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Arogundade, Sodiq and Ngarachu, Maria and Bandele,
Olayinka

United Nations Economic Commission for Africa, Subregional Office
for Southern Africa, Plot No.2392, Longolongo Road, Lusaka 10101,
Zambia

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Innovative Development Financing Amidst Uncertainty: How Can African Countries Leverage Domestic Resource Mobilization?

Sodiq Arogundade^{ab1}, Maria Ngarachu^c and Olayinka Bandele^d

^bCollege of Business and Economics, University of Johannesburg, Auckland Park Kingsway
Campus PO Box 524 Auckland Park, Johannesburg, South Africa

^{a-d}United Nations Economic Commission for Africa, Subregional Office for Southern Africa,
Plot No.2392, Longolongo Road, Lusaka 10101, Zambia

Abstract

In achieving the African Union Agenda 2063 – *The Africa We Want* – and financing SDGs, African economies will require an unprecedented mobilization of resources. This study examines the role of financial development on the nexus between domestic resource mobilization (DRM) and inclusive growth using an unbalanced panel of 31 African countries from 1990-2022. The study finds that: (1) in the presence of a sound financial sector, DRM contributes positively to inclusive growth; (2) African countries with higher inclusive growth benefit more from the positive impact of tax revenue than those with lower growth; (3) regional characteristics differ in terms of the impact of DRM on inclusive growth; and (4) countries must maintain an annual threshold of DRM and financial development to harness the benefits of DRM. The empirical results are robust to different measures of DRM and estimators (two-step system GMM, Machado and Silva quantile regression, and the dynamic panel threshold model). In leveraging the benefits of DRM, the study recommends that African governments should improve their financial sector, and they can learn from the success story of the South African Financial Sector Development and Reform Program.

Keywords: Inclusive Growth, Domestic Resource Mobilization, Financial development, System GMM, Machado and Silva quantile regression, Dynamic Panel Threshold.

*Corresponding author:

1. Sodiq Arogundade

E-mail address: sodiq.arogundade@un.org/arogundadesodiq8@gmail.com.

1. Introduction

Countries have committed to the Sustainable Development Goals (SDGs) that must be achieved by 2030. Achieving these goals will contribute to poverty reduction, zero hunger, reduction in inequality, and inclusive and sustainable growth², among other outcomes. Nevertheless, there has been an unequal pace of progress toward these objectives, with some countries in the developed world fulfilling most of them. In contrast, most African countries and other least-developed countries fall short of these targets and need substantial development finance to achieve these goals (SDG, 2024). In financing the achievement of the SDG goals and the African Union’s Agenda 2063, the role of innovative development finance, like domestic resource mobilization (DRM), cannot be overemphasized. This is because of DRM’s capability to improve government revenue through non-debt income sources and taxation, allowing African countries to own and flexibly chart policies that address their specific development challenges while mitigating the risks of debt distress (Boly et al., 2020). Improving DRM also reduces dependency on external flows, thereby reducing one of the sources of damaging volatility in resource availability and reducing vulnerability to external shocks (UNCTAD, 2007).

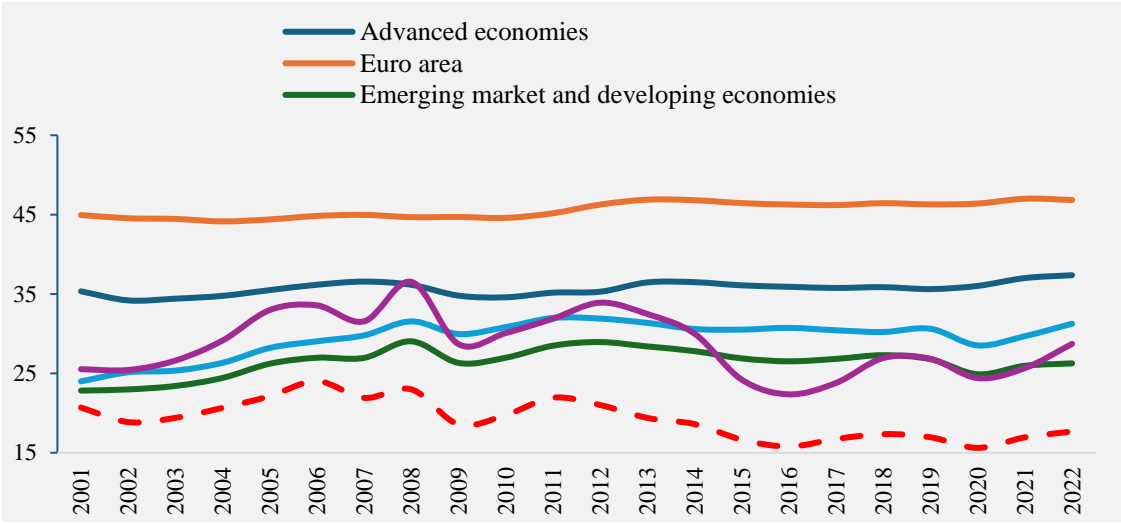
Due to the advantages of DRM over other innovative development finance, many countries have ramped up their capacity to mobilize and efficiently spend domestic resources in their pursuit of poverty eradication and sustainable development. DRM was also identified as the first of six “leading actions” in the 2002 Monterrey Conference on Financing for Development (FfD) consensus declaration. The 2015 Addis Ababa Action Agenda (AAAA) on FfD reaffirmed the urgent need to increase DRM to finance sustainable development and the means of implementation of the SDGs. The recently organized FfD conference in New York also emphasizes the importance of DRM in inclusive and sustainable growth (IATF, 2024). Building off the AAAA, the United Nations developed an Integrated National Financing Framework (INFF) to provide a schema for financing national sustainable development priorities and the SDGs at the country level.

However, despite these efforts, African countries occupy the lowest rungs in terms of mobilizing domestic resources. For instance, the amount of tax revenue as a percentage of GDP in Africa was 17.7 per cent in 2022 (IMF, 2024). This is 29.2 per cent lower than the Euro area, 19.7 per cent

² This refers to an increase in prosperity in parallel with increased equity and widening of opportunities, especially for the poor and vulnerable.

lower than the average for an advanced economy, 13.6 per cent lower than Latin America and the Caribbean, 11 per cent lower than the Middle East and Central Asia, and 9 per cent lower than the average of emerging and developing economies (Figure 1). The World Bank estimates that low-income and lower-middle-income countries could increase their revenue collection by 2 to 4 per cent of GDP, without any trade-off with equity or growth, which by estimation amounts to a revenue gain of US\$125 billion to US\$250 billion (World Bank, 2017). The literature is replete with unremitting debate on the nexus between DRM and inclusive growth. While Oyinlola et al. (2020) and Adeosun et al. (2023) showed that the aggregate tax and disaggregated taxes do not have a significant impact on inclusive growth in sub-Saharan Africa, other studies such as Stoilova (2017) for European Union, Combes and Ouedraogo (2016) for developing countries, Jaimovich and Rebelo (2017) for a sample of OECD countries, and OECD (2017) demonstrate that domestic resource revenue in form of taxes and non-taxes is beneficial in stimulating economic prosperity.

Figure 1: General Government Tax Revenue as a Percentage of GDP



Source: IMF (2024)

Meanwhile financial development has been identified as an important DRM driver. For instance, Akram (2016) argues that market capitalization and the quantity of bank branches have a positive and significant long-term influence on tax revenue. Ahamed (2016) demonstrates the significance of financial development in lowering corporate tax evasion and, therefore, raising tax collections. Nnyanzi et al. (2018) find that financial development in general, financial institutions, and financial markets have a significant impact on tax revenue using a generalized method of moments (GMM) model. According to Aim and Lompo (2021), the ability of the government to collect taxes

is positively and significantly impacted by an established financial sector. The study demonstrates how financial markets and institutions play a major role in tax collection in emerging countries.

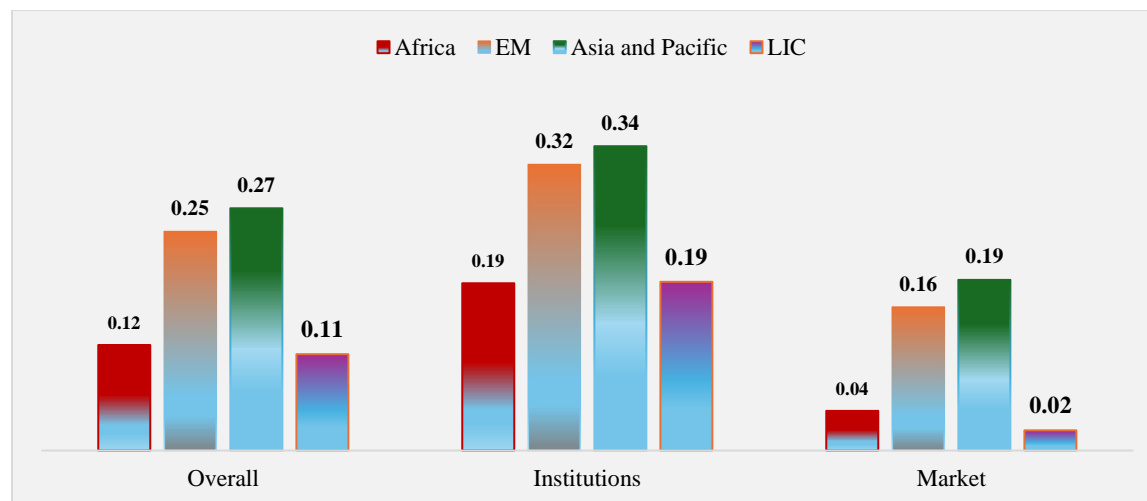
Some studies have also emphasized the importance of financial development on inclusive growth. For example, Acheampong et al. (2021) used the GMM estimator and found that financial development alleviates both male and female poverty rates in Africa. Similarly, Fouejieu et al. (2020) demonstrate that by expanding financial access, impoverished households can build possibilities for themselves through small-family companies, employment creation and a sustainable income. Tchamyou et al. (2019) provide additional evidence that innovation in the finance sector reduces income inequality in Africa. These findings instill confidence in the financial sector's ability to lessen economic disparities in Africa, especially in light of recent improvements in mobile money and Internet banking services.

Despite the importance of financial development in improving inclusive growth and DRM, the level of financial development in Africa is at a low threshold undermining the investment necessary for the continent's graduation to higher income status. Africa falls behind other developing regions in terms of progress made since 1980. As presented in Figure 2, Africa's average Financial Development Index score is 0.12. In contrast, the average Financial Development Index score for emerging markets is 0.25, Asia and the Pacific is 0.27, and low-income countries is 0.11. The comparisons are similar for financial markets and institutions (Figure 2). This sentiment is also shared by Boly et al. (2020), who state that financial development is one of the major factors hindering the advancement of DRM in Africa.

The present study contributes to the literature in the following ways. First, the study examines the impact of DRM on inclusive growth in the context of Africa using the ADB (2013) inclusive growth framework – previous studies have overlooked the all-inclusive measure of inclusive growth. Secondly, the study investigates whether DRM, in the presence of a sound financial sector, will help improve inclusive growth in Africa. Thirdly, the study examines whether there are regional differences in the impact of DRM. Fourthly, the study identifies the threshold of DRM and financial development on inclusive growth. Additionally, the use of cutting-edge econometric approaches such as the instrumental GMM, two-step system GMM by Arellano and Bond (1991), Machado and Silva (2019) Method of Moments Quantile Regression (MMQR), and the dynamic

panel threshold model by Kremer et al. (2013) is another important contribution of this study. These methods account for issues such as serial correlation, cross-sectional dependence, heteroskedasticity, and endogeneity.

Figure 2: Financial Development Index (1980-2021)



Source: IMF (2019)

The remainder of this paper is organized as follows. Section two details the landscape of innovative development finance in Africa. The methodology and estimation techniques are presented in section three. Section four presents the empirical results and discussion, while section five presents the summary of findings, concluding thoughts and policy implications.

2. Landscape of Innovative Development Finance in Africa

2.1. Domestic Resource Mobilization (DRM)

Africa's total government revenues averaged 22.4 per cent (per cent of GDP) between 2000 and 2021 (Figure 3). Despite marginal improvements from the 1980 to 2000 era owing to some reforms, revenues have steadily declined over the last two decades to a low of 18.1 per cent at the end of 2021 from a peak of 27.3 per cent in 2006/7. The poor state of the continent's revenue-to-GDP ratio of approximately 18 per cent is the lowest compared to other regions in the world – Asia-Pacific (21 per cent), Latin America (22.9 per cent), and OECD (33.8 per cent). Structural features of most African economies, including low per capita income, the shares of the agricultural

and industrial/mining sectors,³ the level of trade⁴ and informality as well as the structure of financial markets; administrative and technical difficulties in tax revenue collection, including weak State legitimacy resulting in weak public service delivery in some instances, contribute to the low revenues (UNCTAD, 2007). Similarly, although an important source of the continent's development financing, at roughly US\$350 billion (20 per cent), Africa's gross domestic savings are lower than other developing regions – US\$918 billion for Latin America and the Caribbean and US\$866 billion (25.7 per cent) for South Asia (World Bank, 2021). Furthermore, significant illicit financial flows estimated between US\$89 and US\$100 billion (UNECA, 2018b) annually drain valuable resources from the continent, which, if curbed, could fund half of the continent's SDGs financing gap (Figure 4).

Although tax revenue in African countries represents double the value of aid today (Lewin, 2018), a proliferation of DRM will be critical in ensuring African countries' ability to finance their economic stimulus, renew progress towards the SDGs (UNECA, 2019) and African Union Agenda 2063, and own their developmental process. The international community has also recognized the key role of increased domestic resources, adopting the Addis Ababa Action Agenda in 2015 which provides a framework for development that focuses on aligning financial flows with sustainable development policies (UN, 2015).

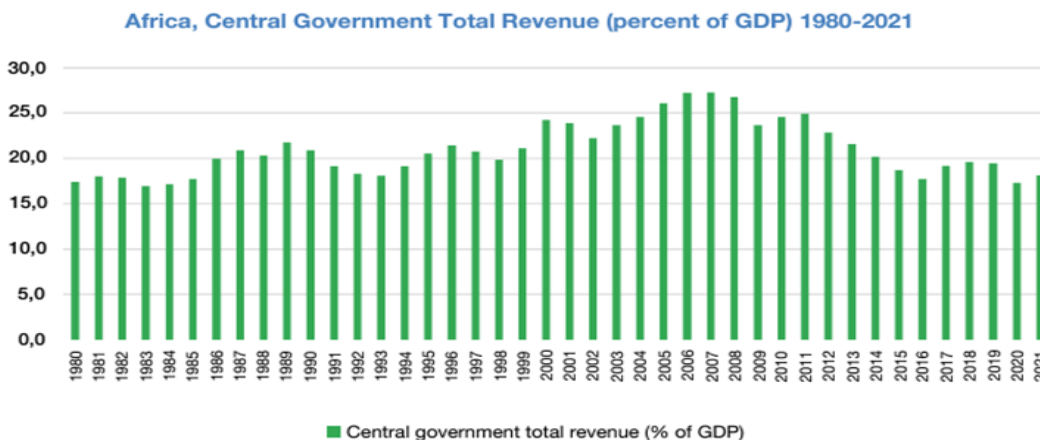
Innovations and reforms in this space present an opportunity to broaden countries' tax bases and make the system more progressive. This includes, *inter alia*: addressing value-added tax regressivity (Swistak & de la Feria, 2024); eliminating wasteful tax incentives and/or reforming subsidies; enhancing the effectiveness of direct taxation, such as property, wealth and corporate taxes including through the deployment of technology and digitalization; expanding the tax net to cover the growing digital economy; promoting environmental taxes or green DRM such as carbon pricing or plastic taxes; integrating gender perspectives into tax policy; and addressing illicit financial flows (IFFs). Championing proactive disclosure requirements (including through progressive industry standards), for instance, in the extractive industries, which are particularly

³ Resource-rich countries (e.g., Algeria, Angola, Congo, Equatorial Guinea or Nigeria) obtained over 60 percent of their tax revenues from oil-export taxes between 2008 and 2016 (AfDB, 2020).

⁴ On average, trade taxation accounted for 44 percent of total tax revenues (excluding grants) in Africa, between 2008 and 2016; while direct and indirect taxation accounted for 28.3 and 22.9 percent, respectively, over the same period (AfDB, 2020).

vulnerable to IFFs, beneficial ownership, participatory budgeting, and social audits may help countries benefit more from their own resources and help stem IFFs (Hickle, 2020).

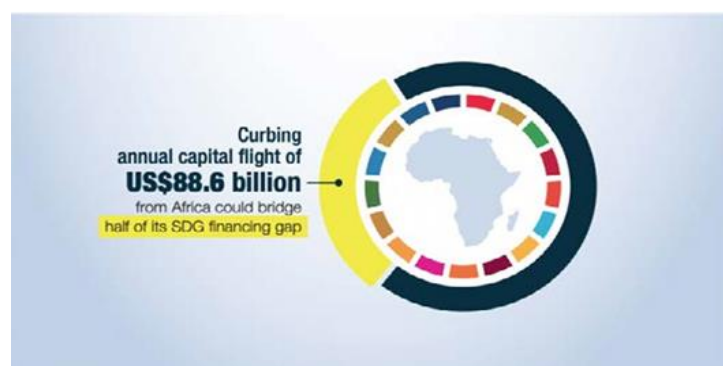
Figure 3: Fiscal Revenue Performance in Africa



Source: AfDB Statistics (2022)

This, in turn, catalyzed the Addis Tax Initiative (ATI), which provides resources and technical assistance on DRM reforms under a shared vision of “tax systems that work for people and advance the SDGs”.⁵ In particular, the ATI Declaration 2025 builds on the first ATI Declaration of 2015 and comprises four commitments to support financing the SDGs through fair, equitable and effective domestic resource mobilization – twenty-one (21) African countries are ATI members.⁶

Figure 4: Annual Illicit Financial Flows from Africa



Source: UNCTAD Economic Development in Africa Report 2020

⁵ Addis Tax Initiative. Accessible on <https://www.addistaxinitiative.net/about>

⁶ With the endorsement of the ATI Declaration 2025, member countries pledge to keep the following key commitments:

1. Enhance DRM based on *equitable tax policies* as well as *efficient, effective and transparent revenue administrations*.
2. Maintain or surpass the 2020 global target level (US\$ 441.1 million) of *DRM cooperation* for country-owned tax reforms.
3. Apply coherent and coordinated policies that foster DRM and *combat tax-related illicit financial flows*.
4. Enhance space and *capacity for accountability of stakeholders* to engage in tax and revenue matters.

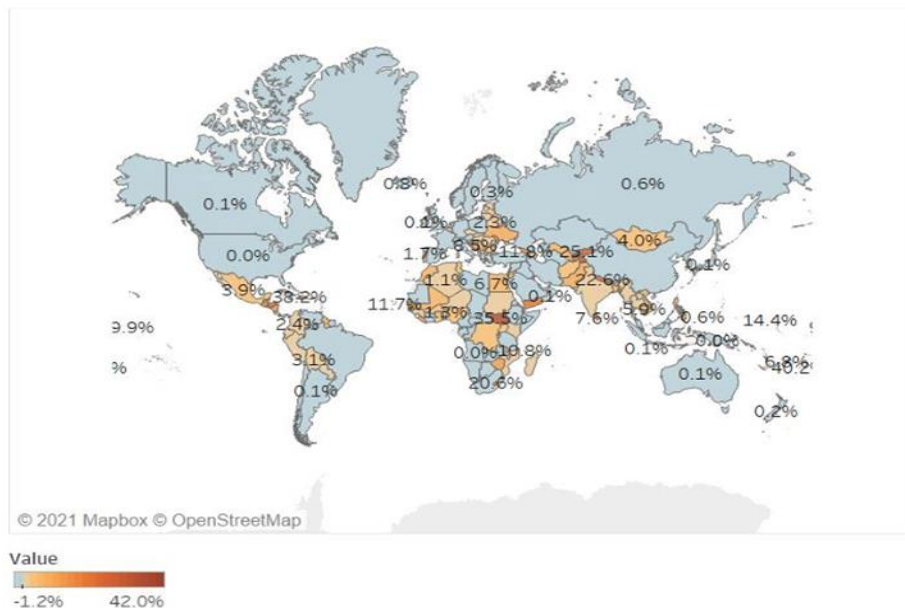
2.2. Diaspora Finance

More than 200 million Africans live outside the continent, and another 1.4 billion-plus live within the continent, with the African diaspora estimated to soon make up over 25 per cent of the global population (WEF, 2024). In addition, the remittances migrants send to the continent have been steadily increasing in volume over the years and, in the last decade, have been the largest source of capital flows ahead of both FDI and ODA (Solimano, 2003; AUC & OECD, 2021). Thus, in contrast to the brain drain phenomenon (which has a negative skills impact), the savings and scale of resources the African diaspora have available to reinvest in their countries of origin present an important developmental opportunity for the continent yet remains a relatively untapped source when compared with other developing regions (Gnimassoun & Anyanwu, 2019).

Diaspora finance, encompassing remittances on one hand and diaspora investment on the other, is increasingly recognized as an important source of financing for development. Remittances are inter-personal financial (and non-monetary) transfers between migrants and their countries of origin mainly used for basic needs and education, while diaspora investments are defined as asset-producing financial instruments through which diasporas (migrants and their descendants) invest in organizations and business opportunities in their country of origin (EC, 2021).

Remittances were estimated to reach US\$91 billion in 2021 and US\$100 billion by 2022 (World Bank, 2023a). It is important to note, however, that a large portion of remittances in Africa is transmitted through informal channels, and thus, some estimates suggest that the exact magnitude could be at least twice as high as reported levels (UNECA, 2006). The top recipients of remittances in 2020 were Egypt (US\$24.4 billion), Nigeria (US\$21 billion), Ghana (US\$3.2 billion), Kenya (US\$2.9 billion) and Senegal (US\$2.3 billion) – in 2022, Egypt (US\$32.3 billion) and Nigeria (US\$20.9 billion) led an unchanged top five except for Morocco (US\$11.4 billion) replacing Senegal (World Bank, 2020a). Total recipients by share of GDP in 2020 were South Sudan (35.4 per cent), Lesotho (20.6 per cent), the Gambia (14.9 per cent), Cabo Verde (12 per cent), Comoros and Zimbabwe (10.8 per cent); Figure 5 below also shows the significant contribution of remittances to countries GDP. The rise of new technologies such as mobile and online money platforms like M-Pesa and Nala has been one of the most significant changes in the remittance market.

Figure 5: Remittance Inflows (percent of GDP in 2019)



Source: World Bank/KNOMAD, 2020. Elaborated by EU's Joint Research Centre (2021).

Despite the lack of systematic international data on diaspora investment flows, estimates indicate US\$500 billion in accumulated diaspora resources stored mostly in host countries (IFAD, UNOSAA and World Bank, 2023). Structured financial instruments for diaspora investments, coupled with the appropriate policies and institutions in place, could better harness these as a development resource, channeling them into productive investments. Diaspora investments are well-placed to support local production networks and MSMEs as most diaspora investors tend to establish more connections with local suppliers, positively impacting inclusive growth and employment (Amendolagine et al., 2013).

Several instruments can channel these savings into investment, including diaspora bonds, specifically designed investment and pension funds, direct investments made by individuals in the diaspora, securitization of future remittances as collateral for new borrowing and recent innovations that enable individuals living abroad to invest in social enterprises (CIGI, 2018). Despite diaspora bonds – sovereign debt instruments sold by governments to their diaspora populations – offering a significant alternative to borrowing, only a handful of countries have issued diaspora bonds (e.g., Ethiopia, Ghana, Kenya, Nigeria and Rwanda). Expanding these will require careful tailoring to country-specific circumstances and the characteristics of the migrated diaspora. Advancing continental and regional instruments such as the AU's African Diaspora

Investment Fund may also circumvent the complexity and range of technical, legal, institutional and regulatory requirements and costs to establish these. Other innovative modalities include diaspora tourism and philanthropy (IOM, 2022), leveraging diaspora investments for climate adaptation, as well as other unexplored investment vehicles to tap into the wealth (and not just the incomes) of diaspora populations. These include, among others, revenue bonds, debt issued by subnational governments, diaspora private-equity funds, corporate and debt-equity, as well as mechanisms to mobilize institutional investors such as diasporas' pension funds, with the accompanying regulatory frameworks (Terrazas, 2010).

2.3. Pension and Sovereign Wealth Funds

Like diaspora finance, pension funds represent an important source of domestic financing for African countries. Though pension funds on the continent have undergone substantial development over the past few years, including migration from a single pillar system where contribution was limited to a few, particularly public sector workers only, to a more inclusive three tier system which includes both public and private sector workers and an even extension to informal workers in a few countries (Güven, 2019); most African countries invest a substantial portion of their pension funds abroad. In 2017, assets managed by African pension funds amounted to US\$676 billion with estimates suggesting these would surpass the US\$1.1 trillion mark by 2020 (Juvonen, 2019). According to the OECD (2021) Global Pension Study, assets held by pension funds exceeded US\$56 trillion globally, an increase of 11 per cent from 2019, of which Africa held approximately US\$700 billion (Soumaré, 2020). Indeed, the various reforms and flexibilities (expansion in coverage and simplification of pension regulations) have resulted in an 8 per cent annual increment in the pension industry in Africa – this rate is as high as 20 per cent in some years, as in the case of Nigeria and East Africa (PwC, 2015). Redirecting investments in this growing industry domestically, or a significant portion of the funds could certainly help close the continent's colossal financing gap.

Pension funds, among other institutional investors such as insurance companies and sovereign wealth funds, are uniquely positioned to engage in long-term, high-return impact investment, including financing infrastructure deficits (UNECA, 2018a; AUC & OECD, 2023). With bonds and equities markets accounting for almost 75 per cent of pension fund investment at the end of 2020 (OECD, 2021), pension funds are one of the key investors in capital markets (World Bank,

2020b). Furthermore, a number of studies report a positive effect of pension funds on capital market development, which holds promise for the African continent.⁷

However, despite their potential, Africa continues to attract the lowest share of capital from institutional investors compared to other developing regions (AUC & OECD, 2023), with OECD data showing that of the accumulated US\$380 billion of assets by 2020 across 15 African countries; South Africa accounted for almost 80 per cent of the total, and Namibia and Botswana accounting for a considerable share of the balance. Shallow national capital markets and financial development are key drivers of local institutional investors seeking ‘safe’ investment routes in established regional markets or internationally. But also, one cannot overlook that the fiduciary requirements embedded in the regulatory frameworks of pension funds restrict the extent to which fund managers may sanction investments in development projects, including the infrastructure investments critically needed.

Africa is home to at least twenty (20) sovereign wealth funds. The expansion of these state-owned investment funds could ensure that African countries better manage and benefit from large excess reserves. Over US\$1 trillion of excess reserves have not been effectively put to work to finance Africa’s development (UNECA, 2016). Unlocking idle resources and channelling them into productive investments remains critical to closing the financing gap – central banks can play an important role in this regard. As can the provision of capacity-building support by specialist development partners in providing frameworks, tools and training modules for fund manager departments to utilize in upgrading the skills of key project managers, assessing risk and preparing project proposals for investments in Africa’s largely untried infrastructure development landscape. Incidentally, this is similar to the case with pension fund managers and departments.

2.4. Public-Private Partnerships (PPPs)

In a climate of reduced fiscal space and increasing debt burdens, public-private partnerships (PPPs) hold the potential to move the continent closer to attaining the SDGs and Agenda 2063. The Addis Ababa Action Agenda (AAAA) recognizes the important role of both public and private investments, particularly in infrastructure financing, including through PPPs. PPPs involve the private sector supplying infrastructure assets and services traditionally provided by governments.

⁷ See for example, Bayar & Kilic (2019), Enache et. al. (2015), Moleko & Ikhide (2016), Zubair (2016) and Assefuah et. al. (2023).

The infusion of the private sector's capital, managerial efficiency, dynamism, and technological and entrepreneurial know-how, coupled with the socioeconomic and environmental awareness and responsibilities of the public sector, warrant these partnerships (UNDESA, 2016). With attention increasingly focused on better fiscal risk management, African governments are presented with the opportunity to grow their local private sector through joint ventures with large international firms as well. Combined with local content policies, PPPs can also increase skills within participating local firms and beneficiary communities. The AAAA also emphasizes the need to build capacities to enter into PPPs.

Despite a sharp rise since the 1990s in the private sector's participation in infrastructure finance in developing countries, especially in electricity and telecommunications, private finance provides a small portion of aggregate infrastructure investment in the developing world (UNDESA, 2016; IMF, 2014). Public infrastructure investment still dwarfs private investment, as infrastructure investment via PPPs is less than one-tenth of public investment in advanced economies and less than one-quarter of public investment in emerging markets and developing economies. Moreover, on average, PPP investment commitments in Sub-Saharan Africa have been lower than other developing regions over the years.

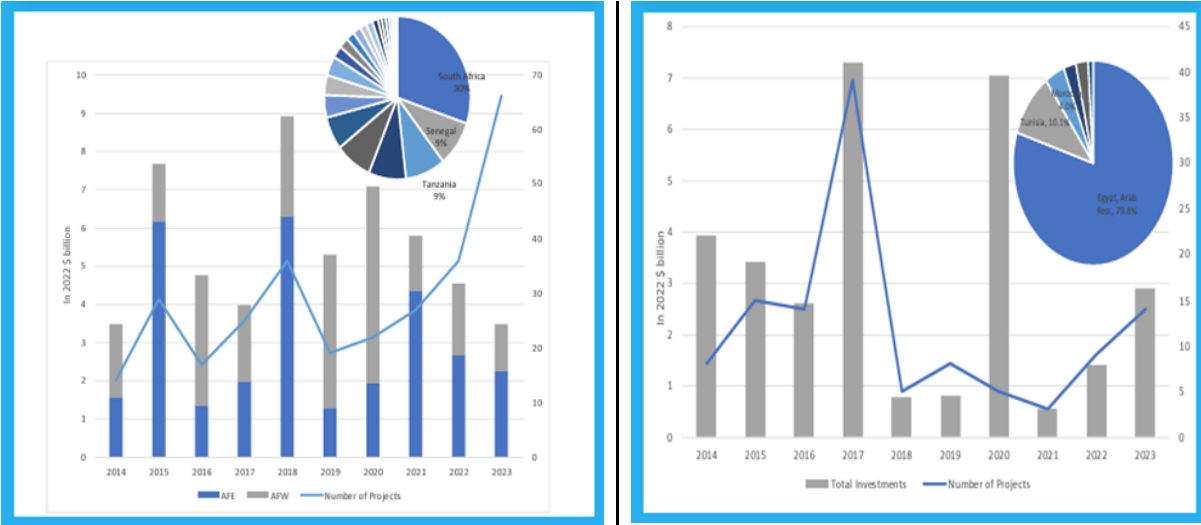
Having said this, it is encouraging to note the private sector's increasing contribution to PPPs in the developing world. In 2023, approximately 67 per cent came from private sources (compared to 50 per cent in 2022), while 13 per cent came from public sources (compared to 35 per cent in 2022)⁸ (World Bank, 2023b). Private sector investments in infrastructure, or private participation in infrastructure (PPI) in 2023 in low- and middle-income countries, amounted to US\$86 billion (representing 0.2 per cent of the GDP of all LMICs). Africa received roughly US\$6.5 billion in investments, representing a marked 24 per cent year-on-year decrease and a 45 per cent five-year average decrease in Sub-Saharan Africa (SSA) in particular.⁹ The significant decline is attributed to multiple SSA countries experiencing decreases in investments, putting the continent's commitments second worst to Europe and Central Asia's US\$4.1 billion owing to reduced investments in Russia, Ukraine, and Türkiye. As a percentage of regional GDP, SSA was tied

⁸ The balance came from development and export finance institutions whose share remained relatively unchanged from 2022 to 2023.

⁹ The financial closure of new significant investments in Egypt and Tunisia influenced the North Africa average in 2023.

second lowest at 0.17 per cent, with South Africa responsible for 30 per cent of the regional PPI, followed by Senegal and Tanzania (Figure 6). Energy and ICT, including the growth in cross-border ICT, continue to dominate the continent’s PPI.

Figure 6: Investment Commitments in Infrastructure Projects with Private Participation in Low- and Middle-Income Countries in Africa (2014-2023)



Source: WB PPI (2023).

Given the continent’s large agricultural sector, it would be remiss not to mention the potential and innovations in agriculture public-private partnerships to support development and boost agricultural productivity. Agri-PPPs encompass four common types of PPPs targeted at different entry points along the value chain (FAO, 2016): (1) value chain development (VCD) PPPs – aimed at developing new or upgrading existing value chains; (2) innovation and technology transfer (ITT) PPPs – used to improve production along the value chain through RD&I and technology transfer and may also involve commercializing small-scale technologies to improve post-harvest practices and agro-processing for MSMEs; (3) market infrastructure (MI) PPPs – to improve the flow of products through market logistic centres; and, (4) business development services (BDS) PPPs – designed to build the necessary linkages between farmers, MSMEs and downstream customers.

Other less traditional agri-PPPs include water and sanitation PPPs – including irrigation PPPs; green-energy PPPs – promoting the use of technologies for renewable energy in the agriculture sector, such as biogas; and, more recently, agricultural insurance PPPs – used to increase access to smallholders to agricultural insurance programs. Most agri-PPPs identified in Africa are VCD

PPPs, followed by MI and irrigation PPPs; few ITT PPPs exist despite their demonstrated strong potential to drastically improve farmer income by targeting issues hindering farm productivity.

Despite the use of the same terminology, it is also important to note that agri-PPP projects differ widely from traditional PPPs in the infrastructure sector, which poses unique challenges related to the governance and design of agri-PPP projects (FAO & AU, 2019). Though many developing countries have revised national PPP policies and laws to include agriculture as one of the eligible sectors for PPP projects, the policies remain largely unchanged and can only be effectively applied to infrastructure PPPs. Some of the key differences include the level of investment required and the degree of contractual formality used in partnership agreements. Agri-PPPs generally involve lower levels of investment and, therefore, less complex contract agreements, including the use of Memoranda of Understanding; selection procedures for agri-PPPs may also need to be more flexible, allowing for the use of unsolicited bids and simpler feasibility assessment procedures; and finally, agri-PPPs involve a wider spectrum of partners in addition to the core public partner and private agribusiness firm, including farmers, farmer organizations, smallholder farmers and agricultural SMEs, financial institutions and non-governmental organizations.

3. Data and Methodology

3.1. Data

This study uses an unbalanced panel of 31 African countries from 1990-2022. The choice of period and country was influenced by data availability (see Table A1 in the Appendix). The dependent variable is inclusive growth, and this is calculated through the B2A algorithm. In using this method, we follow Angeon and Bates (2015) and Briguglio (2014, 2016) in normalizing our variables. This is because the variables used in the calculation are measured in different units; the Max-Min formula, displayed in Equation (1), is used to normalize each variable.

$$X_{ij}^{RS} = \frac{X_{ij} - X_{jmin}}{X_{jmax} - X_{jmin}} \quad (1)$$

X_{ij}^{RS} is the rescaled variable of country i , of component j ; X_{ij} is the actual observation of country i of component j in all the selected samples of the study. X_{jmax} is the maximum value of observation of component j and X_{jmin} is the minimum value of observation of component j . Hence, the rescaled values take values between the range of 0 and 1. The second step in the calculation of the index is to use a simple arithmetic average of each of the recalled variables

(X_{ij}^{RS}) in Equation (1). The choice of the 18 variables (See Table A2 in the Appendix) used in calculating the index was informed by the ADB (2013) and Adeosun et al. (2023) inclusive growth framework, which emphasizes three pillars – growth and expansion of economic opportunity, social inclusion to ensure equal access to economic opportunity and social safety nets.

The main variables of interest are domestic resource mobilization and financial development. In the empirical analysis of this study, four variables were used to measure DRM: overall taxes, direct taxes, indirect taxes, and non-tax revenue. Studies such as Adeosun et al. (2023), Oyinlola et al. (2020), Stoilova (2017), OECD (2017), Jaimovich and Rebelo (2017), Combes and Ouedraogo (2016) used similar measurements. Financial development is measured using the IMF (2019) financial development indicator. This index captures the complexity of the financial sector, as it combines nine variables relating to the financial markets (stock and bond market) and financial institutions (banking and non-banking sectors). The choice of real GDP per capita (constant 2015 U.S. dollars), mobile telephony (mobile cellular subscriptions per 100 people), globalization, and FDI (inward stock U.S. dollars) are guided by previous empirical literature (Oyinlola et al., 2020; Adeosun et al., 2023; Acheampong et al., 2021; Urata & Doan, 2022; Anetor et al., 2020; Ghosh, 2016).

Table 1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	JB	Expected sign	Data source
Inclusive growth	1023	0.431	0.084	0.209	0.695	26.22***	NA	Authors'
Domestic Resource Mobilization								
Taxes (% of GDP)	682	14.2	6.80	1.00	42.70	161.5***	+	UNU
Direct Taxes (% of GDP)	670	6	3.90	0.10	20.40	174.3***	+	UNU
Indirect Taxes (% of GDP)	712	8	4.10	0.40	29.60	366.5***	+	UNU
Total non-tax revenue (% of GDP)	699	5.9	9.10	0.01	65.40	6555***	+	UNU
Control Variables								
RGDPC	991	2577.16	3136.55	190.35	16747.36	1651***	+	WDI
Globalisation	992	108.408	346.703	22	2021	3.3e+04***	+	KOFGI
FDI (% of GDP)	1016	34.778	50.049	0.051	461.741	2.6e+04***	+	UNCTAD
FD	960	0.157	0.106	0	0.592	556.2***	+	IMF
Mobile Telephony	1012	41.192	48.645	0	206.703	175.5***	+	WDI

Note: World Bank World Development Indicator (WDI), International Financial Statistics - IMF Data (IFS), The United Nations University World Institute for Development Economics Research (UNU-WIDER). KOF Swiss Economic Institute, UN Trade and Development (UNCTAD). JB is Jarque–Bera test for normality.

3.1.1. Description of the main variables

The summary statistics of the variables used in this study are presented in Table 1. The average inclusive growth index among the 31 African countries from 1990 to 2022 is 0.431. This generally indicates a low level of inclusive growth since the index ranged between 0 and 1. Seychelles had the highest score of 0.695 for inclusive growth in 2019, while Somalia had the lowest score of 0.209 in 2000. The average value of the DRM variables is 14%, 6%, 8%, and 5.9% for overall taxes, direct taxes, indirect taxes and non-tax revenue, respectively. Seychelles had the highest overall and indirect taxes in 1993; Tunisia had the highest direct taxes in 2020, while Libya commanded the highest non-tax revenue in 2020. However, Libya had the lowest overall and indirect taxes in 2012, while Somalia and Uganda had the lowest direct and non-tax revenue. Furthermore, the financial development index ranged from 0 to 0.592, with an average value of 0.16.

The correlation matrix is presented in Table A3 in the Appendix. The results presented in the table indicate that none of the main explanatory variables (Real GDP, globalization, FDI, and financial development) have a correlation coefficient over 0.7, excluding the possibility of significant multicollinearity. However, the correlation coefficients of the DRM variables are high, motivating the use of stepwise regression. Furthermore, column seven in Table 1 displays the chi-square statistics of the Jarque-Bera normality test. We can conclude that all the variables failed the normality test since they are significant at the 5% level of significance. This implies that drawing conclusions based solely on OLS estimates can be erroneous. This gives rise to the application of a quantile regression, which offers a robust evaluation of the study's empirical analysis.

3.2. Methodology

This study uses the instrumental GMM and a two-step system GMM by Arellano and Bond (1991) to examine the impact of DRM on inclusive growth. These models are adopted due to the following: (1) the number of countries (i) used in this study is higher than the corresponding periods within each country (t), (2) to address potential endogeneity, which may occur due to simultaneity bias or unobserved heterogeneity. The standard system GMM specification in levels and first differences is specified thus:

$$IG_{i,t} = \beta_0 + \beta_1 IG_{i,t-\tau} + \beta_2 DRM_{i,t} * \beta_3 FD_{i,t} + \beta_4 X_{i,t} + \sum_{h=1}^2 \delta_h W_{h,i,t-\tau} + \tau_t + \varphi_i + \mu_{i,t} \quad (1.0)$$

$$\begin{aligned}
IG_{i,t} - IG_{i,t-\tau} = & \beta_1 IG_{i,t-\tau} - IG_{i,t-2\tau} + \beta_2 (DRM_{i,t-\tau} - DRM_{i,t-2\tau}) + \beta_3 \left((DRM_{i,t-\tau} * FD) - \right. \\
& \left. (DRM_{i,t-2\tau} * FD) \right) + \beta_4 (\ln X_{i,t} - \ln X_{i,t-\tau}) + \sum_{h=1}^2 \delta_h W_{h,i,t-\tau} - W_{h,i,t-2\tau} + (\tau_t - \tau_{t-1}) + (\mu_{i,t} - \\
& \mu_{i,t-\tau})
\end{aligned} \tag{1.1}$$

$IG_{i,t}$ denotes inclusive growth of country i at period t . $DRM_{i,t}$ indicates different measure of DRM; $FD_{i,t}$ indicates financial development measures. Real GDP per capita, globalization, financial development, FDI, and mobile telephony are the control variables that make up $X_{i,t}$. We further examine the reliability of the system GMM estimator through the Sargan and Hansen test of over-identifying restriction. This test confirms the reliability of the instruments used in the study. Secondly, we verify the absence of second-order autocorrelation ($AR2$) in the residuals (Roodman, 2009).

Due to the constraints of GMM, the study adopted a panel quantile regression approach for robustness check to examine the heterogeneous and distributional effects across quantiles. Quantile regressions are used to estimate the conditional median or a variety of different quantiles of the response variables, as opposed to regular least-squares regressions, which produce estimates of the conditional mean of the endogenous variable subject to specific values of the exogenous variables. This study, however, adopts the Machado and Silva (2019) Method of Moments Quantile Regression (MMQR). The advantage of this method is that it allows individual influences to affect the whole distribution rather than just shifting means, which makes it possible to discover the conditional heterogeneous covariance impact of financial development drivers (Canay, 2011). The MMQR estimation method is suitable when the panel data model includes endogenous explanatory variables in addition to individual effects.

The specification of the conditional quantile estimation $Q_y(\tau|X)$ is expressed thus as:

$$Y_{i,t} = \alpha_i + X_{i,t}\beta + (\delta_i + Z_{it}\gamma)U_{i,t} \tag{2}$$

$(\alpha_i, \delta_i), i = 1 \dots, n$, is the individual i fixed effect. Z is a k -vector of X that may undergo different transformations with element l , and this is expressed thus as:

$$Z_l = Z_l(X), l = 1 \dots, k \tag{3}$$

$X_{i,t}$ is distributed independently, identically for each i . In addition, $U_{i,t}$ is distributed independently and uniformly throughout time (t) and between individuals (i). Equation (2) is re-written thus as:

$$Q_y(\tau|X_{i,t}) = (\alpha_i + \delta_i q(\tau)) + X_{it}\beta + Z_{it}\gamma q(\tau) \quad (4)$$

The quantile distribution of inclusive growth ($Q_y(\tau|X_{i,t})$) depends on the positions of the control variables ($X_{i,t}$). The scalar coefficient is $\alpha_i(\tau) \equiv \alpha_i + \delta_i q(\tau)$. The control variables ($X_{i,t}$) is the same as those presented in equation (1). The individual fixed effect for individual i is indicated by τ . The τ -th quantile sample, expressed by Y . $q(\tau)$, is solved through an optimization problem.

Lastly, the dynamic panel threshold model by Kremer et al. (2013) was used to estimate the threshold of DRM and financial development on inclusive growth. This method is an extension of the original model of Hansen (1999) and Caner and Hansen (2004), as it allows for endogenous regressors in a panel framework. If financial development influences the DRM-inclusive growth nexus, regression functions will not be the same across all countries. The dynamic panel threshold model of the relationship between changes in inclusive growth, financial development, and DRM take the following form:

$$\begin{aligned} \Delta IG_{i,t} = & \mu_i + \beta_1 DRM_{i,t} I(FD_{i,t} \leq \gamma) + \delta_1 I(FD_{i,t} \leq \gamma) + \beta_2 DRM_{i,t} I(ABS_{i,t} > \gamma) + \psi X_{i,t} \\ & + \varepsilon_{i,t} \end{aligned} \quad (5)$$

Where γ is the threshold level, and the error term ε_{it} is $i.i.d(0, \sigma^2)$. $I(\cdot)$ is an indicator which takes the value of 1 if the argument in the indicator function holds, and 0 otherwise. The threshold variables $FD_{i,t}$ (financial development) divides the sample into regimes with different regression slope parameters β_1 and β_2 . $X_{i,t}$ is a vector of explanatory variables uncorrelated with the error term ε_{it} .

4. Empirical Results and Discussions

Table 2 presents the GMM estimates on the impact of DRM on inclusive growth in selected African countries. The study relies on the GMM estimates since it can address endogeneity through internal and external instruments. The diagnostics statistics indicate that there is no evidence of second-order serial correlation since the p -values of $AR(2)$ statistics are insignificant. Furthermore, since the p -values of the Hansen statistics are insignificant at the 5% level of significance, we can also accept the null hypothesis of the instrument validity. This indicates that the System-GMM model

can be used for inferences. The significance and positive sign of initial inclusive growth across the models indicate the importance of initial conditions of inclusive growth as one of the key drivers of current inclusive growth in the region. This is consistent with the study of Arogundade et al. (2022), which states that the initial levels of economic development matter. The empirical results indicate that DRM has a significant and positive impact on the inclusive growth of African countries, regardless of the measure of DRM used – overall taxes, direct taxes, indirect taxes, and non-tax revenue (except for the IV-GMM). A plausible explanation for this result is that DRM enhances the government's ability to generate revenue through taxes, fees, and other domestic sources. The improvement in this revenue allows greater public investment in infrastructure and the social sector, such as education and health services, which are critical for inclusive growth.

Table 2: Analyzing the Impact of DRM and Inclusive Growth in Africa

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV-GMM				Two-Step GMM			
L. Inclusive growth					0.253**	0.427***	-0.323***	-0.188***
					(0.129)	(0.154)	(0.0514)	(0.0689)
Taxes	0.333***				0.572***			
	(0.0559)				(0.168)			
Direct Taxes		0.330***				0.780***		
		(0.0842)				(0.158)		
Indirect Taxes			0.428***				1.448***	
			(0.0741)				(0.411)	
Non-tax Revenue				-0.0349				0.133***
				(0.0323)				(0.0158)
RGDPC	0.00347*	0.00366*	0.00198	0.00197	0.00281*	0.00405**	0.00218*	-9.21e-05
	(0.00191)	(0.00200)	(0.00194)	(0.00197)	(0.00146)	(0.00163)	(0.00115)	(0.00146)
Globalization	8.49e-06*	2.31e-06	6.18e-06	-1.38e-06	1.42e-05***	6.33e-06***	1.77e-05	-9.07e-06***
	(4.50e-06)	(4.44e-06)	(4.34e-06)	(4.17e-06)	(4.20e-06)	(2.25e-06)	(1.13e-05)	(1.91e-06)
FDI	3.25e-05	0.000113***	5.06e-05	0.000150***	-5.63e-05	1.86e-05	-2.62e-05	0.000115*
	(3.05e-05)	(3.41e-05)	(3.13e-05)	(3.96e-05)	(8.03e-05)	(4.47e-05)	(0.000129)	(6.03e-05)
FD	0.246***	0.300***	0.289***	0.349***	0.0773*	0.0752*	0.272***	0.402***
	(0.0234)	(0.0239)	(0.0207)	(0.0176)	(0.0436)	(0.0505)	(0.0986)	(0.0332)
Mobile Telephony	0.000618***	0.000608***	0.000666***	0.000657***	0.000445***	0.000274***	0.000675***	0.000652***
	(4.77e-05)	(4.82e-05)	(5.02e-05)	(5.03e-05)	(7.85e-05)	(7.20e-05)	(9.38e-05)	(5.76e-05)
Constant	0.324***	0.341***	0.325***	0.353***	0.219***	0.187***	0.382***	0.425***
	(0.00637)	(0.00456)	(0.00591)	(0.00410)	(0.0358)	(0.0507)	(0.0292)	(0.0287)
Observations	481	478	507	489	443	441	449	439
χ^2	1433	1266	1419	1246	1389	2514	389.3	927.2
Number of countries	31	31	31	31	31	31	31	31
Instruments					17	17	19	19
AR2					0.393	0.895	0.520	0.747
Hansen					0.582	0.246	0.606	0.0934

Robust standard errors in parentheses: *** indicates significance at 1%, ** at 5%, and * at 10%. The IV-GMM estimator is used to estimate columns (1) – (4), while the two-step system GMM is used to estimate columns (5)-(8).

Secondly, revenue from DRM provides the financial resources needed to sustain and develop social safety nets, including pensions, unemployment benefits, and social assistance programs. This empirical outcome lends credence to the findings of the OECD (2017). These safety nets assist in reducing poverty by protecting vulnerable populations from economic shocks. A similar empirical outcome was established by Jaimovich and Rebelo (2017), OECD (2017), Stoilova (2017), and Combes and Ouedraogo (2016). Financial development contributes positively and significantly to inclusive growth across all the models. This is in consonance with the results of Acheampong et al. (2021), Wen et al. (2022), and Abbas et al. (2022) that a developed financial sector mobilizes financial resources to the critical sectors capable of contributing to economic growth, capital accumulation, and inclusive growth.

Generally, the control variables exhibit the anticipated signs and are statistically significant. According to the results, the coefficient of real GDP per capita proxy for economic growth is positive and significant, indicating that rising economic growth positively influences African countries' inclusive growth. The results corroborate the empirical findings of Kuznets (2019) and Michálek and Výboš'ok (2019), which argue that economic growth typically leads to higher demand for labour, creating new jobs. This can reduce unemployment and underemployment, providing more people with stable incomes and improving overall living standards. The coefficient of globalization enters the model with a positive sign (since three out of the four models indicate a positive sign). A plausible explanation for this empirical outcome is that globalization, especially economic globalization and financial openness, is capable of catalyzing new investment, creating new decent jobs, increasing wages and productivity and economic development (Urata & Doan, 2022; Gopinath & Parket, 2019).

The coefficient of FDI is mixed (positive and negative). The positive sign supports the empirical claim made by Arogundade et al. (2023) that FDI can increase productivity and entrepreneurship, improve competition, transfer knowledge and technology, and increase government revenue through taxes paid by foreign investors. However, the negative impact can be because multinational corporations repatriate capital to their home country and the crowd-out impact on domestic investors (Anetor et al., 2020; Arabyat, 2017).

Table 3: Role of Financial Development on the Nexus Between DRM and Inclusive Growth in Africa

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IV-GMM				Two-Step System GMM			
L. Inclusive growth					0.120 (0.158)	1.125*** (0.0570)	0.550** (0.230)	-0.285*** (0.0198)
Taxes	0.118 (0.176)				-0.0738 (0.253)			
FD*Taxes	2.185*** (0.777)				4.505*** (1.301)			
Direct Taxes		0.367** (0.183)				-0.384 (0.237)		
FD*Direct Taxes		0.0278 (0.533)				1.435* (0.745)		
Indirect Taxes			0.119 (0.246)				0.0494 (0.238)	
FD*Indirect Taxes			2.257** (1.000)				2.147** (1.078)	
Non-tax revenue				-0.124** (0.0591)				-0.200*** (0.0370)
FD* non-tax revenue				0.618** (0.264)				2.610*** (0.384)
Constant	0.380*** (0.0268)	0.341*** (0.00968)	0.357*** (0.0211)	0.358*** (0.00485)	0.383*** (0.0796)	-0.0246 (0.0200)	0.168** (0.0852)	0.474*** (0.0126)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	313	463	401	489	443	441	449	439
R-squared	0.706	0.695	0.712	0.660				
χ^2	912.1	1494	1581	1355	931.8	37911	10335	3714
Number of countries	31	31	31	31	31	31	31	31
Instrument					17	22	22	25
Hansen					0.728	0.840	0.924	0.340
AR2					0.899	0.216	0.414	0.591

Robust standard errors in parentheses: *** indicates significance at 1%, ** at 5%, and * at 10%. The IV-GMM estimator is used to estimate columns (1) – (4), while the two-step system GMM is used to estimate columns (5)-(8).

Similarly, mobile telephony enters the model with a positive and significant coefficient across all the models, suggesting that information and communication technology (ICT) positively influences inclusive growth. This empirical outcome is congruent with Ghosh (2016) and Cleeve and Yiheyis (2014), who argue that mobile telephony enables connectivity and empowers businesses and individuals to participate more actively in the economy, facilitating market access, entrepreneurship, and job creation.

4.1. Role of Financial Development on the Nexus between DRM and Inclusive Growth

The study further investigates whether financial development matters in the role of DRM on inclusive growth in Africa, i.e., whether DRM combined with sound financial development improve inclusive growth. The empirical estimate is based on the two-step GMM. The diagnostics statistics suggest that the instruments are valid since the Hansen statistics are insignificant at the 5% level of significance. Similarly, there is no evidence of second-order serial correlation since the p-values of AR (2) statistics are insignificant. The results, as presented in Table 3 above, present the panel estimation of Equation 2 and include the interactive element of DRM and financial development. The computed DRM coefficients and the interaction term are the primary parameters of interest. Both variables were included in the model as separate regressors to guarantee that the DRM and financial development interaction term does not serve as a proxy for either DRM or financial development.

The results suggest that all the DRM measures (direct taxes, indirect taxes, and non-tax revenue) interacted with financial development contribute positively and significantly to inclusive growth in Africa. This suggests that improvement in financial development has a positive and significant effect on the positive relationship between DRM and inclusive growth. A deep dive into the impact of the different measures of DRM suggests that a one per cent increase in financial development increases the impact of direct taxes, indirect taxes, and non-tax revenue on inclusive growth by 4.5%, 1.44%, 2.15%, and 2.61%, respectively. This infers that in the presence of a sound financial sector, the overall tax contributes more to inclusive growth compared to other individual taxes used in this study.

There are three explanations for this empirical result: First, by increasing the effectiveness and capacity of financial systems, financial development enhances DRM and facilitates improved tax

administration and collection. Second, financial development facilitates access to banking and credit services for underserved populations, promoting entrepreneurship and economic participation. Thus, financial development increases the size of the tax base by bringing the unbanked people into the formal economy and providing financial services to them. It also draws investments and mobilizes domestic savings, increasing the amount of money available for public investment. Third, financial development improves financial literacy and access to diverse financial products to boost economic activities and taxable income further.

4.2. Impact of DRM and Inclusive Growth in Africa: Subregional Analysis

After obtaining the panel estimate of DRM and inclusive growth in Africa, this section further investigates whether there are regional differences in terms of the effect of DRM. This is to ascertain whether regional characteristics matter in the utilization of DRM, and to also determine which region utilizes DRM the most. As presented in Table 4, it is important to note that the impact of DRM on inclusive growth differs across the sub-region and measures of DRM – overall taxes, direct taxes, indirect taxes, and non-tax revenue. For instance, in Southern Africa, the overall tax rate and indirect taxes negatively impact inclusive growth. This is in tandem with the empirical study of Oyinlola et al. (2020), which argues that endemic issues in tax administration, low tax compliance and morale, prevalence of tax evasion and inactive taxpayers significantly influence the achievement of inclusive growth. However, direct taxes and non-tax revenue contribute positively to inclusive growth in the sub-region, which is consistent with the results of this study. Similarly, financial development positively and significantly impacts inclusive growth in the southern African region.

In West and North Africa, the impact of DRM on inclusive growth is positive and significant, except for the non-tax revenue, which negatively influences inclusive growth in the two sub-regions. This result is at par with the results presented in Table 2, suggesting that DRM improves the capacity of the government to invest in social sectors like health and education, which are important for inclusive growth. The negative impact of non-tax revenue in the sub-region could be because non-tax revenues from donations and grants, fines and penalties, rents and royalties, etc., are unpredictable and volatile. The volatility could hinder government revenue and spending in essential sectors like education, health, infrastructure and social protection.

In Central Africa, the impact of DRM on inclusive growth is negative and significant, albeit only at the 10 per cent level, except for the non-tax revenue. The negative impact of the overall taxes, direct taxes, and indirect taxes aligns with Adeosun et al. (2023) and Oyinlola et al. (2020) that low tax effort and compliance affect the extent to which African countries mobilize revenue for inclusive growth.

In Eastern Africa, all the measures of DRM – overall taxes, direct taxes, indirect taxes, and non-taxes all contribute to the inclusive growth path of the region. Additionally, financial development also contributes positively and significantly to the inclusive growth of the sub-region.

The overall findings of the subregional analysis suggest that regional characteristics differ in terms of the impact of DRM on inclusive growth. This calls for a regional approach as well as region-specific policies to harness the potential impact of DRM.

Table 4: Impact of DRM and Inclusive Growth in Africa: Subregional Analysis

VARIABLES	(1)	(2)	(3)	(4)
	IV-GMM			
	Southern Africa			
Taxes	-0.450*** (0.116)			
Direct Taxes		0.569** (0.252)		
Indirect Taxes			-0.685*** (0.257)	
Non-tax Revenue				0.130* (0.0683)
FD	0.456*** (0.0364)	0.318*** (0.0514)	0.328*** (0.0441)	0.333*** (0.0361)
Constant	0.404*** (0.0183)	0.448*** (0.0182)	0.353*** (0.0414)	0.379*** (0.0309)
Control variables	Yes	Yes	Yes	Yes
Observations	69	78	78	78
R-squared	0.931	0.926	0.924	0.915
χ^2	998.7	1473	1216	1189
	Western Africa			
Taxes	0.886*** (0.0884)			
Direct Taxes		1.241*** (0.359)		
Indirect Taxes			0.882*** (0.0906)	
Non-tax Revenue				-0.596***

FD	-0.0570 (0.0591)	-0.114 (0.0944)	0.0108 (0.0564)	(0.0951) 0.0816 (0.0934)
Constant	0.274*** (0.0232)	0.339*** (0.0289)	0.287*** (0.0226)	0.347*** (0.0219)
Control variables	Yes	Yes	Yes	Yes
Observations	183	183	187	173
R-squared	0.660	0.499	0.653	0.566
χ^2	488.2	219.1	650.0	295.1
Central Africa				
Taxes	-0.205* (0.108)			
Direct Taxes		-0.398* (0.224)		
Indirect Taxes			-0.385 (0.364)	
Non-tax Revenue				0.0958*** (0.0219)
FD	0.427 (0.287)	0.752** (0.302)	0.149 (0.410)	0.416** (0.183)
Constant	0.179** (0.0807)	0.210** (0.0936)	0.157* (0.0842)	0.300*** (0.0990)
Control variables	Yes	Yes	Yes	Yes
Observations	33	26	33	19
R-squared	0.558	0.654	0.521	0.636
χ^2	86.85	67.11	111.0	47.47
Northern Africa				
Taxes	0.484** (0.205)			
Direct Taxes		1.614*** (0.530)		
Indirect Taxes			1.190 (1.869)	
Non-tax Revenue				-0.405*** (0.115)
FD	-0.254** (0.113)	-0.558*** (0.158)	-0.0915 (0.113)	0.0524 (0.127)
Constant	0.435*** (0.0270)	0.513*** (0.0263)	0.392*** (0.0828)	0.611*** (0.0549)
Control variables	Yes	Yes	Yes	Yes
Observations	54	47	50	50
R-squared	0.624	0.638	0.481	0.585
χ^2	86.43	114.0	75.68	116.1
Eastern Africa				
Taxes	0.215* (0.126)			
Direct Taxes		0.598* (0.353)		
Indirect Taxes			0.519*** (0.196)	
Non-tax Revenue				0.0999

FD	0.136** (0.0615)	0.215*** (0.0529)	*0.0773 (0.0771)	(0.359) 0.256*** (0.0726)
Constant	0.334*** (0.0358)	0.337*** (0.0458)	0.333*** (0.0363)	0.409*** (0.0378)
Control variables	Yes	Yes	Yes	Yes
Observations	114	108	139	131
R-squared	0.774	0.767	0.745	0.729
χ^2	737.0	618.3	1029	788.3

Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

4.3. Distributional Impact of DRM on Inclusive Growth in Africa

In this section, we examine the impact of DRM on inclusive growth across different conditional distributions of inclusive growth using the Machado and Silva (2019) method. Restricting the interpretation to DRM and DRM interacted with FD, which are our variables of interest, the empirical outcome presented in Table 5 indicates that the overall taxes, direct taxes, and indirect taxes have a positive and significant impact on inclusive growth across the quantiles. The result is directly similar to Table 2.

This suggests that regardless of the distribution of inclusive growth, overall taxes, direct taxes, and indirect taxes increase inclusive growth in Africa. However, a close examination of the coefficients suggests that the magnitude of the impact differs across the conditional quantile. For instance, the impact of overall taxes reduced from 0.32% at the 25th quartile to 0.29% at the 50th quartile and 0.26% at the 75th quartile, suggesting that increases in DRM the overall tax level benefit lower growth countries more. Conversely, when the overall taxes variable is interacted with financial development, the elasticity increased from 0.99% at the 25th quartile to 1.03% at the 50th quartile and 1.079% at the 75th quartile. This suggests that African countries with higher inclusive growth benefit more from the positive impact of tax revenue on inclusive growth than those with lower inclusive growth. A possible reason for this result is that countries with higher inclusive growth often have more developed financial systems and stronger institutions that are more efficient in collecting, managing and allocating domestic resources towards sectors that promote inclusive growth.

Concerning the elasticity of direct tax, the impact is also positive across the conditional quantile, but the elasticity differs. For example, in the 25th and 50th quartiles, the elasticity is 0.28%, while the 75th quartile estimate is relatively unchanged at 0.29%. However, when the direct taxes variable

is interacted with financial development, the elasticity increased from 0.74% in the 25th quartile to 0.82% in the 50th quartile to 0.92% in the 75th quartile. This indicates that African countries with higher inclusive growth benefit more from the positive impact of direct tax revenue on inclusive growth than those with lower inclusive growth.

Regarding indirect tax, the impact is positive across the conditional quantile but with a varying elasticity across the conditional quantile. For example, the elasticity of indirect tax declined from 0.48% in the 25th quartile to 0.39% in the 50th quartile and 0.27% in the 75th quartile. The interacted model also declined from 1.67% in the 25th quartile to 1.38 in the 50th quartile and 1% in the 75th quartile. Unlike the previous two results, this suggests that lower-growth countries stand to benefit more from indirect taxes with the requisite financial development in place. However, it is worth emphasizing that this refers to DRM and does not measure distributional effects on households.

The estimate of non-tax revenue is negative. in the 25th quartile (0.07%) and 50th quartile (0.03), but positive and insignificant in the 75th quartile (0.02). The non-tax revenue interacted with financial development is also negative. in the 25th quartile (0.188%) and 50th quartile (0.04), but positive and insignificant in the 75th quartile (0.13).

Table 5: Distributional Impact of DRM on Inclusive Growth in Africa

Variables	(1) Scale	(2) Location	(3) Q=0.25	(4) Q=0.5	(5) Q=0.75
Overall taxes	0.292** (0.148)	-0.0330 (0.143)	0.322 (0.272)	0.291** (0.146)	0.264*** (0.0545)
Overall taxes*FD	1.035*** (0.185)	0.0525 (0.109)	0.985*** (0.205)	1.034*** (0.185)	1.079*** (0.214)
Constant	0.327*** (0.0177)	0.0430** (0.0171)	0.306*** (0.0131)	0.340*** (0.00871)	0.378*** (0.00649)
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	496	496	496	496	496
Direct Taxes	0.288* (0.149)	0.00593 (0.132)	0.283 (0.246)	0.288* (0.155)	0.293*** (0.109)
Direct Taxes*FD	0.834*** (0.208)	0.102 (0.124)	0.743*** (0.224)	0.826*** (0.207)	0.923*** (0.246)
Constant	0.342*** (0.00954)	0.0407*** (0.00845)	0.306*** (0.0131)	0.340*** (0.00871)	0.378*** (0.00649)
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	494	494	494	494	494
Indirect Taxes	0.375*** (0.0628)	-0.125*** (0.0369)	0.481*** (0.0662)	0.386*** (0.0629)	0.265*** (0.0755)

Indirect Taxes*FD	1.342*** (0.246)	-0.388*** (0.143)	1.672*** (0.263)	1.375*** (0.246)	1.009*** (0.289)
Constant	0.329*** (0.00533)	0.0478*** (0.00313)	0.288*** (0.00630)	0.325*** (0.00592)	0.371*** (0.00684)
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	524	524	524	524	524
Non-tax revenue	-0.0291 (0.0354)	0.0515** (0.0211)	-0.0716* (0.0383)	-0.0321 (0.0355)	0.0150 (0.0410)
Non-tax revenue*FD	-0.0296 (0.167)	0.185* (0.101)	-0.188 (0.182)	-0.0398 (0.167)	0.128 (0.194)
Constant	0.353*** (0.00425)	0.0397*** (0.00253)	0.320*** (0.00483)	0.350*** (0.00477)	0.387*** (0.00513)
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	508	508	508	508	508

Country-fixed effects are present in all regressions. The clustered standard errors (determined by bootstrap resampling countries) are in brackets.

4.4. Dynamic Threshold of DRM, Financial Development and Inclusive Growth

While the linear interactive analysis presented in Table 3 provides insightful results, it also imposes limitations that the impact of DRM on inclusive growth monotonically increases with financial development. In addressing this shortcoming, the study uses a dynamic panel threshold model to further explore the existence of a threshold level of financial development and DRM in the DRM-inclusive growth nexus.

Table 6 presents the estimates of the dynamic panel threshold model specified in Equation (5), where DRM indicators – overall tax, direct tax, indirect tax, and nontax revenue – and financial development index are used as the threshold variables. The regime-dependent marginal impact of DRM in inclusive growth is denoted by slope parameters $\hat{\beta}_1$ and $\hat{\beta}_2$. The corresponding confidence intervals at 95% at the lower and upper bound are also displayed in the Table. In Panel A of the Table, the threshold value of overall taxes direct, indirect and non-tax revenue is 23%, 10%, 11%, and 3%, respectively. These threshold values are greater than the panel average for Africa, at 14%, 6%, 8%, and 6%, respectively, for overall, direct, indirect and non-tax revenue taxes (see Table 1). The implication of this is that most African countries are still operating below this estimated threshold, and for them to harness the potential benefits of DRM for inclusive growth, they are expected to maintain these thresholds annually.

Regarding the regime-dependent marginal effect of DRM on inclusive growth, DRM's impact on inclusive growth is positive and insignificant for the overall tax, direct tax, and non-tax revenue model. However, the impact is negative in the indirect tax model. Above the estimated threshold, DRM commands a positive and significant impact in the overall taxes and non-tax revenue model, but the impact is insignificant in the direct and indirect tax model. This lends credence to the argument that the positive impact of DRM in inclusive growth depends on the extent to which these resources are mobilized.

In Panel B of Table 6, the threshold values of financial development across the different types of Models are 0.1 and 0.2. This threshold value is exactly the same as the panel average of 0.2 for Africa. Concerning the regime-dependent marginal impact, Except for non-tax revenue, all the DRM measures are positive and significant on inclusive growth when countries have weak financial development. Above the estimated threshold of financial development, DRM measures (except for non-tax revenue) are positive and significant on inclusive growth. Hence, the same level of DRM may bring different impacts on inclusive growth in different countries with different levels of financial development.

Table 6: Dynamic Threshold Analysis of DRM and Inclusive Growth in Africa

Variables	(1)	(2)	(3)	(4)
(A)				
DRM Threshold on Inclusive Growth				
L. Inclusive growth	0.516*** (0.0397)	0.486*** (0.0400)	0.480*** (0.0396)	0.505*** (0.0393)
Threshold ($\hat{\gamma}$)	0.230	0.101	0.106	0.0283
$\hat{\beta}_1(DRM \leq \hat{\gamma})$	0.0849 (0.0816)	0.0526 (0.161)	-0.151 (0.127)	0.267* (0.141)
$\hat{\beta}_2(DRM > \hat{\gamma})$	0.158** (0.0793)	0.217 (0.134)	0.0207 (0.109)	0.205*** (0.0473)
Control variables	Yes	Yes	Yes	Yes
Constant	-0.0181 (0.0508)	0.0216 (0.0548)	0.0134 (0.0519)	0.0674 (0.0530)
Lower CI	0.0948	0.0596	0.0996	0.0265
Upper CI	0.232	0.104	0.108	0.0341
χ^2	1010	887.1	1026	1006
(B)				
Financial Development Threshold				
L. Inclusive growth	0.535***	0.502***	0.410***	0.504***

	(0.0396)	(0.0399)	(0.0441)	(0.0446)
Threshold ($\hat{\gamma}$)	0.0806	0.151	0.0806	0.0904
$\hat{\beta}_1(FD \leq \hat{\gamma})$	0.208**	0.157	0.352**	-0.0800
	(0.0920)	(0.139)	(0.144)	(0.0804)
$\hat{\beta}_2(FD > \hat{\gamma})$	0.138*	0.391***	0.275**	-0.235***
	(0.0803)	(0.125)	(0.113)	(0.0541)
Control variables	Yes	Yes	Yes	Yes
Constant	-0.0172	-0.0338	0.0647	0.000452
	(0.0515)	(0.0514)	(0.0597)	(0.0644)
Observations	494	492	522	506
Number of countries	30	30	30	30
Upper CI	0.332	0.332	0.309	0.309
Lower CI	0.0783	0.0792	0.0783	0.0883
χ^2	977.0	1016	590.5	662.3

Notes: Each column shows the coefficient from a separate regression and standard errors are in parentheses. These threshold variables were included as explanatory variables for all estimations to avoid erroneous switching (see, for example, Fouquau et al. 2008, p. 291). *** denotes significance at 1 %, ** at 5 % and * at 10%. Column 1 is overall taxes, Column 2 is direct taxes, Column 3 is indirect taxes, and Column 4 is non-tax revenue.

5. Conclusion and Policy Prescriptions

African economies will require an unprecedented mobilization of resources if they are to meet the goals of the 2030 Agenda for Sustainable Development and the African Union Agenda 2063 – *The Africa We Want*. According to UNCTAD (2020), Africa's annual SDG finance gap is approximately \$200 million. The negative effects of geopolitics, climate change and the COVID-19 pandemic on the world economy exacerbate this financing gap. High borrowing costs and debt burdens translate to limited fiscal space for governments to invest in the social, health and education sectors, which poor and vulnerable people rely upon to build their capabilities and access economic opportunities. Given this, governments need to focus on policy prescriptions that provide the greatest opportunity to harness DRM to expand fiscal space for investments in these critical social sectors, as well as infrastructure development and enhance the productive capacities of MSMEs as enablers of inclusive growth. The continent urgently requires financial resources to guarantee the successful execution of infrastructure programmes and the historic Agreement establishing the African Continental Free Trade Area (AfCFTA), among other endeavours.

This study investigated the impact of DRM on inclusive growth using an unbalanced panel of 31 African countries from 1990-2022. In achieving the objectives, we used three models: (1) IV and two-step system GMM, (2) Machado and Silva (2019) Method of Moments Quantile Regression (MMQR), and (3) dynamic panel threshold model by Kremer et al. (2013).

The following are the empirical findings from this study: (1) there is a positive linkage between DRM and inclusive growth. i.e., higher DRM is associated with an increase in spending on social sectors like education and health, which are crucial for inclusive growth; (2) an increase in financial development induces a positive relationship between DRM and inclusive growth in Africa; (3) African countries with higher inclusive growth benefit from the positive impact of tax revenue on inclusive growth than those with lower inclusive growth; (4) there is a regional difference in terms of the impact of DRM on inclusive growth; and (5) African countries must maintain an annual threshold of 23%, 10%, 11%, and 3% of GDP for overall taxes direct, indirect and non-tax revenue, respectively for them to harness the potential impact of DRM.

Based on the aforementioned findings, this study suggests the following policy recommendations to stakeholders, policy makers and African governments.

- Firstly, a focus on reforming tax systems for DRM, particularly tax policy, tax administration, and taxpayer compliance, as well as civil society advocacy, is central to tax reform. Good policymaking recognizes that tax reform is a compromise of equity, efficiency, macroeconomic stability and environmental sustainability. If inclusive growth is a key objective of governments, the compromise may be weighted depending on how these competing objectives feed or undermine inclusive growth. Noting these factors are over the long term, a strengthened tax administration is key to achieving these objectives, which necessitates building the capacity of the public sector. In this regard, two reforms are particularly poignant: tax administration reform and organizational reform at the national and sub-national levels.
 - Tax administration reform is focused on bringing more businesses into the tax net without choking off business development, such as MSMEs. Organizational tax reform is about organizational set-up and management arrangements; two arms of this latter reform are the Inland Revenue and the functional system itself.
 - Governments should focus on ways to improve DRM, including through more efficient taxation of key sectors and therefore, improved management of extractive revenues is important; as noted in the literature, the experience of LMICs shows where countries invest attention in improving their tax administration systems, benefits significantly accrue.

- Secondly, in harnessing the benefits of DRM, the African government should improve their financial sector (capital and money market). While Airtel Money and MTN Money have become critical players in the financial landscape of many African countries, effectively taking on roles traditionally filled by banks, they often lack more advanced financial services such as loans, insurance, and investment options, which are typically available through traditional banks. Addressing issues related to regulatory oversight, network reliability, and security will be key to maximizing the advantages and deepening the financial sector for growth. African governments can also learn from the success story of the South African Financial Sector Development and Reform Program (FSDRP).
 - Reducing bureaucratic hurdles and streamlining processes for listing companies, trading securities, investors, and opening brokerage accounts through digital technologies should also be at the heart of African policymakers. This will significantly improve capital market penetration, leading to more efficient allocation of resources and economic growth.
- Thirdly, increased digitalization in the delivery of taxpayer services and the automation of processes, away from cash payments, can support widening the tax net but must be measured to not place the burden of compliance on poor people who may have limited access to digital technologies and forms of payment. A notable effort to integrate the informal sector into the pension system, with a reliance on innovation and technology to facilitate the transition, bodes well for DRM, given that traditionally, the tens of millions of informal workers in Africa have not been able to contribute and benefit from pension funds, and have been a missed opportunity to build pensions. However, some country regulations distinguish between the formal and informal sectors, leveraging different treatments.
 - Whilst pension funds mainly capture resources from the formal sector, the informal sector grows at a faster rate, which is therefore not harnessed. Again, digital technologies may be used to mobilize resources and raise awareness, including through civil society campaigns. In addition, governments could consider special measures to deal with transnational transactions, including digital trade transactions, which in many countries escape detection or taxes are not currently levied.

5.1. Limitations and Future Recommendations

While this study has filled a gap in the literature, future studies could look at the following: (1) this study only uses 31 African countries - future studies could expand to include a more comprehensive set of African countries and sub-regional comparisons better to understand the dynamics of DRM dynamics across the continent, (2) the study assumes that the eighteen variables used in measuring inclusive growth contribute equally. However, future studies could assign weights based on the importance of each of the variables, (3) future studies could also look at other measurements of DRM that were not captured in this model, and (4) future studies could look at other intermediating variables crucial to the nexus between DRM and inclusive growth.

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Appendices

Table A1: List of Countries

(1) West Africa	(2) East Africa	(3) Central Africa	(4) Southern Africa	(5) Northern Africa
Cote d'Ivoire	Mauritius	Chad	Botswana	Egypt, Arab Rep.
Burkina Faso	Kenya	Congo, Dem. Rep.	Eswatini	Libya
Ghana	Rwanda	Congo, Rep.	Malawi	Morocco
Cameroon	Madagascar	Equatorial Guinea	South Africa	Tunisia
Niger	Seychelles			
Nigeria	Somalia			
Senegal	Uganda			
Cabo Verde	Ethiopia			
Mali				
Mauritania				
Togo				

Table A2: Variables used to construct inclusive growth index

Variable	Variable Definition	Source
Clean energy	Access to clean fuels and technologies for cooking (% of population)	WDI
Contributing worker	Contributing family workers, total (% of total employment)	WDI
Education	Primary education, duration (years)	WDI
Electricity	Access to electricity (% of population)	WDI
Employment	Employment to population ratio, 15+, total (%) (modelled ILO)	WDI
Equality in primary	School enrolment, primary (gross), gender parity index (GPI)	WDI
Equality in secondary	School enrolment, secondary (gross), gender parity index (GPI)	WDI
GDP per capita	GDP per capita (% annual growth)	WDI
Health expenditure	Government expenditure on health (% total government expenses)	WDI
Immunization	Immunization, DPT (% of children ages 12-23 months)	WDI
Mobile cellular	Mobile cellular subscriptions (per 100 people)	WDI
Mortality rate	Mortality rate, under-5 (per 1,000 live births)	WDI
Portable water	People using at least basic drinking water services (% of population)	WDI
Primary education	Number of years required to complete primary education	WDI
Pupil-teacher ratio	Pupil-teacher ratio, primary	WDI
Sanitation	People using at least basic sanitation services (% of population)	WDI
Underweight	Prevalence of underweight, weight for age (% of children under 5)	WDI
Women in parliament	Proportion of seats held by women in national parliaments (%)	WDI

Note: WDI represents World Development Indicators. This Table shows the variables used to construct our inclusive growth index. Source: World Bank Development Indicators, 2023

Table A3: Matrix of correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) totalrevenuein~c	1.000									
(2) taxesincsc	0.555	1.000								
(3) directtaxesinc~s	0.606	0.816	1.000							
(4) indirecttaxest~l	0.305	0.821	0.339	1.000						
(5) nontaxrevenue~l	0.700	-0.096	0.156	-0.310	1.000					
(6) lnrgdpc	0.167	0.011	-0.049	0.067	0.099	1.000				
(7) globalization	0.028	-0.036	0.000	-0.057	0.114	-0.026	1.000			
(8) fdi_gdp	0.348	0.420	0.306	0.381	0.105	-0.015	-0.004	1.000		
(9) fd	0.482	0.667	0.601	0.492	0.136	0.062	0.282	0.228	1.000	
(10) mobilecellular	0.329	0.417	0.439	0.245	0.160	-0.025	0.026	0.397	0.427	1.000