How Financial Sector Development Improve Domestic Tax Revenue Mobilization for Developing Countries?

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ABSTRACT

This study examines the effect of financial development on domestic tax revenue mobilization in developing countries. Our empirical analysis uses the aggregate financial index that comprises the banking system's depth (size and activity), access, and efficiency of financial institutions and financial markets. Using panel data from developing countries over the period 1995-2017, our findings suggest that more developed financial sectors positively and significantly influence the government's ability to raise tax revenue. More interestingly, we find that this favorable effect is sensitive to developing countries characteristics, namely the level of economic development, the degree of financial openness and the stance of fiscal policies. When we more precisely look at the effects of disaggregated financial development components on domestic tax revenues mobilization, we find that the estimated coefficients on the sub-components of financial development are statistically significant at least at 10% of significance, except for the financial market's efficiency. The results denote that domestic tax revenue in developing countries depends on financial institutions and financial markets. Finally, our results show that financial development contributes positively to domestic tax revenue mobilization excluding resources.

Keywords: **Financial development, Domestic Tax revenue, Economic growth, Degree of openness, non-resources tax revenue**

1. INTRODUCTION

The concept of financial development (FD) extends back to the seminal work of Schumpeter (1961), McKinnon (1973) and Shaw (1973). The definition of this concept has emerged considerably over time. For example, Shaw (1973) defined financial development broadly as "the accumulation of financial assets at a faster rate than the accumulation of non-financial assets." Next, Levine (2004) expands on this definition:*" Financial development is achieved when financial instruments, markets, and financial intermediaries reduce, but not necessarily eliminate, the costs of obtaining information, the costs of enforcing contracts, and the*

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costs of transactions, and consequently do a better job of providing five financial functions." Levine's five main functions that require financial development are: (i) producing ex-ante information on projects and promoting optimal allocation of resources, (ii) monitoring investments and controlling enterprises, (iii) facilitating financial transactions, risk hedging, asset diversification, and risk pooling, (iv) ensuring the mobilization of savings, and (v) facilitating the exchange of goods and services. In this paper, we define our financial development following the World Bank. Financial development is: "conceptually, a process of reducing the costs of acquiring information, enforcing contracts, and making transactions ". The literature on financial development is still developing, with new definitions, determinants, and measurement procedures being suggested. The factors that facilitate, restrict or reverse financial development are documented in Girma & Shortland (2008), Herger et al. (2008), Huang (2010a), Huang (2010b); Yang (2011); Roe & Siegel (2011). These include institutional quality, macro-economic policies, geographic and cultural characteristics. The measurement of financial development remains an important issue for empirical studies. Different authors use various sources and analytical methodologies to estimates the value of financial development from developing countries (IMF; World bank; European Statistics; Svirydzenka (2016); Levine (2004); Levine & Zervos (1998)). Financial development constitutes a potential source of domestic revenue mobilization for developing countries (Bohn 1990; Gordon & Li 2009). Tax revenue mobilization is essential for three reasons (IMF, 2018). First, developing countries need to mobilize resources for investments to achieve sustainable development objectives. Second, with increasing debt levels, tax revenue mobilization is a strategy for fiscal consolidation. The third reason is that a substantial tax collection capacity helps to strengthen institutions and increase state capacity. According to the IMF (2017), developing countries remain the region with the lowest tax revenues as a percentage of GDP in the world. However, public expenditure needs are much higher in these countries. The Consensus resulting from the 2002 Monterrey Conference on Financing for Development identified external and domestic resources as sources of financing for economies. Years after this International Conference, developing countries are still struggling to ensure effective mobilization of domestic resources. In August 2015, the International Conference on Financing for Development and Sustainable Development held in Addis Ababa stressed that developing countries' development financing strategies were based on robust domestic resource mobilization. However, it is official development aid, multilateral or bilateral debt, and foreign direct investment that finances the levers of structural transformation. The existing infrastructure in these countries (roads, telecommunications, and port facilities) is so poor that it seriously limits economic growth and the education and health of their workers. The resulting fiscal problems seriously hamper economic growth in these countries. To improve economic growth and reduce dependence on official development assistance, developing countries must close their infrastructure gaps in many areas such as education, health, electricity, roads, ports, motorways...etc.(see, (Calderón & Servén 2004; Arezki & Sy 2016; Esfahani & Ramırez 2003)). Domestic resource mobilization could help these countries address these development challenges. There is voluminous literature on the determinants of tax revenue mobilization. However, few studies have shed light on the link between financial development and tax revenue in developing countries: examples include (Bohn 1990; Ilievski 2015; Bohn 1990; Tavares & Valkanov 2001; Gordon &

Li 2009; Ardagna 2009; Gilbert & Ilievski 2016) investigate the effects of the financial system on either banking or non-banking activities. Indeed, the scope of these papers encounters several limitations. First, different measures of financial development are generally highly correlated and are frequently subject to measurement error. Second, previous studies tend to examine a single indicator, such as bank credit or stock market capitalization, as a proxy for FD, which leads to failure in capturing the complex multidimensional nature of the FD process. In this study, we use a system of FD indicators proposed by Svirydzenka (2016). The analysis of how financial development facilitates tax revenue mobilization is an essential issue in developing countries. Thus, developing countries' financial sector appears as a necessity in economic development because it acts on economic growth through capital accumulation and improvement of productivity. Therefore, we ask the following question: What is the impact of financial sector development on domestic tax revenue mobilization in developing countries? We contribute to this literature by assessing the macroeconomic impact of financial development in domestic tax revenue mobilization in developing countries. Indeed, the relation between financial development and domestic tax revenue mobilization is essential for policymakers. Policymakers want to know policies affect tax revenue (mobilization) as well as how they affect growth [1]. Understanding this relationship will allow policymakers to assess whether financial development will improve domestic tax revenue mobilization. Our investigation is also distinguished using the new financial development database recently compiled by Svirydzenka (2016). [2] To explore the relationship between financial development and domestic tax revenue, we use the system-GMM estimator of Blundell & Bond (1998) that properly tackles endogeneity. Our analysis conducted on a broad panel of 49 developing countries over the period 1995-2017 reveals the following:

(i) We confirm that financial development increases domestic tax revenue mobilization.

(ii) The strength of our finding is secured by a rich robustness analysis that includes an alternative tax revenue measure, additional control variables, and traditional measures of financial development. First, we investigate the robustness of this finding concerning an important source of debate, namely the measure of tax revenue. Moving away from IMF's tax revenue measure (used in our baseline analysis), we use non-resource tax revenue (as a % of GDP) as an alternative measure of tax revenue, which are calculated as total tax revenue (excluding grants and social contributions) minus revenues from resource taxes (% of GDP) following Brun et al. (2015). Estimations with this alternative measure confirm our finding that financial development increases domestic tax revenue mobilization. Second, accounting for additional control variables confirms the strongly significant and positive effect of financial development on domestic tax revenues mobilization. Third, and for the finish, we use five traditional financial development measures as an alternative measure of financial development, namely liquid liabilities, central bank assets, deposits money bank assets, private credit by money banks, and private credit by money banks and other financial institutions that have been used in the literature by King &

[1] Although recent studies have established a robust link between financial sector development and economic growth, less studies have focused on the relation between financial sector development and tax revenue mobilization

[2] The World Economic Forum publishes a Financial Development Index annually. The index database provides nine (09) indices for over 180 countries with annual frequency from 1980.

Levine (1993), Levine & Zervos (1998), Levine et al. (2000) among others. Estimations with these alternative measures confirm our finding that financial development increases domestic tax revenue mobilization when financial development is measured by the liquid liabilities, the deposits money bank assets, the private credit by money banks, or the private credit by money banks and other financial institutions.

(iii) We explore possible heterogeneities by disaggregating the sample based on various economic and structural characteristics, namely the level of economic development, the degree of financial openness, and the stance of fiscal policies. We reveal that financial development exerts a more pronounced effect on domestic tax revenue mobilization in "low-income" compared to "high-income" developing countries. Likewise, financial development fosters domestic tax revenue both in "high" and "low" financial openness regimes, but the effect is more pronounced in the former regime. Regarding the fiscal stance, we find that financial development increases domestic tax collection only when the debt stock is relatively low, underlining the difficulty of raising additional taxes when debt is large.

(iv) Finally, we assess the effect of components of financial development on domestic tax revenue mobilization. Financial markets, financial institutions, financial markets depth, financial institutions' depth, financial markets access, financial institutions access, and the financial institutions' efficiency positively and significantly influence the government's ability to raise tax revenue, except for the financial institutions market's efficiency.

The remainder of the paper is organized as follows. Section 2 reviews the previous literature, and section 3 presents our empirical model. Section 4 focuses on the empirical analysis, and section 5 discusses our empirical results. Section 6 analyzes their robustness, section 7 explores heterogeneities in the effect of financial development on domestic tax revenue related with economic, and structural factors. Section 8 looks at the sub-components of financial development, and section 9 concludes.

2. LITERATURE REVIEW

2.1. *What determines financial development ?*

The literature on financial development is still developing, with new definitions, determinants, and measurement procedures being suggested. The factors that facilitate, restrict or reverse financial development are documented Huang (2010a,b, 2011), Girma & Shortland (2008), Herger et al. (2008); Yang (2011); Roe & Siegel (2011). These include institutional quality, macroeconomic policies, geographic and cultural characteristics. Questions related to the determinants of financial development have been a subject matter of several research. For example, Huang (2005, 2010a) suggest that the level of financial development is determined by its institutional factors (legal and regulatory environment, democratic, corruption, political instability), macroeconomic factors (Inflation, income level, saving rate), structural factors (trade openness and financial openness), geographic and cultural factors (latitude, access to the sea, distance from large markets, colonization, population level, religious, language, and ethnic characteristics).

Various scholars have investigated financial development's relationships with institutional factors but not in a single study. For example, Girma & Shortland (2008) and Huang (2010a) study the effects of political institutions on financial development and financial structure and find positive effects of political institutions on financial development. Bhattacharyya (2013) analyze the impact of democratization on financial structure in a sample of 96 countries covering the period 1970–2005. He finds that democratization leads to a more market-based financial system. La Porta et al. (1997) empirically establish the link between the legal environment and financial markets in 49 countries and find that countries with a lower level of investor protection, measured by both the nature of legal rules and the quality of law enforcement, have smaller and narrower capital, equity, and debt markets. Similarly, Porta et al. (1998) examine legal rules covering the protection of corporate shareholders and creditors, the origin of these rules, and the quality of their enforcement. They claim that national legal origin strongly affects the legal and regulatory environment for financial transactions and explains the differences in financial development between countries. They show that French-civil-law countries generally have the weakest legal protections of investors, and common-law countries the strongest, with German-and Scandinavian-civil-law countries located in the middle. Acemoglu et al. (2001) and Beck et al. (2003) assign differences in countries' financial development to colonial strategies. He finds that differences in early settler mortality can explain cross-country variation in financial development among former colonies. Rajan & Zingales (2003) investigate the role of interest group politics of financial development and find that interest group politics being an important factor in financial development across countries. They argue that interest groups, and especially the incumbent industrial firms and the domestic financial sector opposition will be weaker when a country allows both trade openness and capital flows. Macroeconomic conditions could affect the development of the financial system. According to Huybens & Smith (1999), inflation is one of these macroeconomic variables, hurting financial performance. Indeed, an inflation rate increase reduces the real return on money and assets, resulting in credit rationing. The financial sector would then grant fewer loans, the allocation of resources would become less efficient, and the activity of intermediaries would reduce, with negative consequences for capital investment (Gultekin 1983; Boudoukh & Richardson 1993; Boyd et al. 1996; Ely & Robinson 1997; Barnes et al. 1999; Huybens & Smith 1999; Schotman & Schweitzer 2000; Boyd et al. 2001) Some studies have also looked at the impact of structural factors on financial development. For example, Ibrahim & Sare (2018) examine the determinants of financial sector development in Africa, relying on data for 46 countries spanning 1980–2015, and show that, while human capital robustly influences financial development, trade openness robustly matters more for private credit than domestic credit. They found that trade openness and human capital are substitutes and play an influential role in Africa's financial development. The role of foreign banks in promoting financial development in developing countries is stressed in the literature. Thus, Levine (1996) postulates that foreign banks promote financial development directly by providing-by-providing high-quality banking services and indirectly by spurring domestic banks to improve quality and cut costs; stimulating the growth of the bank supervisory and legal framework; and intensifying pressures on governments to enhance the legal, regulatory, and supervisory systems. Claessens et al. (2001) examine the extent and effect of foreign presence in domestic

banking markets and find that foreign banks have higher profits than domestic banks in developing countries. An analysis of Stulz & Williamson (2003) on the impact of differences in culture, proxied by differences in religion and language, shows two pieces of evidence on the process of financial development. First, culture predicts cross-country variation in protection and enforcement of investor rights, especially for creditor rights. Second, the influence of culture on creditor rights protection is mitigated by the introduction of trade openness. The analysis also shows that the main monotheistic religions, for example, Catholicism, Islam, and Protestantism, are consistently linked to the establishment and enforcement of creditor rights and affect the efficiency of the financial system. Recent papers are studying the effects of natural resources on financial development. Beck (2011) shows that resource-based economies have less developed financial systems, and their banks are more liquid, better capitalized, and more profitable but give fewer loans to firms. Firms in resource-based economies use less external finance, and a smaller share of them uses bank loans, although there is the same level of demand as in other countries, thus pointing to supply constraints. Overall, there is some indication of a natural resource curse in financial development, which falls more on enterprises than households. Zaidi et al. (2019) probes the influence of globalization, natural resources, and human capital on financial development in a panel of thirty-one OECD countries and found that natural resources have Granger causality and positive effects on financial development. Gokmenoglu & Rustamov (2019) investigate the role of the World Bank lending and natural resource abundance on the financial development in the case of four natural resource-rich developing countries: Kazakhstan, Azerbaijan, Russia, and Turkmenistan (KART) during the period from 1992 to 2017 and find that in the long-run the World Bank lending and an abundance of natural resources positively affects financial development. By contrast, Bhattacharyya & Hodler (2014) study whether natural resource revenues hinder financial development and what role political institutions play in this process in 133 countries over the period 1970–2005. The results show that resource rents are negatively associated with financial development in countries with weak political institutions. Still, this negative effect decreases in absolute value and eventually vanishes as the quality of political institutions improves. Canh & Thong (2020) find that the increase in natural resources rents growth positively affects financial market depth. Still, adverse effects on financial institutions, and overall induces financial development.

2.2. *What are the macroeconomic effects of financial development?*

The economic effects of financial development are multiple. They influence savings, investment, economic growth, inflation, trade openness, business cycle volatility, etc. Research on the economic effects of financial development reaches different conclusions.

Several studies such as King & Levine (1993), Levine et al. (2000), Ang & McKibbin (2007), Greenwood et al. (2013), find a positive effect of financial development on growth. For instance, McKinnon (1973) and Shaw (1973) underline the importance of the financial system in promoting economic growth. In the same vein, Levine (1991) shows that stock markets accelerate growth by facilitating the firm's ownership without disrupting the production processes within firms and allowing agents to diversify portfolios. King & Levine (1993) find that financial development is strongly associated with economic growth. Levine

& Zervos (1998) find a strong and positive link between financial development and economic growth. Levine (2005) argues that financial systems may influence saving rates, investment decisions, technological innovation, and long-run growth rates. However, the positive effect of financial development on economic growth needs to be interpreted with some caution since it could reflect the impact of omitted variables, unobserved country-specific effects, and the simultaneity problem Levine et al. (2000). Although past work shows that the level of financial development is a good prediction of economic growth, these results do not settle for causality. The importance of financial development for economic growth is still a debatable issue (Robinson 1952; McKinnon 1973; Lucas Jr 1988; Levine 2001). For example, Lucas Jr (1988) asserts that economists "badly over-stress" the role of financial factors in economics. In contrast, McKinnon (1973, 1989) declares that financial development can be a significant source of economic growth. Also, McKinnon (1973, 1989) suggests that whether or not financial development is an effective driver of subsequent economic growth is conditional on the efficiency of financial institutions and other related conditions in the economy. More recent empirical work provides evidence that demonstrates the changing nature of the finance–growth nexus. For example, Rousseau and Wachtel (2011) provide proof of either vanishing positive impact. In parallel,Benczúr et al. (2019), Arcand et al. (2015), Samargandi et al. (2015), Law & Singh (2014), Cecchetti & Kharroubi (2015), Cournède & Denk (2015), Cecchetti & Kharroubi (2012), Law & Singh (2014), Sahay et al. (2015) provide evidence of a potentially non-linear (often an inverted U-shape) relationship. Demetriades & Rousseau (2016) argue that some financial reforms have significant growth effects, positive or negative, depending on bank regulation and supervision quality. Regarding the effects on growth volatility, Da Silva (2002) shows that, after controlling for other factors that may affect the fluctuations in economic activity, countries which more developed financial systems exhibit less volatile business cycles. A well-developed financial system in Ahamada & Coulibaly (2011) prevents remittances from creating a significant GDP growth volatility. The financial markets may channel remittances to non-remittances-receiving agents with investment needs and allow them to smooth their investment, leading to a decrease in total output volatility. Moradbeigi & Law (2016) provide evidence that supports the dampening effect of financial development in the propagation of oil terms of trade volatility. Specifically, a well-developed financial system can offset some of the negative impacts of oil volatility on growth volatility. Some studies have looked at the relationship between financial development and trade policy with various conclusions, particularly on the impact of financial development on trade liberalization (Beck 2002; Svaleryd & Vlachos 2002; Do & Levchenko 2007; Kim et al. 2010, 2012; Yakubu et al. 2018; Sare et al. 2019; Sare 2021) First, Beck (2002) explores a link between financial development and the structure of the trade balance. He finds that the level of financial development impacts both exports and the trade balance of manufactured goods. In a similar vein, Svaleryd & Vlachos (2002) also find a positive and economically significant relationship between trade policy and financial markets, with causation running in both directions. Then, Kim et al. (2012) have indeed provided evidence that financial development has a positive impact on trade and a negative effect of trade on financial development in poorer countries. In richer countries, financial development stimulates trade openness whereas trade has an ambiguous impact on financial development. Using data from 46

African countries over the period 1980-2015, Yakubu et al. (2018) reveal the differential effects of finance on trade. The authors provide evidence that private credit does not promote trade while domestic credit positively affects trade, and Sare et al. (2019) studying the impact of finance on trade as well as sectoral channels through which finance influences international trade in 46 countries in Africa spanning 1980–2016, find that financial sector development does not have a significant effect on international trade. Sare (2021) seek to quantify the threshold beyond which financial sector development no longer has a positive effect on international trade. To do this, they use data on 46 countries in Africa between 1980 and 2016 and employ a sample splitting and threshold estimation approach. The author finds evidence of threshold effects for a number of the countries. Several recent papers have examined the impact of financial development on poverty and inequality (Jalilian & Kirkpatrick 2005; Clarke et al. 2006; Beck et al. 2007; Ang 2010). On the one hand, Jalilian & Kirkpatrick (2005) examine the contribution of financial development to poverty reduction in developing countries and show that, up to a threshold level of economic development, financial sector growth contributes to poverty reduction growth-enhancing effect. However, Clarke et al. (2006) examine the relationship between financial development and the level of the Gini coefficient. They reject the hypothesis that financial development benefits only the rich and argue that inequality is less when financial development is more significant in the long run. On the other hand, Ang (2010) examines how finance impacts income inequality in India using annual time series data for over half a century and finds that financial development reduces income inequality. Finally, Beck et al. (2007) find that financial development reduces income inequality, exerts a disproportionately positive impact on the relatively poor, and is financial development is strongly associated with poverty alleviation.

2.3. *Financial development and domestic tax revenue mobilization*

This section discusses whether financial development is essential for fiscal policy. Conceptually, I review ways in which the services provided by the financial system may affect domestic tax revenue collection. Those countries with financial systems that are better at performing will mobilize more domestic tax revenues than those with less developed financial systems. So far, little evidence exists of the effects of financial development on domestic tax revenue in developing countries. Financial development plays a significant role in the mobilization of domestic tax revenue. Broadly speaking, financial development can have a direct and indirect effect on domestic tax revenue.

The direct effect stems from the state's ability to tax the financial sector. For instance, Demirgüç-Kunt & Huizinga (2001) show that the financial sector represents significant value-added, employment, and potential tax revenues. In theory, the financial system provides five critical services for economic growth (see Levine (2005)). We argue that these services offered by financial systems could improve the tax administration's performance in collecting domestic tax revenues. To begin with, better access to financial services may facilitate the tax recovery and compliance by taxpayers, i.e., the financial system aids in the tracking and recovery of taxes. Banks, insurance companies, and other financial institutions provide liquidity to the companies and consumers by providing various payment systems essential for their money transactions (see Elliott (2010)). For example, a

country with well-developed, transparent, and efficient financial institutions will be used by companies and taxpayers to carry out their transactions. In turn, tax collecting authorities may obtain precious information from those financial institutions, such as the income and assets of taxpayers.

In contrast, for underdevelopment financial institutions, the size of the informal economy increases and makes the acquisition of tax information more accurate. In the same vein, Gilbert & Ilievski (2016) postulate that Tax-to-GDP ratios increase when bank deposits increase, meaning that taxes on GDP increase for a given value of bank deposits. Bank deposits act here as a source of information for governments. More households use financial instruments to spend their income; its spending is observed by the government and taxed. In general, the efficient perception of people's income taxes is sometimes very complicated even in advanced economies, which have a high level of financial development, and seemingly impossible if income is frequently received and spent in cash. The situation would worsen in developing countries with an underutilized banking system, where most tax revenues come from local and foreign companies. Similarly, governments could tax bank deposits to increase tax revenues. Another strand of research that has been pursued is the role of the lack of state capacity in developing countries (Besley & Persson 2009, 2010, 2013) [3]. Gordon & Li (2009) stress that governments in developing countries are trying to collect more taxes from businesses but are not succeeding. Their tax revenues are limited by their incapacity to collect them. After accounting for state capacity variables, firms in countries with a more developed financial sector report a larger share of their sales to the tax authority. In their further study, Gordon & Li (2009) assume that state capacity is given and that there is asymmetric information in credit markets, particularly within developing countries. If the state capacity is enforced, they analytically show that with a more developed financial sector, which offers lower agency/monitoring costs, the government of a developing country will increase its optimal tax-auditing probability on operating establishments, which in turn generates a significantly higher ratio of tax revenue to GDP in developing countries. The above theoretical studies of the positive relationship between finance and tax revenue also accord with previous empirical studies, which show a positive relationship. For example, Bohn (1990) emphasizes a positive relationship between financial development and tax revenue. Taha et al. (2010) find a significant relationship between direct tax revenues and financial activities. In a similar vein, the development of the bonds and stocks market plays a crucial role in revenue generation. Empirical work by Taha et al. (2013) concluding that the development of the financial system positively influences direct tax revenue in Malaysia. To the extent that financial development impacts the state of the economy, it will also have an indirect effect on domestic tax mobilization, although alternative macroeconomic channels could be important. These factors include international trade, the underground economy, tax evasion activities, and corruption. According to Beck (2002), Beck (2002), Svaleryd & Vlachos (2002), and Kim et al. (2010) find that financial development facilitates international trade. Dabla-Norris et al. (2008); Beck et al. (2014) and Guo & Hung (2020) , find that financial development reduces a company's degree of tax evasion. In turn, Capasso & Jappelli (2013) show that financial development (a reduction in the cost of external finance) can

[3] These studies pointed out that developing countries are limited by two complementary aspects of state capacity: (i) fiscal capacity and (ii) legal capacity

reduce tax evasion and the size of the underground economy. We argue that economic growth is the main indirect channel through which financial development could affect domestic tax revenue mobilization. Financial systems impact investment decisions on productivity enhancement activities through two mechanisms: (i) by assessing potential investors and investing in the most successful ones, (ii): they may also provide research, assessment, and supervisory support more efficiently and cost-effectively than individual investors or individuals, they are equally able to mobilize and provide the appropriate financing to investors rather than to individuals (see (King & Levine 1993)). In sum, the assessment and screening of investors reduce the cost of investment in improving productivity and stimulates economic growth. As a result, economic growth would increase considerably, and the country's government could collect higher tax revenues. There is a large literature (King & Levine 1993; Levine 1996; Levine & Zervos 1998; Rajan & Zingales 1996; Levine et al. 2000; Levine 2001, 2005; Ang & McKibbin 2007; Greenwood et al. 2013) provided empirical evidence of a positive impact of the financial development on the economic growth. Likewise, a developed financial system may facilitate exchanges of goods and services (trade transactions), contributing to boosting the competitiveness of companies on the international market. Consequently, this will result in increasing exports and imports, and the country concerned could be able to generate higher tax revenues. Specifically, the positive effect of international trade on tax revenues is expressed through revenues generated from taxes on international trade (so-called gate revenues) and domestic tax revenues. Moreover, financial development may contribute to reducing a company's degree of tax evasion. For example, larger companies and societies owned by foreign investors and other societies whose financial statements are reviewed by external auditors are less likely to escape taxes. Individuals and companies escaping taxes or irregularly operating tend to hide their income. Indeed, access to external credits is very costly for companies having greater tax avoidance practices. Financial development encourages more transparency of companies that depend increasingly on external financing. Thus, developing countries being the most affected by tax evasion, with a certain high level of financial development, may reduce the tax revenue lost due to tax evasion. Finally, financial development is a potential disincentive to the spread of the informal economy.[4] According to Capasso & Jappelli (2013), when companies or individuals work informally, their ability to report income and assets is lower and the cost of credit higher. Thus, as financial markets become more developed, more efficient intermediaries penetrate the market, and the cost of credit decreases, increasing the cost of the opportunity cost of continuing underground exploitation[5]. In Brief, financial development leads to the formalization of firms or individuals, i.e., it pushes firms to reveal information about their income and assets to financial intermediaries and tax officials. Several papers have studied the structural factors of the economy (see (Lotz & Morss 1970; Chelliah 1971; Tanzi 1992; Ghura 1998; Mahdavi 2008; Bird et al. 2008; Khattry & Rao 2002; Baunsgaard & Keen 2010; Crivelli & Gupta 2014) and the quality of institutions (see (Gupta 2007; Bird et al. 2008; Dioda 2012; Tanzi & Davoodi 2001) as the main determinants of revenue mobilization in developing countries and none of them have analyzed the financial

[4] Many factors explain the emergence and size of informal activities, such as high taxation, high social charges, heavy legislation, and labor costs, as factors that may push firms into informality. Among these factors, credit availability and its price have received little attention.

[5] The starting point of this analysis is that the ability to reveal and report income reduces the frictions of information and the cost of credit Ellul et al. (2016)

development as a potential determinant of tax revenue. This paper aims to fill the gap in previous literature by focusing on the impact of financial development on domestic tax revenue mobilization.

3. THE MODEL

Following numerous studies on the determinants of the performance of public revenues, especially in developing countries (see, (Baunsgaard & Keen 2010; Crivelli & Gupta 2014; Crivelli 2016; Gnangnon & Brun 2018)), we use the dynamic panel model:

$$Y_{i,t} = \theta_1 Y_{i,t-1} + \beta_1 FD_{i,t} + X_{i,t}\beta_2 + \alpha_i + \mu_t + \epsilon_{i,t} \tag{1}$$

Where $Y_{i,t}$ represents the mobilization of tax revenue from country i in period t. θ_1 is the coefficient of lagged tax revenue mobilization (tax revenue/ GDP). FD represents the level of financial development. We are mainly interested in β_1 which is the coefficient of FD. X is the vector of control variables; these include GDP growth, trade openness, natural resource rents, the share of agriculture, polity2. α_i and μ_t are the country and time fixed effects, and $\epsilon_{i,t}$ an error term. The time coverage extends from 1995 to 2017.

The financial development index measures the level of financial development measured by five banking sector performance indicators and size. Financial development summarizes depth (market size and liquidity), access (the ability of individuals and companies to access financial services), and efficiency (the power of institutions to provide financial assistance at low cost and with sustainable incomes and the level of activity in capital markets). Drawing from the literature on the determinants of tax revenue (Lotz & Morss 1967, 1970; Chelliah 1971; Tanzi et al. 1981; Tanzi 1992; Ghura 1998; Khattry & Rao 2002; Gupta 2007; Bird et al. 2008; Baunsgaard & Keen 2010; Dioda 2012; Brun et al. 2015) we retain several key factors, including structural factors, that influence countries' tax revenue [6], That is:

(i) The Growth rate of gross domestic product (Gdp-growth) controls the economic cycle and monetary conditions. This variable is assumed to have a positive effect on domestic tax revenue. The growth rate of gross domestic product (Gdp-growth) controls the economic cycle and monetary conditions. This variable is assumed to have a positive effect on domestic tax revenue.

(ii) The degree of trade openness (trade openness) measured by the share of exports and imports should also impact tax revenue, but its expected sign is controversial. The more open a country is to the outside world, the more a positive effect of trade openness on tax revenue can be expected. Trade openness might have a positive sign because the increase in trade volume increases economic growth and increases tax revenue. For example Thomas & Trevino (2013) observe a

[6] Empirical findings show that Gdp growth, international trade, natural resource rents, agriculture share, inflation, etc., are some of the primary determinants of tax revenue. Interestingly, there are currently papers in the literature on the issue point out institutions and good governance as the most critical factors which affect tax revenue in DCs (see Aaskoven (2018))

positive effect of trade openness on non-resource tax revenue. On the other hand, trade openness leads to at least tariff liberalization, which could be associated with lower tax revenue. The empirical literature on the impact of trade openness has provided evidence that trade openness is negatively related to total tax revenue and tax revenue from international trade (Khattry & Rao 2002)

(iii) Natural resource rents in the percentage of GDP (natural rents)[7]. The effect of natural resources on domestic tax revenue is ambiguous. Indeed, on the one hand, a resource-rich country can generate a sizeable taxable surplus, (Gupta 2007), while on the other hand, natural resources might reduce the governments' incentives for collecting taxes (Lim 1988; Martinez-Vazquez et al. 2001)

(iv) The share of agriculture in the GDP (Agriculture/GDP) measures the value-added in the agricultural sector as a proportion of total value-added. We expect agriculture to harm tax revenue considering the difficulty of taxing the farm sector (Khattry & Rao 2002; Baunsgaard & Keen 2010; Brun et al. 2015).

(v) Finally, we also control for Polity2[8]. This variable represents the quality of governance which measures the degree of democracy in a country. This variable is also expected to have a positive impact on tax revenue (Gupta 2007).

A significant concern when estimating equation *(1)* is the potential endogeneity. We have to solve three main problems to estimate the equation (1). First, the error term incorporates unobserved country heterogeneities λ_i, inducing a bias of the omitted variables if correlated with the other explanatory variables.

$$E[(\lambda_i)(X_{i,t})] \neq 0 \tag{2}$$

où $\mu_{i,t} = \lambda_i + \epsilon_{i,t}$ et $\epsilon_{i,t}$ est i.i.d (0,1)

Second, the financial development influences tax revenue performance; it is also possible that the level of taxes (and hence tax revenue) could affect financial institutions and, therefore, the depth of financial development (see, (Colombo & Caldeira 2018; Schandlbauer 2017)). For example, an increase in tax revenue provides more public expenditure, which generally contributes to improving the state of infrastructure, leading to a better environment for developing the financial sector in the economy. Consequently, there is a causality bias due to the correlation between the error term and financial development variable:

$$E[(\mu_{i,t})(X_{i,t})] \neq 0 \tag{3}$$

[7] Natural resource measure is the ratio of resource rents to GDP. These rents, which include rents from energy, minerals, and forestry.

[8] The polity2 score corresponds to the difference between the democracy and the autocracy scores. It measures the competitiveness of political participation, the openness and competitiveness of executive recruitment, and constraint on the executive.

Third, this equation *(1)* could generate a dynamic endogeneity bias concerns because of the presence of the lagged value of the tax revenue/GDP variable among the explanatory variables; it can be correlated with the error term:

$$E[(Y_{i,t-1})(\mu_{i,t})] \neq 0 \tag{4}$$

Linear dynamic panel models, such as Eq. *(1)*, contain unobserved panel effects that can be fixed or random (see Arellano & Bond (1991)). By construction, the unobserved panel-level effects are correlated with the lag(s) of the dependent variable, making most standard estimation approaches inconsistent (see Arellano & Bond (1991)). Indeed, as Baltagi (2008) explained, standard estimators, such as the pooled ordinary least squares estimator, the fixed effects model, and the random-effects model, are inconsistent due to these problems cited above. Given the need to solve unobserved country heterogeneity, causality bias, and dynamic endogeneity bias, estimating this equation by a fixed-effects model would lead our results to suffer from Nickell's bias Nickell (1981) severe given the short duration of our data.

The dynamic panel GMM estimators developed by Arellano & Bond (1991) and improved by Arellano & Bover (1995) and then by Blundell & Bond (1998) develop a method for estimating the generalized method of moments (GMM), which gives consistent parameter estimates for models of this type. We evaluate our dynamic panel model using the generalized moment method (GMM) estimator. Two specific econometric methods were used: Arellano & Bond (1991) generalized first difference moment method (GMM in difference), (1991) and Blundell & Bond (1998) generalized system moment method (GMM System). The GMM dynamic panel estimator is suitable for estimating our dynamic equation in which a one-year delay of the dependent variable is included as an explanatory variable. These two methods make it possible to control the heterogeneity of countries and address the problem of endogeneity of variables, which may (necessarily) arise when studying the relationship between financial development and tax mobilization (tax revenue mobilization). Indeed, the OLS estimate is biased (upwards) because of the correlation between the error term (which contains specific effects) and the delayed endogenous variable. In addition, the Within estimate is also lowered (downward) because the transformation results in a negative correlation between the error term and the delayed endogenous variable on small samples Nickell (1981). Thus, to correct Nickell (1981) estimation bias, an instrumental variable method will be applied. The GMM estimator uses model-internal instruments (delayed values of variables suspected of endogeneity) to counter weak instruments and difficulties in processing several endogenous variables. The GMM first-difference estimator consists of associating the first difference of the equation to be estimated to eliminate country-specific effects with each period and then to instrument our explanatory variables of the first-difference equation by their level values lagged by one period. The GMM estimator in the Blundell & Bond (1998) system combines the first difference equations with the level equations in which their first differences instrument the variables.

To verify the validity of our estimate, three (03) tests were carried out so that the following assumptions could be confirmed:

• The AR (1) or m1 test of Arellano-Bond to test for the presence of 1st order autocorrelation (under the alternative hypothesis). In this test, the null hypothesis of absence of first-order serial correlation in the error terms must be rejected; the p-value of the test must be less than 0.10 (P-value 0.10)

• The AR (2) or m2 test of Arellano-Bond to test for the absence of second-order autocorrelation, (Under the null hypothesis). In this test, the null hypothesis of absence of second-order serial correlation in the error terms should not be rejected; the p-value of the test must be greater than 0.10 (p-value 0.10).

• Hansen's instrument exogeneity test for testing instrument exogeneity and the p-value of the test must be greater than 0.10 (p-value 0.10). We also apply Roodman (2009)'s criterion by limiting the number of instruments to no more than the number of individuals. We use the xtabond2 command of Roodman (2009) on Stata to make the estimates and assuming that tax revenue, the level of financial development, the Growth rate of gross domestic product, and trade openness are endogenous. Only natural resource rents, the share of agricultural value-added, and polity2 are assumed to be weakly exogenous or exogenous.

4. EMPIRICAL ANALYSIS

4.1. *Data and stylized facts*

This sample period is determined by the availability of Financial Development (FD) Index data. Tax revenue data stem from the International Centre for Tax and Development (ICTD), Government Revenue Dataset (GRD), and The IMF's tax revenue dataset. The data on the treatment variable is drawn from the Financial Development (FD) Index database of the International Monetary Fund. The data on control variables come from various sources, including The World Bank Group (World Development Indicators Worldwide Governance Indicators), The IMF World Economic Outlook (WEO) data, GFI data, ICRG. The treatment variable in this study comprises the financial development index. Financial development data comes from Svirydzenka (2016). We use a global financial development index as a measure of financial development that allows us to assess specific characteristics of the level reached by the size, activity, and efficiency of financial intermediaries to test its impact on tax revenue mobilization. The following figure illustrates the level of financial development in countries around the world. As we can observe, the level of financial development is lower in Sub-Saharan Africa countries than in the rest of the world. We use a dynamic panel over the period 1995-2017. Our study covers a sample of 49 developing countries.

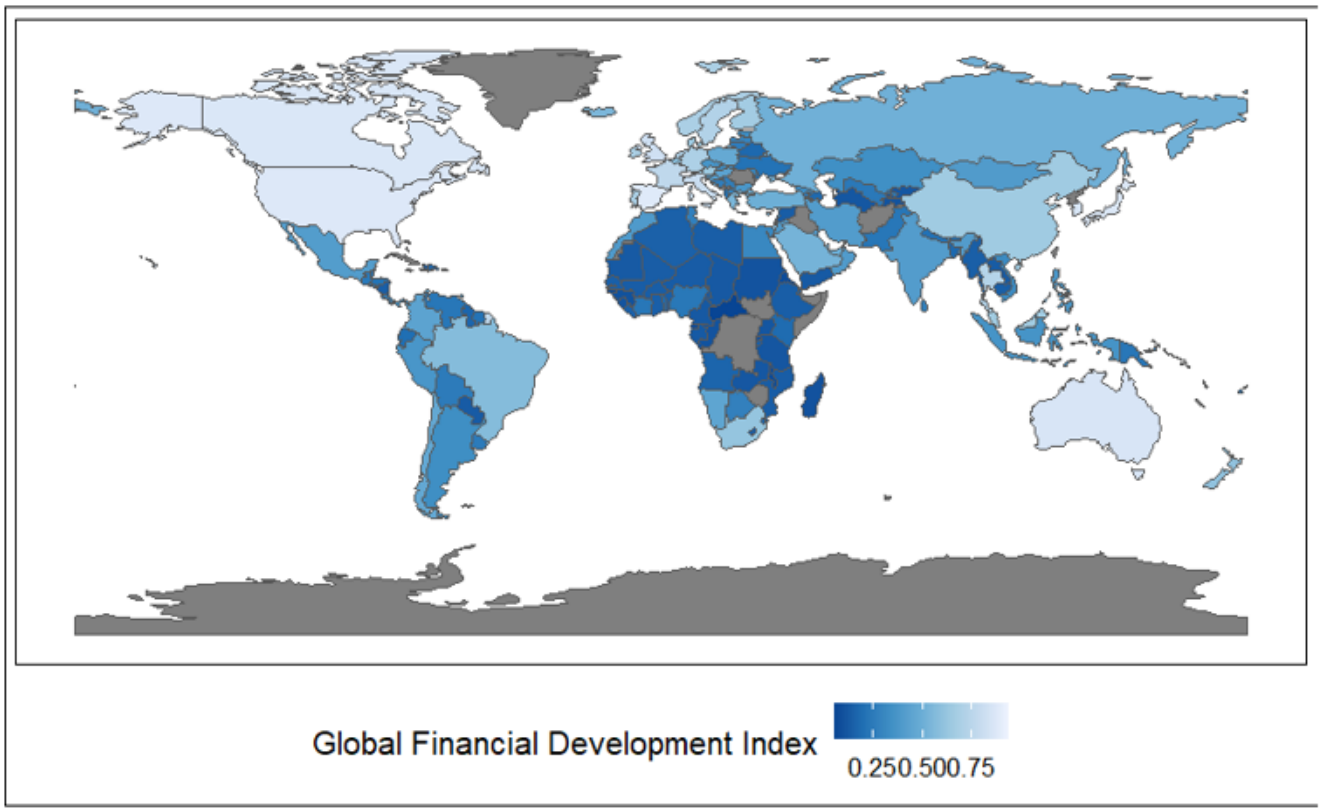

Figure 1. World map of the financial development index from 1995 to 2017

Table A. Descriptive statistics for main variables.

Variable name	Obs	Mean	Std.Dev	Min	Max
(1)	(2)	(3)	(4)	(5)	(6)
Tax revenue over GDP	1079	23.9997	9.7745	5.89	60.68
Non-Resource Tax Revenue over GDP	1008	15.7571	6.3472	1.916	56.92
Development Index	1127	0.2531	0.1398	0.0308	0.7299
GDP Growth	1126	4.3383	4.0723	-14.7586	34.4662
Trade Openness over GDP	1105	38.0116	16.8493	0.0837	110.2034
Natural resource rents over GDP	1122	5.9834	8.2239	0.0013	55.8521
Agriculture over GDP	1121	13.5391	9.8273	1.8283	57.2386
Polity2	1117	4.1996	6.1032	-10	10

Sources: World Bank, IMF

NOTE—Table D, contains the list of variables used in this paper and a brief description of the data.[a]

[a] Table C in the appendix presents the matrix of correlation of the variables studied

In Figures 2 & 3, we outline, for the first time, the relation between tax revenue (respectively non-resources tax revenue) and various indices of financial development. The financial development global index is positively related to Tax revenue. Also,

Financial Institutions and Financial Markets seem to increase tax revenue. Financial institutions' depth, financial institutions' access, financial institutions' efficiency, and financial markets' depth positively affect tax revenue. In contrast, tax revenue is negatively related to financial market access and financial market efficiency.

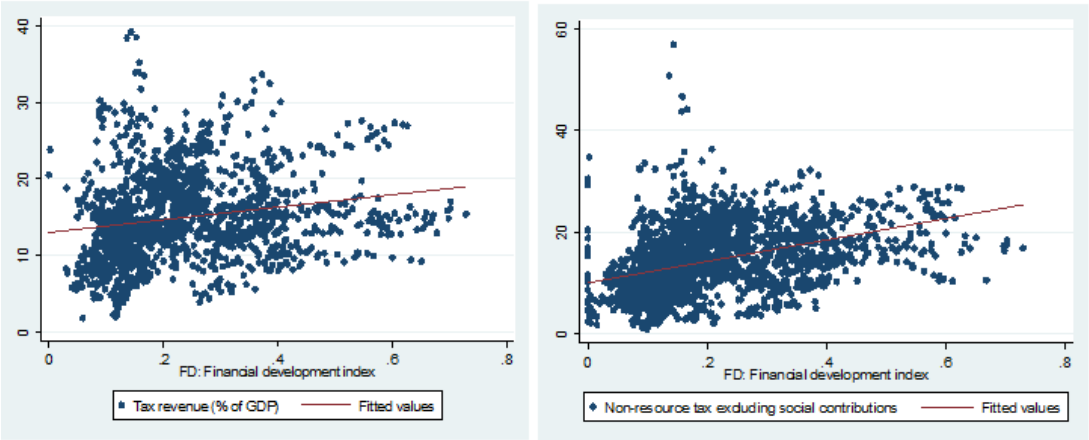

Figure 2. Tax revenue (Non resource tax excluding social contributions) and financial development index, financial institutions index and financial markets index

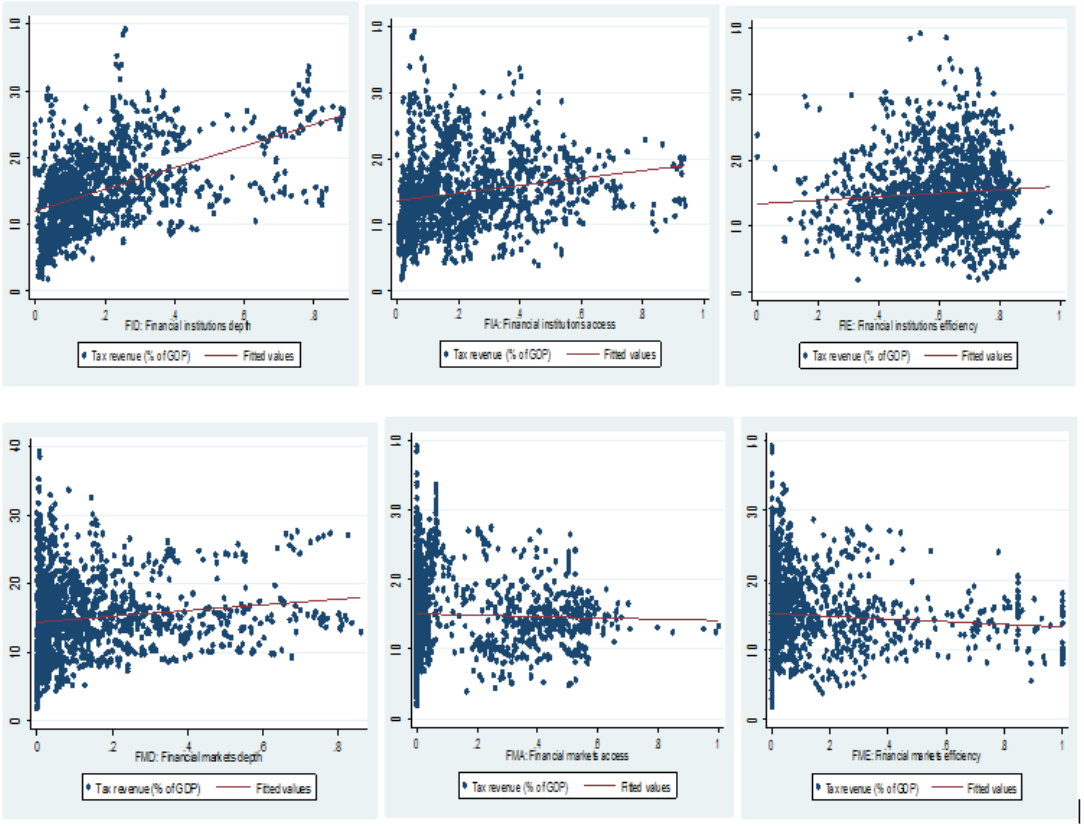

Figure 3. Tax revenue and financial institutions index sub-components and financial markets index sub-components

The evolution of financial development highlights that the financial development index increases over the years in developing countries from 0.19 to 0.30 between 1995 to 2017. The financial development index is higher in the Middle East North Africa countries than in other regions worldwide.

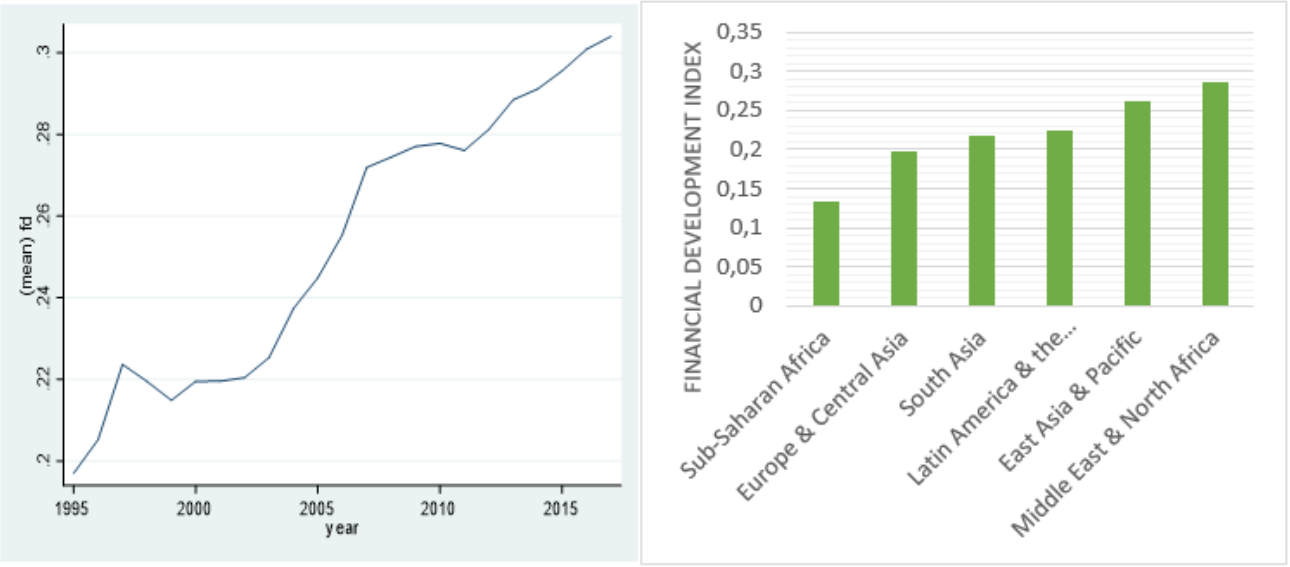

Figure 4. Evolution of financial development index over time and financial development by region from 1995 to 2017

5. EMPIRICAL RESULTS

This section presents the results of the financial development impact on tax revenue mobilization. Table 1 presents the results for Specification 1, using the dynamic panel two-step system GMM estimations[9]. The statistical tests do not invalidate the econometric method: the null hypotheses of the Sargen/Hasen and AR (2) tests are accepted. Moreover, the positive coefficient of the lagged dependent variable highlights an inertia effect that legitimates the dynamic panel specification. Column [6] is the baseline model, including the lagged tax revenue variable, the financial development variable, real Gdp growth, trade openness, natural resource rents, agriculture value, and polity2. The lagged tax revenue variable's estimated coefficient is positive and statistically significant at a 1% level. This is a common finding in the literature indicating that tax revenue in one year is heavily influenced by tax revenue in the previous year, as Gnangnon & Brun (2018) highlighted. We find that the coefficient of financial development is positive and statistically significant at the 1% level. Financial development has a significant and positive effect on tax revenue. 1% increase in financial development is associated with a 0.38 percentage point increase in domestic tax revenue. The more a country is characterized by a significant financial development (increase in the level of its financial development), the more there will be an increase in the flow of non-renewable tax revenue. The well-functioning financial sector (banking system, stock market, and bond market activity, etc.) of the developing countries enables the tax collection by the administration and the payment of taxes by taxpayers. Access to banking services facilitates at lower costs, which can help provide more instant liquidity and financing. Also, banks and financial institutions in facilitating financing provide different types of payment systems essential for monetary transactions; therefore, if a country has well-developed transparent and efficient financial institutions, businesses and taxpayers will use them to carry out their transactions. In turn, tax collecting authorities (tax collectors) can obtain valuable information from these financial institutions, such as the income and assets of taxpayers. On the other hand, in the case of underdeveloped financial institutions, the size of the informal economy increases and makes the acquisition of accurate tax information more difficult. As for the control variables, Trade openness exerts a positive and significant impact on domestic tax revenue. We observe that the level of natural resource rents is positively associated with domestic tax revenue. These results are consistent with previous works (Gupta 2007; Tanzi 1992; Ghura 1998). We also note that domestic tax revenue is negatively and significantly driven by high value-added agriculture (as % of GDP). The other control variables are not significant, including quality of governance (polity2) and real GDP growth. The insignificance of the latter is surprising, but it is likely to be determined by the quality of government (polity2)[10].

Table 2 replaces the financial development variable in our specification by its one, two, and three-year(s) lag, respectively. The results suggest the positive impact of financial development on domestic tax revenue. We first report the results for total financial development lagged one year, suggesting that an additional 1% of financial development is associated on average with a 0.368

[9] In this paper, our preferred estimator is the system-GMM. It has been highlighted that the lagged values of variables in level as it is done with the difference-GMM estimator are sometimes imperfect instruments for variables in first differences.

[10] Indeed, in column [6], when we add polity2 as a control variable, the coefficient of real GDP growth remains positive but not significant.

percentage point increase in domestic tax revenue by the country (column 1). The financial development coefficient remains significant and of a similar magnitude also when the financial development variables are lagged by two and three periods. The other controls have all the typical signs.

Table 1. The effects of financial sector development on domestic tax revenue

Dependent variable: log.Tax revenue over GDP	[1]	[2]	[3]	[4]	[5]	[6]
Lag.(log.Tax revenue over GDP)	0.549***	0.791***	0.649***	0.681***	0.681***	0.639***
	(0.159)	(0.088)	(0.098)	(0.079)	(0.103)	(0.128)
Financial Development Index	0.514**	0.209**	0.430***	0.287**	0.263***	0.380***
	(0.209)	(0.103)	(0.139)	(0.116)	(0.099)	(0.145)
Log.GDP growth		0.036**	0.040*	0.069**	0.057**	0.049
		(0.018)	(0.021)	(0.032)	(0.027)	(0.034)
Log. Trade Openness			0.071***	0.056**	0.057*	0.084**
			(0.024)	(0.027)	(0.030)	(0.038)
Log.Natural resource rents over GDP				0.016*	0.014	0.023**
				(0.009)	(0.010)	(0.011)
Log.Agriculture over GDP					-0.060*	-0.069*
					(0.033)	(0.041)
Polity2						-0.004
						(0.004)
Constant	1.270***	0.547**	0.633**	0.566**	0.730*	0.754
	(0.468)	(0.259)	(0.322)	(0.264)	(0.405)	(0.486)
Observations	1030	934	901	858	858	858
Countries	49.000	49.000	48.000	46.000	46.000	46.000
Instruments	6.000	40.000	19.000	35.000	41.000	33.000
Sargan - Hasen test, p-value	0.967	0.422	0.752	0.666	0.759	0.794
AR1	0.003	0.007	0.006	0.008	0.008	0.010
AR2	0.717	0.839	0.710	0.924	0.908	0.953

Robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The variables "Log. GDP growth ", "Financial Development Index " and "Log.Trade Openness over GDP" has been considered as endogenous across all model specifications. The variables "Log. Natural Rents "," Log. Agriculture over GDP ", " Polity2 ". have been considered as exogenous

Table 2. Baseline: The Effect of Financial Development on domestic tax revenue (using lag(s))

Dependent variable: log.Tax revenue over GDP	[1]	[2]	[3]	[4]
Lag(log.Tax revenue over GDP)	0.639***	0.634***	0.642***	0.670***
	(0.128)	(0.128)	(0.119)	(0.119)
Financial development Index	0.380***			
	(0.145)			
Financial development Index(t-1)		0.368***		
		(0.129)		
Financial development Index (t-2)			0.369***	
			(0.120)	
Financial development Index (t-3)				0.339***
				(0.099)
Log.GDP growth	0.049	0.064	0.067*	0.051*
	(0.034)	(0.043)	(0.039)	(0.028)
Log. Trade Openness over GDP	0.084**	0.082**	0.080**	0.071**
	(0.038)	(0.039)	(0.040)	(0.035)
Log. Agriculture over GDP	-0.069*	-0.077*	-0.073*	-0.054
	(0.041)	(0.044)	(0.042)	(0.039)
Log. Natural Rents over GDP	0.023**	0.026**	0.025**	0.016**
	(0.011)	(0.011)	(0.011)	(0.007)
Polity2	-0.004	-0.004	-0.004	-0.003
	(0.004)	(0.003)	(0.003)	(0.003)
Constant	0.754	0.764	0.733	0.694
	(0.486)	(0.489)	(0.469)	(0.471)
Observations	858	858	831	803
Countries	46.000	46.000	46.000	46.000
Instrument	33.000	33.000	33.000	33.000
Sargan - Hasen test, p-value	0.794	0.774	0.767	0.749
AR1	0.010	0.008	0.008	0.011
AR2	0.953	0.972	0.977	0.937

Robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The variables "Log. GDP growth ", "Financial Development Index " and "Log.Trade Openness over GDP" has been considered as endogenous across all model specifications. The variables "Log. Natural Rents ", " Log. Agriculture over GDP "," Polity2 " have been considered as exogenous

6. ROBUSTNESS CHECKS

This section investigates the robustness of our findings that financial development significantly encourages domestic tax revenue mobilization in developing countries.

6.1. *An alternative measure of tax revenue*

Our principal domestic tax revenue measure is the tax revenue ratio from the International Centre for Tax and Development (ICTD), Government Revenue Dataset (GRD), and The IMF's tax revenue dataset. We begin by taking a closer look at our dependent variable. Following Brun et al. (2015) we use non-resource tax revenue (as a % of GDP) as an alternative measure of tax revenue, which are calculated as total tax revenue (excluding grants and social contributions) minus revenues from resource taxes (% of GDP)—using of non-resource tax revenue as a dependent variable result in much greater homogeneity than total government revenue. As we can observe, the coefficient associated with financial development is positive and enormously

significant, suggesting that the increase in tax revenue following the impact of economic growth does not change with the tax revenue measure. Finally, the estimated coefficient in non-resource tax revenue in absolute value is 0.810 percentage point, a magnitude somewhat higher compared with our benchmark findings.

Table 3. Robustness: The effects of financial sector development on Non resources tax revenue

Dependent variable: Log.Tax revenue over GDP	[1]	[2]
Alternatives		
	Baseline	Alternative 1
	[1]	[2]
Lag.(Log. Tax revenue)	0.639***	0.510***
	(0.128)	(0.128)
Financial Development Index	0.639***	0.810***
	(0.128)	(0.308)
Constant	0.754	0.137
	(0.486)	(1.111)
Observations	858	858
Countries	46.000	46.000
Instruments	33.000	33.000
Sargan - Hasen test, p-value	0.794	0.774
AR1	0.010	0.008
AR2	0.953	0.972
Controls	Yes	Yes

Robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The variables "Log. GDP growth ", "Financial Development Index " and "Log.Trade Openness over GDP" has been considered as endogenous across all model specifications. The variables "Log. Natural Rents "," Log. Agriculture over GDP ", " Polity2 ". have been considered as exogenous

6.2. *Testing for additional controls*

We alternatively introduce additional covariates that may affect tax revenue mobilization. We add these additional covariates into the main specification to address the issue of omitted variables. (Column [1] is the baseline model. Column [2]-[9] include additional covariates). We control for the aid (% of GDP), population density (% of GDP), financial (capital) openness index, external debt (% of GDP), Foreign direct investment (% of GDP), migrants' remittances (% of GDP) and the government debt (% of GDP). In the second column [2], we control for aid[11] (% of GDP). This variable should also positively impact tax revenue, but that depends on the type of aid. Aid is also expected to harm tax revenue. Clist & Morrissey (2011) argued that aid flows reduce government revenue efforts, reducing the effectiveness of aid. We find that the coefficient relating to the aid is positive and statistically significant. The most striking result is that aid positively impacts domestic tax revenue mobilization. Let us remember that this is a topic where the sizeable existing literature provides no robust evidence. Following Clements et al. (2004)'s research findings, countries that receive higher levels of foreign assistance will collect less domestic tax revenue, owing to weaker incentives to pursue politically costly local tax revenue mobilization. Similarly, Yohou et al. (2016) show that aid directly reduces tax revenues, but it enhances tax performance for higher levels of government stability. Then, Clist & Morrissey (2011) present evidence that there was likely no consistent effect of aid on domestic tax revenue mobilization. Brun et al. (2011) argued that the positive impact of aid was contingent on the quality of institutions in recipient countries. Lastly, Clist (2016) points to a modest but positive effect on foreign aid, generally on domestic tax revenue. Even controlling for this variable, we observe that financial development still positively affects domestic tax revenue. In column [3], we control for population density-which measures the proportion of de people under 15 and those over 65. This variable is also expected to harm tax revenue. According to Bahl (2004),in countries with high population growth, the tax system may lag in its ability to attract new taxpayers. The coefficient of this variable is negative as expected and significant. We find that financial development still positively affects domestic tax revenue. Adding the capital openness index in column [4] as a control variable, we find that this variable has a positive and significant effect on domestic tax revenue. Financial development remains enormously substantial and positive. In column [5], we add the external debt, which may directly affect the conduct of fiscal policy by affecting government resources, and thus, potentially, on the tax revenue ratio. We observe that external debt negatively impacts domestic tax revenue mobilization, while financial development remains firmly significant and positive. In column [6], we include the Foreign direct investment (% of GDP), which measures the capacity of a given country to attract foreign investors. This variable positively affects economic growth, and therefore it might have a positive effect on domestic tax revenue. Even controlling for this variable, we observe that financial sector development still positively affects domestic tax revenue. In column [7], we add migrants' remittances as a control variable. This variable may increase recipient endowments and, therefore, their capacity to pay taxes. Ebeke (2011) reveals that remittances contribute significantly to both levels and stability of the government's tax revenue ratio in recipient

[11] The amount of official development assistance (grants plus concessional loans, measured in U.S. dollars) divided by Gross National Income

countries. Table 5 shows a positive and significant effect of migrant remittances, while financial development remains firmly substantial and positive. Adding government debt (% of GDP) in column [8] as a control variable, we find that this variable has no significant effect on domestic tax revenue. Financial development remains firmly substantial and positive. In the last column [9], we control for the inflation rate-which captures the macroeconomic stability. This shows that the high level of inflation leads to low tax revenue. We expect this variable to reduce domestic tax revenue. We find that this variable has no significant effect on domestic tax revenue, but financial development remains enormously substantial and positive. According to columns [2]-[9] in Table 4, the additional variables confirm the robustness of our baseline model. Whenever significant, their effect is consistent with what one may expect. Overall, accounting for other control variables proves the intensely substantial and positive effect of financial development on domestic tax revenues mobilization.

Table 4. Robustness: The effects of financial sector development on domestic tax revenue (additional controls)

Dependent variable: Log.Tax revenue over GDP	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Lag(log.Tax revenue over GDP)	0.639***	0.676***	0.761***	0.657***	0.652***	0.662***	0.659***	0.685***	0.647***
	(0.128)	(0.090)	(0.074)	(0.092)	(0.087)	(0.064)	(0.085)	(0.073)	(0.146)
Financial development index	0.380***	0.551***	0.285***	0.501***	0.658***	0.687***	0.749***	0.779***	0.610***
	(0.145)	(0.169)	(0.110)	(0.151)	(0.218)	(0.194)	(0.260)	(0.165)	(0.235)
Log.GDP growth	0.049	0.007	0.048*	0.011	0.010	0.005	0.006	0.004	0.005
	(0.034)	(0.007)	(0.026)	(0.007)	(0.007)	(0.008)	(0.015)	(0.011)	(0.011)
Log.Trade openness over GDP	0.084**	0.050 ***	0.060***	0.056***	0.060***	0.059***	0.038***	0.060***	0.054***
	(0.038)	(0.008)	(0.026)	(0.011)	(0.010)	(0.007)	(0.018)	(0.012)	(0.016)
Log.Natural resource rents over GDP	0.023**	0.020*	0.003	0.003	0.029**	0.007	0.007	0.015	0.012
	(0.004)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.005)	(0.003)	(0.003)
Polity2	-0.004	-0.004*	-0.003	-0.004*	-0.002	-0.001	0.002	-0.003	-0.004
	(0.078)	(0.100)	(0.090)	(0.109)	(0.097)	(0.083)	(0.089)	(0.083)	(0.089)
Log.Aid over GDP		0.024**	0.005	0.014*	0.013	-0.005	0.031	-0.011	-0.016
		(0.011)	(0.008)	(0.008)	(0.012)	(0.011)	(0.031)	(0.013)	(0.014)
Log. Population Density			-0.031**	-0.050**	-0.043**	-0.039***	-0.051	0.057***	-0.066*
			(0.014)	(0.020)	(0.019)	(0.015)	(0.054)	(0.020)	(0.034)
Financial Openness Index				-0.097**	-0.142**	-0.146**	-0.043*	-0.116*	-0.161**
				(0.047)	(0.057)	(0.053)	(0.023)	(0.060)	(0.081)
Log.External Debt over GDP					-0.038***	-0.043***	0.039*	-0.040***	-0.034**
					(0.015)	(0.015)	(0.021)	(0.014)	(0.017)
Log.Foreign direct investment over GDP						0.014*	0.011*	0.011*	0.012*
						(0.030)	(0.024)	(0.030)	(0.024)
Log.Remittances over GDP							0.022**	0.023**	0.030**
							(0.024)	(0.030)	(0.024)
Log.Government Debt over GDP								-0.002	0.010
								(0.020)	(0.020)
Log.Inflation									0.015
									(0.012)
Constant	0.754	0.876**	0.580*	1.128***	1.911**	1.918**	1.932**	1.694***	1.768**
	(0.486)	(0.341)	(0.334)	(0.404)	(0.509)	(0.606)	(606)	(0.510)	(0.850)
Observations	858	801	801	801	733	713	713	713	626
Countries	49	49	46	46	45	45	45	45	41
Instruments	38	42	44	40	41	39	43	35	35
Sargan - Hasen test, p-value	0.794	0.582	0.791	0.584	0.276	0.184	0.500	0.322	0.376
AR1	0.010	0.044	0.009	0.013	0.014	0.019	0.023	0.018	0.058
AR2	0.953	0.793	0.817	0.685	0.686	0.658	0.528	0.569	0.635

Note: Robust Standard errors in parentheses. The variables "Log. GDP growth ", "Financial Development Index " and "Log.Trade Openness over GDP" has been considered as endogenous across all model specifications.

The variables "Log. Natural Rents " " Log. Agriculture over GDP "," Polity2 " have been considered as exogenous $^{*}\ p < 0.10, ^{**}\ p < 0.05, ^{***}\ p < 0.01$

6.3. *Traditional measures of financial development*

We now look at robustness for each type of measure. Our empirical analysis uses five financial development measures: liquid liabilities, central bank assets, deposits money bank assets, private credit by money banks, and private credit by money banks and other financial institutions. First, liquid liabilities measure the size or financial depth used in the literature by King & Levine (1993) among others. Second, central bank assets and deposit money bank assets count two financial sectors relative to GDP. These measures give evidence of the importance of the financial services performed by the two financial sectors close to the size of the economy. Finally, private credit by money banks and private credit by money banks and other financial institutions measure

the activity of financial intermediaries in one of its primary functions: channeling savings to investors. Both measures isolate credit issued to the private sector instead of credit given to governments and public enterprises. Furthermore, they concentrate on credit issued by intermediaries other than the central bank. Also, they have been used in the literature, the first by Levine & Zervos (1998), and the second by Levine et al. (1999) and Beck et al. (2000). Using these variables, we look both at the level and the magnitude effect. Regarding the level effect, in Table 5, we observe that the results mainly depend on the nature of the financial development indicator used. In particular, when the liquid liabilities measure financial development, the deposits money bank assets; the private credit by money banks, or the private credit by money banks and other financial institutions, the empirical evidence supports the hypothesis that financial development significantly increases domestic tax revenue. On the contrary, when the central bank assets measure financial development, domestic tax revenue is not considerably affected. Table 5 shows a magnitude somewhat higher off the deposits banks assets effect than the other indicators regarding the magnitude effect. The impact of deposit money bank assets on domestic tax revenue is relatively more important.

Table 5. Robustness: The effect of traditional measures of financial development on domestic tax revenue

Dependent variable: Log.Tax revenue over GDP	[1]	[2]	[3]	[4]	[5]
Lag.(log.Tax revenue over GDP)	0.779**	0.612**	0.732***	0.775***	0.792***
	(0.234)	(0.263)	(0.178)	(0.160)	(0.177)
Log.Liquid liabilities to GDP (%)	0.150**				
	(0.074)				
Log.Central bank assets to GDP (%)		0.008			
		(0.029)			
Log.Deposit money bank assets to GDP (%)			0.291***		
			(0.081)		
Log.Private credit by money banks to GDP (%)				0.287**	
				(0.112)	
Log.Private credit by money banks and other financial institutions to GDP (%)					0.254**
					(0.104)
Constant	1.618	2.614	1.373	1.418	1.019
	(1.564)	(2.493)	(0.947)	(0.966)	(0.862)
Observations	69	69	69	69	69
Countries	23	23	23	23	23
Instruments	20	20	18	18	18
Sargan - Hasen test, p-value	0.596	0.118	0.885	0.804	0.765
AR1	0.090	0.091	0.087	0.099	0.064
AR2	0.482	0.563	0.505	0.415	0.342
Controls	Yes	Yes	Yes	Yes	Yes

Note: Robust Standard errors in parentheses. The variables "Log. GDP growth ", "traditional measures" and "Log.Trade Openness over GDP" has been considered as endogenous across all model specifications.The variables "Log. Natural Rents "" Log. Agriculture over GDP "," Polity2 " have been considered as exogenous,* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

7. HETEROGENEITY

One concern over the findings mentioned above is that these parameters may be heterogeneous across countries. In principle, the system GMM estimates impose homogeneity on all slope coefficients. A natural way to confront this problem is to investigate more homogeneous subsamples. This section turns to three subsamples: lower-income countries, higher-income countries, lower-openness degree, higher-openness degree, lower-public debt levels countries, and higher-public debt levels countries. This section analyzes the sensitivity of the effect of financial development on domestic tax revenue mobilization concerning the overall state of the economy, financial openness level, and debt level. First, we focus on the level of economic development. Indeed, we search for a potential impact of the level of economic development on the effect of financial development by distinguishing between ”low” and ”high” GDP growth levels, using the median of GDP growth to separate the two groups. For low-income countries, the net impact of financial development on domestic tax revenue mobilization in the short term is positive and significant (column [2]) and is 1.615 percentage points (= 2.015 – 0.400). The magnitude of this impact appears to be far higher than the net impact of this variable on domestic tax revenue in high-income countries (column [3]), which is positive and significant and amounts to 0.617 percentage point (= 0.894 – 0.277). Moreover, results presented in columns [2]– [3] in Table 6 show that fiscal potential is more significant in ”low-income” countries in most cases. Although financial development significantly improves tax revenue mobilization in both ”high” and ”low” levels of economic growth, the estimated coefficient of a financial product is more robust in ”low-income.” Second, we examine the potential influence of financial openness. According to Balima et al. (2016), more open countries may attract more foreign investors and be more vulnerable to risk. Therefore, domestic tax revenue mobilization could serve as a social protection tool and provide a ”spare tire” for governments, particularly against adverse shocks affecting access to financial markets. Thus, we expect the estimated effect to be more critical in relatively more financial openness countries. We test this hypothesis by dividing the sample into ”high” and ”low” openness degrees, using the median level of the Chinn-Ito index to separate the two groups. For high-openness countries, the net impact of financial development on domestic tax revenue mobilization in the short term is positive and significant (column [4]) and is 1.126 percentage point (= 1.544 – 0.418). The magnitude of this impact appears to be far higher than the net impact of this variable on domestic tax revenue in low-openness countries (column [5]), which is positive and significant and amounts to 1.077 percentage points (= 1.363 – 0.286). Results depicted on lines [4]– [5] in Table 6 confirm our hypothesis, as estimated coefficients of financial development are larger in ”high” openness contexts. Third, we condition the effect of financial development on the debt levels by splitting our sample into ”low” and ”high” public debt levels, using the median of total government debt in % of GDP to separate the two groups. Indeed, significant debt levels make it more difficult to raise taxes since large debt may reflect less fiscal space (Ostry et al. 2010). Thus, we expect the estimated effect to be more critical in relatively less indebted countries. For low-debt countries, the net impact of financial development on domestic tax revenues mobilization in the short term is positive and significant (column [6]) and is 1.908 percentage point (= 2.443 – 0.535). The magnitude of this impact appears to be far higher than the net impact of this

variable on domestic tax revenue in high debt countries (column [7]), which is positive and significant and amounts to 1.668 percentage point (= 2.028 – 0.360). Results reported in columns [6]– [7] of Table 6 show that financial development significantly improves tax revenue mobilization exclusively in "low" debt countries, consistent with theoretical insights.

Table 6. Heterogeneity in the effect of financial development on domestic tax revenue

Dependent variable: Log.Tax revenue over GDP	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Lag (log. Tax revenue over GDP)	0.639***	0.588**	0.860***	0.665***	0.801***	0.700***	0.856***
	(0.128)	(0.256)	(0.111)	(0.114)	(0.082)	(0.236)	(0.060)
Financial Development Index	0.380***	2.015**	0.894***	1.363***	1.544**	2.443*	2.028**
	(0.145)	(0.885)	(0.340)	(0.487)	(0.709)	(1.427)	(1.016)
Financial development*Low Income		-0.400**					
		(0.199)					
Financial development*High Income			-0.277***				
			(0.100)				
Financial development*low Openness				-0.286**			
				(0.125)			
Financial development* High Openness					-0.418*		
					(0.227)		
Financial development*low Debt ratio						-0.535**	
						(0.263)	
Financial development*High Debt ratio							-0.360*
							(0.203)
Low Income		0.074					
		(1.045)					
High Income			-0.442				
			(0.452)				
Low Openness				0.083			
				(0.347)			
High Openness					-0.795		
					(0.812)		
Low Debt ratio						-0.217	
						(1.026)	
High Debt ratio							-1.035
							(0.651)
Observations	858	446	412	428	430	214	168
Countries	46.000	29.000	30.000	33.000	31.000	26.000	23.000
Instruments	33.000	24.000	27.000	26.000	20.000	17.000	22.000
Sargan - Hasen test, p-value	0.794	0.774	0.888	0.345	0.533	0.334	0.988
AR1	0.010	0.036	0.009	0.062	0.012	0.036	0.095
AR2	0.953	0.579	0.697	0.242	0.305	0.221	0.545
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust Standard errors in parentheses. The variables "Log. GDP growth ", "Financial Development Index " and "Log.Trade Openness over GDP" has been considered as endogenous across all model specifications. The variables "Log. Natural Rents " " Log. Agriculture over GDP "," Polity2 " have been considered as exogenous $^{*}\ p < 0.10, ^{**}\ p < 0.05, ^{***}\ p < 0.01$

$^{*}\ p < 0.10, ^{**}\ p < 0.05, ^{***}\ p < 0.01$

8. THE SUB-COMPONENTS OF FINANCIAL DEVELOPMENT

So far, we have focused on the aggregate financial development (FD) index. We now investigate the effects of disaggregated financial development components on domestic tax revenue mobilization.

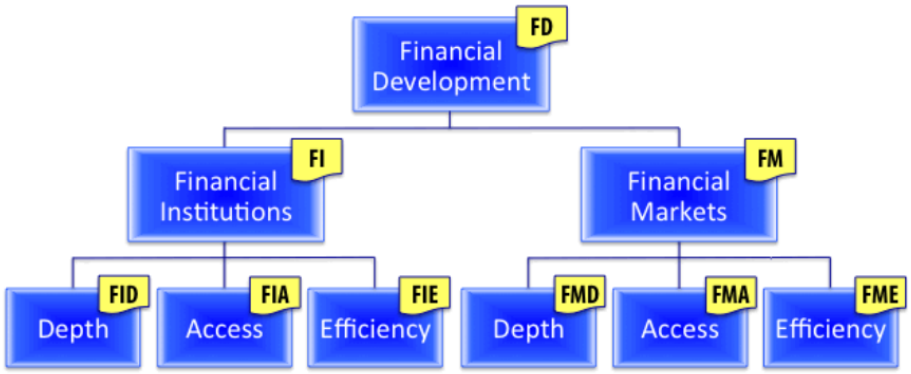

Figure 5. Financial Development Index -Overview [a]

[a] Source: IMF staff, based on Čihák et al. (2012).

Financial development is defined as a combination of depth (size and liquidity of markets), access (the ability of individuals and companies to access financial services), and efficiency (ability of institutions to provide financial assistance at low cost and with sustainable revenues, and the level of activity of capital markets). Nine indices of the International Monetary Fund Financial Development Index (IMF-FDI) are used in this section to measure various dimensions of financial development and to consider the complex multidimensional nature of financial development other than just the financial depth of credit or the stock market (Svirydzenka 2016). Using these indices would provide an excellent understanding of the true relationships between the different dimensions of financial development and tax revenues, i.e., overall financial development and two sub-dimensions (including financial institutions and financial markets) and finally, the second level of dimensions that include financial depth, financial access, and financial efficiency. First, Financial institutions (FI) include banks, insurance companies, mutual funds, pension funds, and other non-bank financial institutions. Second, financial markets (FM) include mainly stock and bond markets. Thirdly and to finish, within financial institutions (FI) and financial markets (FM), different dimensions of the financial system were measured: depth, access, and efficiency. The estimated coefficients on the sub-components of financial development are statistically significant, at least at 1 %, except for the efficiency of the financial markets. Note that the financing of the developing economies relies more on banking intermediation than on the stock market. For example, there is evidence that financial sectors are essentially bank-based Gaies et al. (2019); Andrianaivo & Yartey (2010); Senbet & Otchere (2006); Creane et al. (2006). The results denoting that domestic tax revenue in developing countries is dependent on financial institutions. Finally, we pose the following question. Is it possible that one dimension of institutions—banking and nonbanking—as well as markets complements the other? The answer to this question may suggest that the three dimensions of institutions—banking and nonbanking—as well

as markets may indeed reinforce each other's effectiveness, and if possible, such complementarity needs to be exploited. That is, the choice may not after all be between one or the other, but of capturing the multidimensional nature of the financial development process. Our central question is also related to a strand of the empirical literature since the 1970s which approximates financial development by the ratio of private credit to GDP, and to a lesser extent, by stock market capitalization, also as a ratio to GDP. We find that the coefficient of the interaction term of financial institutions depth and financial institutions efficiency, the coefficient of the interaction term of financial institutions access and financial institutions efficiency, and the coefficient of the interaction term of financial markets depth and financial markets efficiency to be positive, which therefore points to a complementary relationship between financial institutions depth and financial institutions efficiency, financial institutions access and financial institutions efficiency, and financial markets depth and financial markets efficiency.

Table 7 : The effect of financial development sub-components on domestic tax revenue

Dependent variable: Log.Tax revenue over GDP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Lag (log.Tax revenue over GDP)	0.596**	0.707***	0.339**	0.672***	0.745***	0.703***	0.601***	0.558***	0.763***	0.709***	0.894***	0.642***	0.608***	0.753***
	(0.231)	(0.119)	(0.136)	(0.163)	(0.170)	(0.136)	(0.179)	(0.133)	(0.089)	(0.069)	(0.079)	(0.097)	(0.074)	(0.099)
Financial institutions	0.417***													
	(0.147)													
Financial markets		0.173**												
		(0.100)												
Financial institutions depth			0.301**						-0.153	-0.948				
			(0.141)						(0.131)	(0.649)				
Financial markets depth				0.239**									-0.192	
				(0.093)									(0.159)	
Financial institutions access					0.131**				-0.054		-0.910*			
					(0.065)				(0.103)		(0.551)			
Financial markets access						0.194**								-0.020
						(0.096)								(0.180)
Financial institutions efficiency							0.474**			-0.234	-0.694*			
							(0.223)			(0.152)	(0.407)			
Financial markets efficiency								0.068					-0.162	-0.091
								(0.050)					(0.152)	(0.252)
Financial institutions depth*Financial institutions access									0.364					
									(0.243)					
Financial institutions depth*Financial institutions efficiency										1.310*				
										(0.755)				
Financial institutions access*Financial institutions efficiency											1.539*			
											(0.887)			
Financial markets depth*Financial markets access												0.614		
												(0.769)		
Financial markets depth*Financial markets efficiency													0.668**	
													(0.279)	
Financial markets access*Financial markets efficiency														0.341
														(0.714)
Observations	858	858	858	858	858	858	858	858	858	858	858	858	858	858
Countries	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Instruments	37	19	37	32	22	35	25	30	19	40	31	28	40	19
Hansen	0.831	0.203	0.704	0.826	0.529	0.788	0.417	0.455	0.140	0.258	0.708	0.323	0.468	0.301
AR1	0.090	0.054	0.037	0.031	0.096	0.054	0.100	0.088	0.006	0.009	0.010	0.004	0.011	0.012
AR2	0.948	0.868	0.716	0.823	0.947	0.943	0.987	0.828	0.828	0.815	0.831	0.759	0.704	839
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust Standard errors in parentheses. The variables "Log. GDP growth ", "Log.Trade Openness over GDP" "Financial Development Index" and the components of the latter have been considered as endogenous across all model specifications. The variables "Log. Natural Rents "," Log. Agriculture over GDP ", " Polity2 " have been considered as exogenous.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

9. CONCLUSION

The main objective of this study was to analyze the relationship between financial development and tax revenue mobilization from theoretical and empirical perspectives in developing countries over the period 1995 to 2017. Our work contributes to the literature on this topic in several ways. Using an appropriate method, namely the GMM-system estimator, on a sample of 49 developing countries, we have shown that financial development contributes positively and significantly to domestic tax revenue mobilization. This result is supported by an extensive set of robustness tests, including alternative tax revenue measures, additional covariates, and traditional measures of financial development for estimating the coefficient of our financial development variable. Given these results, this analysis shows that financial development is relevant for tax revenue mobilization. We believe that efforts should help developing countries, particularly low-income countries, build their financial systems to make valuable information easily accessible from these financial institutions.

APPENDIX

Conflict of interests: I have no conflicts of interest to disclose.

Table B. List of countries used in the analysis

Full Sample				
Angola	**Bhutan**	**Guatemala**	**Madagascar**	**Paraguay**
Albania	**Bostswana**	**Indonesia**	**Mexico**	**Russian Federation**
Argentina	**China**	**India**	**Mali**	**El Salvador**
Azerbaijan	**Côte d'Ivoire**	**Jamaica**	**Myanmar**	**Togo**
Burkina Faso	**Colombia**	**Jordan**	**Mongolia**	**Thailand**
Bangladesh	**Costa Rica**	**Lebanon**	**Malaysia**	**Tunisia**
Bulgaria	**Dominican Republic**	**Sri Lanka**	**Namibia**	**Ukraine**
Belarus	**Fiji**	**Lesotho**	**Nepal**	**South Africa**
Bolivia	**Gabon**	**Morocco**	**Peru**	**Zambia**
Brazil	**Ghana**	**Moldova**	**Philippines**	

Table C. Pairwise correlation between variables used in the analysis

Variable	Tax revenue	Non-Resource Tax Revenue	Financial Development	GDP Growth	Trade openness	Natural rents	Inflation	Agriculture	Polity2
Tax revenue	1.000								
Non-Resource Tax Revenue	0.7812*	1.000							
Financial Development	0.2620*	0.4017*	1.000						
GDP growth	0.2983*	0.3633*	0.5368*	1.000					
Trade openness	0.0785	0.0108	-0.5478*	-0.5974*	1.0000				
Natural rents	0.5392*	0.3938*	-0.0088	0.2069*	0.2271*	1.0000			
Inflation	-0.0219	-0.0659	-0.3342*	-0.4838*	0.2509*	-0.0612	1.0000		
Agriculture	0.1167*	0.1485*	0.0818	-0.1265*	0.0079	0.0822	0.2594*	1.0000	
Polity2	0.0367	0.0263	0.0386	0.0144	-0.0112	-0.0497	-0.0698	-0.1007	1.0000

Table A'. Descriptive statistics for main variables.

Variable name	Obs	Mean	Std.Dev	Min	Max
(1)	(2)	(3)	(4)	(5)	(6)
Tax revenue over GDP	1079	23.9997	9.7745	5.89	60.68
Non-Resource Tax Revenue over GDP	1008	15.7571	6.3472	1.916	56.92
Development Index	1127	0.2531	0.1398	0.0308	0.7299
GDP Growth	1126	4.3383	4.0723	-14.7586	34.4662
Trade Openness over GDP	1105	38.0116	16.8493	0.0837	110.2034
Natural resource rents over GDP	1122	5.9834	8.2239	0.0013	55.8521
Agriculture over GDP	1121	13.5391	9.8273	1.8283	57.2386
Polity2	1117	4.1996	6.1032	-10	10

Sources: World Bank, IMF

NOTE—Table D, contains the list of variables used in this paper and a brief description of the data.[a]

[a] Table C in the appendix presents the matrix of correlation of the variables studied

Table D. Definition and sources of variables.

Variables	Descriptions	Sources
Tax revenue	Tax revenue divided by GDP	WDI
Non-Resource Tax Revenue	It is calculated as total tax revenue (excluding grants and social contributions) minus resource tax revenue (% GDP)	ICTD
Financial Development Index	Index for overall financial development	(FSED), 2005
GDP Growth	The annual percentage growth rate of GDP at market prices is based on constant local currency.	WDI
Trade Openness over GDP	Sum of exports and imports of goods and services, % of GDP.	WDI
Natural resource rents	Total natural resources rents % of GDP.	WDI
Agriculture over GDP	Share of agriculture in aggregate value added.	WDI
Population density	The midyear population divided by land area in square kilometers.	WDI
Inflation	Annual percentage change of consumer price index.	WDI
Polity2	Polity2 index	Polity4 Project
External debt over GDP	Total external debt stocks, % of GDP (External public and private sector debt)	WDI
FDI net Inflows	It is the sum of equity capital, reinvestment of earnings,	WDI
AID	Net official development assistance and official aid received(constant 2016US$)	WDI
Remittances	Remittances in percentage of GDP	WDI
Capital openness index	It captures the degree of financial openness	Chinn & Ito (2008)
Liquid liabilities	Ratio of liquid liabilities to GDP	IMF
Central bank assets	Claims on the domestic real nonfinancial sector by the central Bank as share of GDP	IMF
Deposit money bank assets	Claims on the domestic real nonfinancial sector by deposit money banks as share of GDP	IMF
Private credit by money banks	Private credit by deposit money banks to GDP	IMF
Private credit by money and other financial institutions	Private credit by deposit money banks and other financial institutions to GDP	IMF
Deposit money bank assets	Claims on the domestic real nonfinancial sector by deposit money banks as share of GDP	IMF
Financial institutions	The Financial institutions index	FSED
Financial markets	The Financial markets index	FSED
Financial institutions depth	The Financial institution's depth index	FSED
Financial institutions access	The Financial institution's access index	FSED
Financial institutions efficiency	The Financial institution's efficiency index	FSED
Financial markets depth	The Financial markets depth index	FSED
Financial markets access	The Financial markets access index	FSED
Financial markets efficiency	The Financial markets efficiency index	FSED

REFERENCES

Aaskoven, L. 2018, Public Choice, 174, 335

Acemoglu, D., Johnson, S., & Robinson, J. A. 2001, American economic review, 91, 1369

Ahamada, I., & Coulibaly, D. 2011, Economic modelling, 28, 2748

Andrianaivo, M., & Yartey, C. A. 2010, African Development Review, 22, 394

Ang, J. B. 2010, Southern economic journal, 76, 738

Ang, J. B., & McKibbin, W. J. 2007, Journal of development economics, 84, 215

Arcand, J. L., Berkes, E., & Panizza, U. 2015, Journal of Economic Growth, 20, 105

Ardagna, S. 2009, European Economic Review, 53, 37

Arellano, M., & Bond, S. 1991, The review of economic studies, 58, 277

Arellano, M., & Bover, O. 1995, Journal of econometrics, 68, 29

Arezki, R., & Sy, A. 2016, Journal of African Economies, 25, ii59

Bahl, R. 2004, Contributions to economic analysis, 268, 337

Balima, W. H., Combes, J.-L., & Minea, A. 2016, Southern Economic Journal, 83, 550

Baltagi, B. 2008, Econometric analysis of panel data (John Wiley & Sons)

Barnes, M., Boyd, J. H., & Smith, B. D. 1999, European Economic Review, 43, 737

Baunsgaard, T., & Keen, M. 2010, Journal of Public Economics, 94, 563

Beck, T. 2002, Journal of international Economics, 57, 107

—. 2011, European Banking Center Discussion Paper

Beck, T., Demirgüç-Kunt, A., & Levine, R. 2003, Journal of financial Economics, 70, 137

—. 2007, Journal of economic growth, 12, 27

Beck, T., Levine, R., & Loayza, N. 2000, Journal of financial economics, 58, 261

Beck, T., Lin, C., & Ma, Y. 2014, The Journal of Finance, 69, 763

Benczúr, P., Karagiannis, S., & Kvedaras, V. 2019, Journal of Macroeconomics, 62, 103048

Besley, T., & Persson, T. 2009, American economic review, 99, 1218

—. 2010, Econometrica, 78, 1

—. 2013, in Handbook of public economics, Vol. 5 (Elsevier), 51–110

Bhattacharyya, S. 2013, Journal of Comparative Economics, 41, 979

Bhattacharyya, S., & Hodler, R. 2014, World Development, 57, 101

Bird, R. M., Martinez-Vazquez, J., & Torgler, B. 2008, Economic analysis and policy, 38, 55

Blundell, R., & Bond, S. 1998, Journal of econometrics, 87, 115

Bohn, H. 1990, The American Economic Review, 1217

Boudoukh, J., & Richardson, M. 1993, The American economic review, 83, 1346

Boyd, J. H., Levine, R., & Smith, B. D. 2001, Journal of monetary Economics, 47, 221

Boyd, J. H., Levine, R. E., Smith, B. D., et al. 1996, Inflation and financial market performance, Vol. 9617 (Federal Reserve Bank of Cleveland)

Brun, J.-F., Chambas, G., & Guerineau, S. 2011

Brun, J.-F., Chambas, G., & Mansour, M. 2015, Financing sustainable development addressing vulnerabilities, 205

Calderón, C., & Servén, L. 2004, The effects of infrastructure development on growth and income distribution (The World Bank)

Canh, N. P., & Thong, N. T. 2020, Resources Policy, 66, 101590

Capasso, S., & Jappelli, T. 2013, Journal of Development Economics, 101, 167

Cecchetti, S. G., & Kharroubi, E. 2012

—. 2015

Chelliah, R. J. 1971, Staff Papers, 18, 254

Chinn, M. D., & Ito, H. 2008, Journal of comparative policy analysis, 10, 309

Čihák, M., Demirgüç-Kunt, A., Feyen, E., & Levine, R. 2012, World Bank Policy Research Working Paper

Claessens, S., Demirgüç-Kunt, A., & Huizinga, H. 2001, Journal of Banking & Finance, 25, 891

Clarke, G. R., Xu, L. C., & Zou, H.-f. 2006, Southern economic journal, 578

Clements, B., Gupta, S., & Inchauste, G. 2004, in Helping Countries Develop: The Role of Fiscal Policy (INTERNATIONAL MONETARY FUND)

Clist, P. 2016, Development Policy Review, 34, 365

Clist, P., & Morrissey, O. 2011, Journal of international development, 23, 165

Colombo, J. A., & Caldeira, J. F. 2018, Journal of Corporate Finance, 50, 402

Cournède, B., & Denk, O. 2015, Available at SSRN 2649935

Creane, S., Goyal, R., Mubarak, A. M., & Sab, R. 2006, IMF Staff Papers, 53, 479

Crivelli, E. 2016, Eurasian Economic Review, 6, 1

Crivelli, E., & Gupta, S. 2014, European Journal of Political Economy, 35, 88

Da Silva, G. F. 2002, Journal of Macroeconomics, 24, 233

Dabla-Norris, E., Gradstein, M., & Inchauste, G. 2008, Journal of development economics, 85, 1

Demetriades, P. O., & Rousseau, P. L. 2016, Economics Letters, 141, 87

Demirgüç-Kunt, A., & Huizinga, H. 2001, Journal of Public Economics, 79, 429

Dioda, L. 2012

Do, Q.-T., & Levchenko, A. A. 2007, Journal of Financial Economics, 86, 796

Ebeke, C. H. 2011
Elliott, D. J. 2010, Manuscript, Brookings Institution, Washington, DC
Ellul, A., Jappelli, T., Pagano, M., & Panunzi, F. 2016, Review of Finance, 20, 37
Ely, D. P., & Robinson, K. J. 1997, Journal of International Money and Finance, 16, 141
Esfahani, H. S., & Ramırez, M. T. 2003, Journal of development Economics, 70, 443
Gaies, B., Goutte, S., & Guesmi, K. 2019, Finance Research Letters, 31
Ghura, M. D. 1998, Tax revenue in Sub-Saharan Africa: Effects of economic policies and corruption No. 98-135 (International Monetary Fund)
Gilbert, S., & Ilievski, B. 2016, The Quarterly Review of Economics and Finance, 61, 1
Girma, S., & Shortland, A. 2008, Oxford economic papers, 60, 567
Gnangnon, S. K., & Brun, J.-F. 2018, Information Economics and Policy, 43, 23
Gokmenoglu, K. K., & Rustamov, B. 2019, Resources Policy, 63, 101433
Gordon, R., & Li, W. 2009, Journal of public Economics, 93, 855
Greenwood, J., Sanchez, J. M., & Wang, C. 2013, Review of Economic Dynamics, 16, 194
Gultekin, N. B. 1983, The Journal of Finance, 38, 49
Guo, J.-T., & Hung, F.-S. 2020, Journal of Development Economics, 102463
Gupta, A. S. 2007, Determinants of tax revenue efforts in developing countries No. 7-184 (International Monetary Fund)
Herger, N., Hodler, R., & Lobsiger, M. 2008, Review of World Economics, 144, 558
Huang, Y. 2005
—. 2010a, Determinats of Financial Development
—. 2010b, World Development, 38, 1667
—. 2011, in Determinants of Financial Development (Springer), 10–63
Huybens, E., & Smith, B. D. 1999, Journal of monetary economics, 43, 283
Ibrahim, M., & Sare, Y. A. 2018, Economic analysis and policy, 60, 18
Ilievski, B. 2015, Journal of Applied Finance and Banking, 5, 1
Jalilian, H., & Kirkpatrick, C. 2005, Journal of development studies, 41, 636
Khattry, B., & Rao, J. M. 2002, World Development, 30, 1431
Kim, D.-H., Lin, S.-C., & Suen, Y.-B. 2010, Southern Economic Journal, 76, 827
—. 2012, The Journal of International Trade & Economic Development, 21, 513
King, R. G., & Levine, R. 1993, The quarterly journal of economics, 108, 717
La Porta, R., Lopez-de Silanes, F., Shleifer, A., & Vishny, R. W. 1997, The journal of finance, 52, 1131
Law, S. H., & Singh, N. 2014, Journal of Banking & Finance, 41, 36
Levine, R. 1991, The journal of Finance, 46, 1445
—. 1996, International financial markets: Harmonization versus competition, 7, 224
—. 2001, Review of international Economics, 9, 688
—. 2004, Finance and Growth: Theory, Evidence, and Mechanisms. Handbook of Economic Growth. Eds. P. Aghion and S. Durlauf, Amsterdam: North-Holland Elsevier Publishers, forthcoming
—. 2005, Handbook of economic growth, 1, 865
Levine, R., Beck, T., & Loayza, N. 1999, Financial intermediation and growth: causality and causes (The World Bank)
Levine, R., Loayza, N., & Beck, T. 2000, Journal of monetary Economics, 46, 31
Levine, R., & Zervos, S. 1998, American economic review, 537
Lim, D. 1988, Economic Development Policies in Resource-rich Countries (1988)
Lotz, J. R., & Morss, E. R. 1967, Staff Papers, 14, 478
—. 1970, Economic Development and cultural change, 18, 328
Lucas Jr, R. E. 1988, Journal of monetary economics, 22, 3
Mahdavi, S. 2008, International Review of Economics & Finance, 17, 607
Martinez-Vazquez, J., et al. 2001, Mexico: An evaluation of the main features of the tax system, Tech. rep., International Center for Public Policy, Andrew Young School of Policy ...
McKinnon, R. I. 1973
—. 1989, Oxford Review of Economic Policy, 5, 29
Moradbeigi, M., & Law, S. H. 2016, Resources Policy, 48, 97
Nickell, S. 1981, Econometrica: Journal of the Econometric Society, 1417
Ostry, J. D., Ghosh, A. R., Kim, J. I., Qureshi, M. S., et al. 2010, Fiscal space (International Monetary Fund, Research Department Washington)
Porta, R. L., Lopez-de Silanes, F., Shleifer, A., & Vishny, R. W. 1998, Journal of political economy, 106, 1113
Rajan, R. G., & Zingales, L. 1996, Financial dependence and growth, Tech. rep., National bureau of economic research
—. 2003, Journal of financial economics, 69, 5
Robinson, J. 1952
Roe, M. J., & Siegel, J. I. 2011, Journal of Comparative Economics, 39, 279
Roodman, D. 2009, The stata journal, 9, 86
Sahay, R., Čihák, M., N'Diaye, P., & Barajas, A. 2015, Revista de Economía Institucional, 17, 73
Samargandi, N., Fidrmuc, J., & Ghosh, S. 2015, World development, 68, 66

Sare, Y. A. 2021, International Journal of Finance & Economics, 26, 515

Sare, Y. A., Aboagye, A. Q., & Mensah, L. 2019, International Journal of Finance & Economics, 24, 328

Schandlbauer, A. 2017, Journal of Financial Intermediation, 30, 86

Schotman, P. C., & Schweitzer, M. 2000, Journal of empirical Finance, 7, 301

Schumpeter, J. 1961, New York

Senbet, L. W., & Otchere, I. 2006, in Annual world bank conference on development economics 2006: Growth and integration, 81–120

Shaw, E. S. 1973

Stulz, R. M., & Williamson, R. 2003, Journal of financial Economics, 70, 313

Svaleryd, H., & Vlachos, J. 2002, Journal of International Economics, 57, 369

Svirydzenka, K. 2016, Introducing a new broad-based index of financial development (International Monetary Fund)

Taha, R., Colombage, S. R., & Maslyuk, S. 2010, in 2010 International Conference on Management Science & Engineering 17th Annual Conference Proceedings, IEEE, 1084–1090

Taha, R., Colombage, S. R., Maslyuk, S., & Nanthakumar, L. 2013, Journal of Asian Economics, 24, 147

Tanzi, V. 1992

Tanzi, V., Aguirre, C. A., Griffith, P. S., Tanzi, V., & Yücelik, M. Z. 1981, Taxation in Sub-Saharan Africa, Tech. rep., International Monetary Fund

Tanzi, V., & Davoodi, H. 2001, in The political economy of corruption (Routledge), 101–122

Tavares, J., & Valkanov, R. I. 2001, in EFA 2003 Annual Conference Paper No. 201

Thomas, M. A. H., & Trevino, M. J. P. 2013, Resource dependence and fiscal effort in Sub-Saharan Africa No. 13-188 (International Monetary Fund)

Yakubu, A. S., Aboagye, A. Q., Mensah, L., & Bokpin, G. A. 2018, The Journal of International Trade & Economic Development, 27, 917

Yang, B. 2011, Economics Letters, 112, 262

Yohou, H. D., Goujon, M., & Ouattara, W. 2016, Journal of African Economies, 25, 468

Zaidi, S. A. H., Wei, Z., Gedikli, A., et al. 2019, Resources Policy, 64, 101476