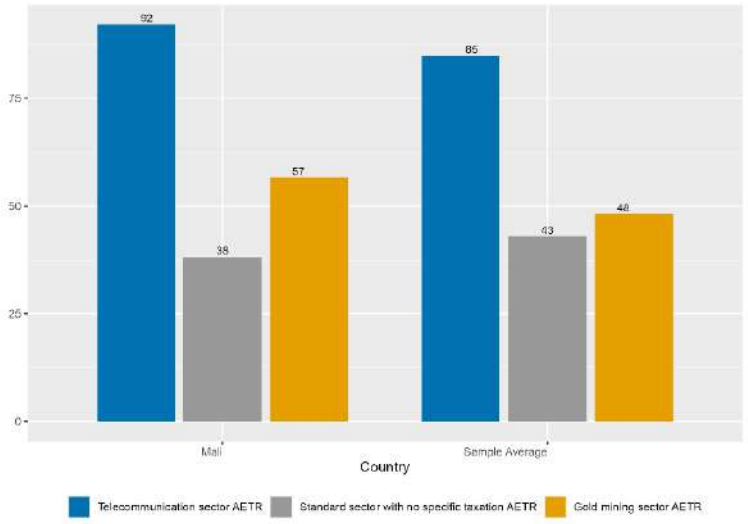
Figure E.3: AETR breakdown by beneficiary institution



Cross-sectoral comparison

The AETR is compared across three sectors: telecommunications, gold mining, and a standard economic sector. Figure E.4 highlights that, in Mali, the mobile telecommunications companies bear a higher tax burden than the firms of standard sector (92% against 38%), and also more than the gold mining sector companies, which average AETR is 57%.

Figure E.4: Cross-sectoral comparison of AETR



"Sur quoi la fondera-t-il l'économie du monde qu'il veut gouverner ? Sera-ce sur le caprice de chaque particulier ? Quelle confusion ! Sera-ce sur la justice ? Il l'ignore."

Pascal

FERDI

Créée en 2003, la **Fondation pour les études et recherches sur le développement international** vise à favoriser la compréhension du développement économique international et des politiques qui l'influencent.

Contact
www.ferdi.fr
contact@ferdi.fr
+33 (0)4 43 97 64 60