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Foreign Aid, Financial Development and Tax Revenue Nexus in Emerging Markets

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Abstract: This study explored the influence of foreign aid on tax revenue in emerging markets using panel data (2001-2019) methods such as fully modified ordinary least squares (FMOLS), pooled ordinary least squares (OLS) and fixed effects. Secondly, to investigate tax revenue's influence of the complementarity between foreign aid and financial development in emerging markets using the same data set. Foreign aid and tax revenue were found to have an inverse relationship. Financial development's influence on tax revenue was found to be significantly positive in majority of instances. The complementarity variable's impact on tax revenue was also positive and significant. Emerging markets are therefore urged to implement policies that strengthens financial sector development to increase tax revenue and as a way of improving foreign aid's favourable impact on tax revenue in emerging markets.

Keywords: Foreign Aid; Transitional Economies; Panel Data; Tax Revenue

JEL Classification: C23; F35; H2; P2

1. Introduction and Background

Consistent with Gupta et al. (2003), the liquidity enhancement economic growth role of foreign aid in the form of grants and loans is well established in literature to an extent that it is no longer debatable. The reform enhancement agenda of foreign aid in the receiving countries has also been extensively explained in literature and its economic growth benefits well documented (Carter, 2010; Ross, 2004). Despite its role in economic growth and development, tax revenue has a far received little attention in the foreign aid-economic growth nexus. What is also still a subject of intense contestation in literature is the direct influence of foreign aid on tax revenue.

Theoretical literature which supports the foreign aid-led tax revenue include Carter (2010) and Ross (2004). Consistent with Pack and Pack (1990), there are conditions under which foreign aid reduces tax revenue. Moreover, Gupta et al. (2003) noted that certain conditions must be available in the receiving country before foreign aid enhance tax revenue. These arguments motivated this author to

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find out the role of the financial sector in the foreign aid-tax revenue nexus, using transitional markets as a focal point.

Empirical researchers which explored the influence of foreign aid on tax revenue exist (refer to Table 1). What is quite notable is that they failed to agree on the role of foreign aid on tax revenue as they produced results which were contradictory, divergent and far from showing consensus. Five sets of results are evident. Firstly, a positive influence of foreign aid on tax revenue was supported by some empirical researchers (Wen et al., 2023; Gupta et al., 2003; Tagem, 2020; Tagem, 2022a; Gang & Khan, 1990; Mbatia & Ellyne, 2017; Morrissey et al., 2014; Ebeke & Ehrhart, 2011; Clist, 2014; Nteziryayo, 2019; Bwire et al., 2013; Mascagni, 2014; Clist & Morrissey, 2011). Secondly, others supported the view that foreign aid and tax revenue are inversely related (Mbatia, 2018; Benedek et al., 2014; Diaz-Sanchez et al., 2021; Mbatia & Ellyne, 2017; Thornton, 2014; Brown, 2012; Dayanat, 2022; Syed & Mukhtar, 2021; Bowa, 2016). Thirdly, a U-shaped kind of relationship between the two variables was also supported (Diarra et al., 2023). Fourthly, the influence of foreign aid on tax revenue was found to be either insignificant or negligible (Tagem, 2020; Berg & Levy, 2020; Dinku, 2008). Finally, other empirical researchers observed that certain conditions must be available in the receiving country before foreign aid can effectively influence tax revenue (Benedek et al., 2014; Diarra et al., 2023; Tagem, 2022a; Martins, 2009; Berg & Levy, 2020; Akhtar et al., 2023). This lack of unanimity shows a gap still exists which requires filling in.

Their empirical work is characterized by the following methodological issues. The data they used is now outdated hence their results are no longer useful in today's policy making decisions. Majority of them assumed a linear relationship between foreign aid and tax revenue, which is not true consistent with Gupta et al. (2003). Majority did not consider the endogeneity problem prevalent in the tax revenue data. None of them focused on emerging markets as a focal point, a glaring omission given the importance of this economic bloc in the world economy and geopolitics. None of them performed sensitivity analysis. This study filled in these gaps.

2. Influence of Foreign Aid on Tax Revenue – Theoretical Literature

Consistent with Hisali and Ddumba-Ssentamu (2013), the type of foreign aid (loan, or a grant) determines its impact of domestic tax revenues. Carter (2010) argued that domestic tax revenue is increased by foreign aid targeting administrative, legal, policy reforms changes whilst foreign aid channelled towards enhancing political institutions and domestic governance systems also enhances domestic tax revenue (Ross, 2004). Carter (2010) further noted that foreign aid directed towards salaries and imports in the short term leads to a short run increase in domestic tax revenue.

The ambiguous impact of foreign aid on tax revenue depends on conditions put forward by the donor community such as policy reforms and liberalization, among others. For example, parastatals which suddenly begin to make profits post liberalization instigated by foreign donors leads to increased domestic tax revenue (Pack & Pack, 1990). If profit posting parastatals makes loss because of privatisation triggered by donor community conditions, then foreign aid reduces domestic tax revenue (Pack & Pack, 1990).

Gupta et al. (2003) argued that the influence of foreign aid on tax revenue depends on certain characteristics in the receiving country such as corruption, among others. For example, high levels of foreign aid inflow into a country characterized by high levels of corruption offsets tax revenue

generation efforts. Gupta et al. (2003) further noted that foreign aid inflow does not lead to increased domestic tax revenue when governments reduce tax burden on the people to spur consumption expenditure linked economic growth.

3. Foreign Aid Led Tax Revenue – Empirical Literature

Empirical literature on the foreign aid's influence on tax revenue is presented in Table 1.

Table 1. Influence of foreign aid on tax revenue from an empirical literature point of view

Researchers	Focal point	Time frame	Method	Outcomes
Mbatia (2018)	Sub-Saharan Africa	1990-2014	Panel data analysis	Foreign aid had a negative influence on tax revenue when all the countries were pooled together.
Wen et al. (2023)	Asian countries	2001-2019	Panel fully modified ordinary least squares (FMOLS)	In the long run, it was observed that foreign aid helped to improve tax revenue. The interaction between governance and foreign aid.
Benedek et al. (2014)	Developing countries	1980-2009	Difference and system generalized methods of moments (GMM)	Foreign aid in the form of grants were negatively linked to domestic tax revenue whilst foreign aid in the form of loans enhanced domestic tax revenue. Further analysis noted that foreign aid in the form of grants negatively affected excise, value added tax and income tax revenues whilst enhancing trade tax revenue. In addition, foreign aid significantly influenced domestic tax revenue in countries characterised by weak institutions and generally in low income countries.
Diaz-Sanchez et al. (2021)	Comoros	1984-2017	Vector Error Correction Model	Foreign aid in the form of grants negatively affected tax revenue in the long run in Comoros. An unconditional package of foreign aid was found to have enhanced tax revenue efforts in Comoros.
Gupta et al. (2003)	Developing countries	1970-2000	Fixed and random effects models	Foreign aid through loans were found to have had a significant enhancing effect on domestic tax revenue generation whilst tax revenue was negatively affected by foreign aid in the form of grants in a non-significant manner. The study also noted that corruption had a negative impact on foreign aid (grants)'s ability to generate domestic tax revenue.
Diarra et al. (2023)	Developing countries	1984-2014	Panel data analysis	Foreign aid which was granted during conflict times had a significant positive influence on domestic tax revenue. Such positive influence on tax revenue increased with the level of technical help availed to the receiving countries. Further analysis show that the relationship between foreign aid and tax revenue follows a U-shape especially during conflict times.
Tagem (2020)	Developing countries	1980-2013	Panel data analysis	A positive relationship running from foreign aid towards tax revenue was observed. Further analysis indicates that foreign aid had an

				insignificant positive impact on tax revenue in countries characterised by high political and bureaucratic costs.
Tagem (2022a)	Developing countries	1980-2013	Dynamic heterogeneous (panel) time series techniques	In both short and long run, the impact of foreign aid on tax revenue although largely positive, the actual extent depended on bureaucratic and political costs. In other words, high levels of bureaucratic and political costs made the tax revenue influence of foreign aid to be quite insignificant.
Martins (2009)	Ethiopia	1964-2005	Multi-regression analysis	Foreign aid channelled towards building capacities enhanced tax revenue in Ethiopia.
Tagem (2022b)	Developing countries	1980-2013	Heterogeneous co-integrated panel analysis	A long run relationship between foreign aid and tax revenue was observed. The interaction between foreign aid and tax revenue enhanced government spending both in the short and long run.
Gang and Khan (1990)	India	1961-1984	Time series data analysis	Bilateral aid was found to be mainly directed towards developmental projects which are more likely to help the country generate more tax revenue. The interaction between foreign aid and government expenditure had a negative influence on tax revenue.
Berg and Levy (2020)	Post-civil war countries	1978-2012	Panel data analysis	Foreign aid insignificantly improved tax revenue in countries with parties which are dominant. In countries characterised by absence of party dominance, foreign aid had a significant positive effect on tax revenue.
Mbatia and Ellyne (2017)	Sub Saharan Africa	1990-2014	Fixed effects 2SLS and fixed effects	When countries were pooled together, foreign aid (grants and loans) negatively influenced tax revenue. However, foreign aid (grants and loans) significantly enhanced tax revenue in upper middle-income countries.
Morrissey et al. (2014)	Sub Saharan Africa	1980-2009	Panel methods of data analysis (fixed effects, ordinary least squares, generalized least squares)	A significant positive impact of foreign aid on tax revenue was observed.
Thornton (2014)	Asia, Sub-Saharan Africa, Latin America, Middle East and North Africa (MENA) region	1984-2009	Panel data analysis	Foreign aid inflow led to a significant decrease in tax revenue.
Ebeke and Ehrhart (2011)	Sub-Saharan Africa	1980-2005	Panel data analysis	Foreign aid inflow ensured stable tax revenue generation by reducing the sensitivity between public investment and tax revenue shocks.
Dinku (2008)	Ethiopia	1975-2005		A non-significant positive impact of foreign aid on tax revenue was observed in Ethiopia.
Clist (2014)	Developing countries	1980-2011	Panel data analysis	A positive impact of foreign aid on tax revenue was detected.

Brown (2012)	Developing countries	1989-2006	Panel data analysis	Foreign aid dependency syndrome reduces governments' efforts to implement workable tax revenue boosting efforts.
Nteziryayo (2019)	Rwanda	2006-2018	Vector Error Correction Model (VECM)	Foreign aid improved tax revenue in Rwanda due to the prevalence of strong tax administration, and institutional systems.
Dayanat (2022)	Sri Lanka	1990-2017	Three-Stage least squares (3SLS)	Foreign aid led to a decrease in tax revenue.
Bwire et al. (2013)	Uganda	1972-2008	Vector Autoregressive Approach	Foreign aid was found to have been associated with increased tax revenue generation.
Akhtar et al. (2023)	Pakistan	1975-2018	Autoregressive Distributive Lag (ARDL)	The interaction between foreign aid and tax revenue had a deleterious influence on economic growth in Pakistan.
Mascagni (2014)	Ethiopia	1960-2009	VECM	Tax revenue in Ethiopia was significantly enhanced by foreign aid (loans and grants) inflow.
Syed and Mukhtar (2021)	Pakistan	1972-2016	Generalized methods of moments (GMM)	Foreign aid, both loans and grants adversely influenced tax revenue generation efforts in Pakistan.
Bowa (2016)	Zambia	1970-2014	VECM	Foreign aid was negatively associated with government revenue both in the short and long run.
Clist and Morrissey (2011)	Developing countries	1970-2005	Fixed effects model	The evidence that foreign aid (grants) significantly enhance tax revenue was observed.

Source: Author

The empirical literature presented in Table 1 produced results which are quite varied. Some show results which supports the foreign aid's positive influence on tax revenue whilst others indicate that tax revenue was negatively affected by foreign aid. Other empirical studies noted a feedback effect between foreign aid and tax revenue. The indirect influence of foreign aid on financial development was also supported. The neutral hypothesis was also supported by some empirical studies. The lack of consensus on the direction and nature of causality from foreign aid to tax revenue is evident in Table 1. This study tries to contribute towards addressing this unresolved academic discourse. Looking at Table 1, there is no single study which focused exclusively on emerging markets and no study which attempted finding out if financial development is a channel through which tax revenue is influenced by foreign aid. This study attempted to fill in these gaps.

4. Impact of Financial Development on Tax Revenue

A study by Masiya et al. (2015) says that tax revenue generation improve in direct response to an increase in monetization (broad money) in the economy. A developed financial sector is better able to play it's in the economy of channeling funds from the deficit to the surplus sectors of the economy, improving liquidity, risk management and lending money to the most productive sectors of the economy. This leads to economic growth and consequently pushes up the total amount of tax revenue generated in the economy (Masiya et al., 2015). Consistent with Raof (2022), there exists several ways through which tax revenue is enhanced by financial development. Firstly, economic growth triggered by financial development multiplies the taxable base related activities. Secondly, the complementarity

between economic growth and financial development deter the thriving of a shadow economy which is prevalently dominated by tax evasion. Thirdly, financial sector led economic growth increases wealth levels among the people and consequently uptake of goods and services, new investment and the tax base size in the economy. Fourthly, a developed financial sector facilitates tax revenue education, collection and monitoring (Akcay et al., 2016).

According to Demirguc-Kunt et al. (2017), a developed financial system enables people to do their transactions in a safe environment, allow them to undertake business and education and be more effective financial market players. They also argued that a developed financial sector drives the whole economy towards formalization hence easier for the tax collectors to track and calculate the amount of annual tax payable by each economic agent. Formalized financial sector is a catalyst for investment and business growth and consequently expansion of tax revenue base necessary for economic boom (Al-Own & Bani-Khalid, 2021).

5. Methodology

Panel data (2001-2019) was used in this study having been extracted from publicly available and internationally reputable sources such as International Financial Statistics and World Bank Indicators. The benefits of these databases include (1) easy to verify data as it is publicly available, (2) reputable so the results are credible and 3) its easier and cheaper to extract data. Countries that form part of this study are Brazil, Colombia, Indonesia, Thailand, Turkey, South Africa and Republic of Korea. The tax revenue function is expressed as equation 1.

$$TR = f(FAID, FIN, HCD, FDI, INFR, OPEN, UNEMP) \quad [1]$$

Mbatia (2018), Wen et al. (2023), Benedek et al. (2014), Diarra et al. (2023), Akhtar et al. (2023), Mbatia and Ellyne (2017), and Bowa (2016) influenced the inclusion of these independent variables in the model. TR, which is the dependent variable stands for tax revenue and is proxied by tax revenue as a ratio of GDP. Net official development assistance received expressed as ratio of GDP (FAID) is a proxy of foreign aid. Financial development (FIN) is measured by three proxies in this study, namely domestic credit to private sector by banks as a ratio of GDP, stock market capitalization of listed domestic companies as a ratio of GDP and total value of stocks traded as a ratio of GDP.

The advantage of high levels of human capital development is that people are better able to understand and cooperate with tax authorities regarding the tax rules, ethics, codes, methods and procedures hence increasing the likelihood of domestic tax revenue generation and collection, argued (Chilima, 2005). A positive influence of human capital development on tax revenue is expected. Human capital development index is a measure of human capital development used.

Yoshino and Abidhadjaev (2017) argued that infrastructure development enhances economic growth and consequently tax base size through allowing people to have easy access to markets, carrying their farming produce to the markets, smoothening communication and provision of clean water. Infrastructure development is expected to spur tax revenue. It is measured by individuals using the internet (% of population) in this study.

Pissarides (1998) argued that high unemployment levels promote tax evasion as the people try to avoid parting with the little financial resources that they have. High unemployment levels are expected to reduce tax revenue. Total unemployment (% of total labour force) is the proxy of unemployment used in this study.

High level of trade openness allows the growth and profitability of local industry as they can acquire production related materials from anywhere in the world and be able to access international financial and commodity markets. It means they will pay more tax such as import tax, value added tax, income tax as they employ more people and sales tax, argued Castro and Camarillo (2014). The theoretical expectation therefore is that trade openness boost tax revenue. Exports of goods and services (% of GDP) is the proxy of trade openness in this study.

Amoh and Adom (2017) argued that FDI directly enhances economic growth through provision of additional liquidity, skills, managerial skills and financial resources hence helping to expand the tax base in the economy. A positive influence of FDI on tax revenue is expected. Net FDI inflows as a ratio of GDP is the proxy of foreign direct investment employed.

These proxies were used in this study based on earlier empirical work of Berg and Levy (2020), Nteziryayo (2019), Thornton (2014), Morrissey et al. (2014), Mbatia (2018), Benedek et al. (2014), Diaz-Sanchez et al. (2021), Diarra et al. (2023), Tagem (2020), Berg and Levy (2020), Mbatia and Ellyne (2017), and Nteziryayo (2019).

$$TR_{it} = \beta_0 + \beta_1 FAID_{it} + \beta_2 FIN_{it} + \beta_3 (FAID_{it}.FIN_{it}) + \beta_4 HCD_{it} + \beta_5 FDI_{it} + \beta_6 INFR_{it} + \beta_7 OPEN_{it} + \beta_8 UNEMP_{it} + \mu + \varepsilon \quad [2]$$

Equation 2 is the econometric formation of equation 1. The inclusion of the interaction term (FAID.FIN) follows Diarra et al (2023)'s argument that institutional and macroeconomic environment determines foreign aid's impact on tax revenue. It also resonates with Masiya et al. (2015) and Amoh and Adom (2017) whose argument is that foreign capital inflow through a formally developed, structured and dynamic financial sector enhances economic growth, business expansion and consequently domestic tax revenue base. FMOLS, fixed effects and pooled OLS were used to econometrically estimate equation 2.

6. Pre-Estimation Diagnostic Analysis

This section comprises of trend, correlation and descriptive statistical analysis. Figure 1 shows net official development assistance received (foreign aid) trends whilst Figure 2 diagrammatically presents tax revenue trends during the period spanning from 2001 to 2019. In Figure 1, net official development assistance received for Brazil declined from 0.05% of GDP in 2001 to 0.01% of GDP in 2006, increased by 0.02 percentage points during subsequent five-year period (2006-2011), went up again by 0.01 percentage points between 2011 and 2016 before going down from 0.04% of GDP in 2016 to 0.02% of GDP in 2019. For Colombia, net official development assistance received decreased from 0.41% of GDP in 2001 to 0.02% of GDP in 2006 before further going down by 0.003 percentage points during the subsequent five-year timeframe from 2006 to 2011. Moreover, Columbia's net official development assistance received went up from 0.017% of GDP in 2011 to 0.0019% of GDP in 2016 before recording a growth of 0.01 percentage points between 2016 and 2019.

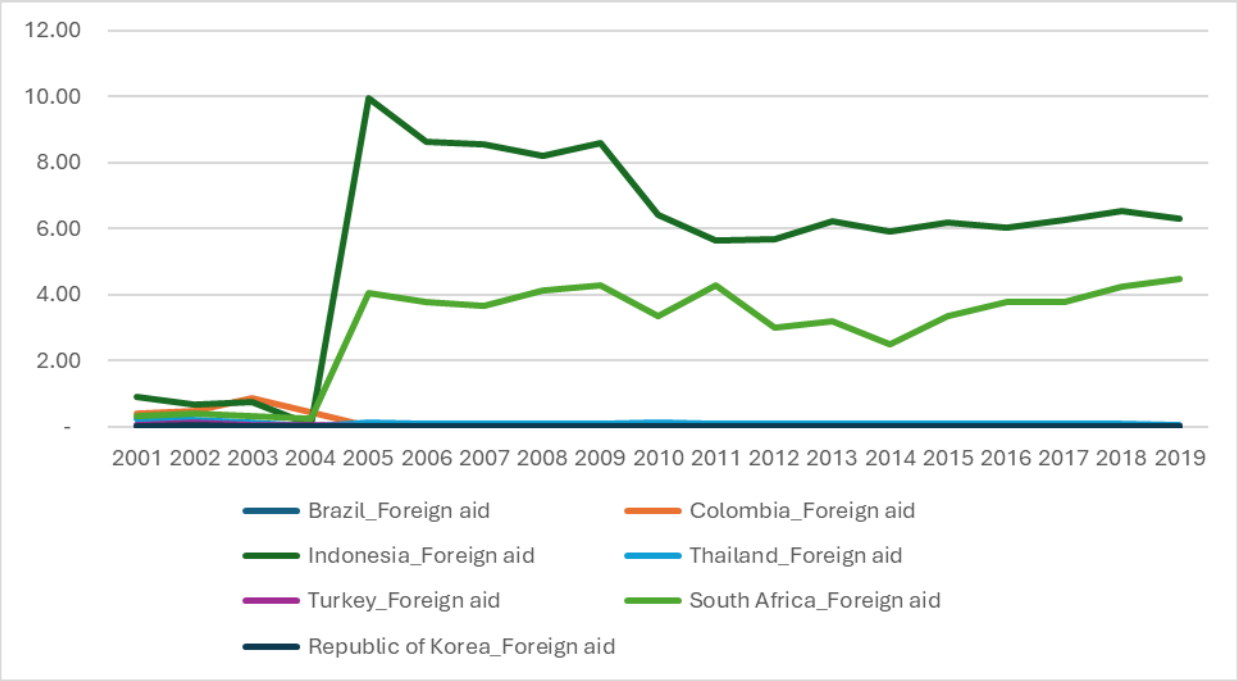

Figure 1. Net official development assistance received (% of GDP) trends

A massive increase of 7.73 percentage points in Indonesia's net official development assistance received was observed between 2001 and 2006 and then a decline from 8.636% of GDP in 2006 to 5.644% of GDP in 2011 before experiencing a growth of 0.40 percentage points during the subsequent five-year period (2011 to 2016). For Indonesia, the period between 2016 and 2019 was characterised by a marginal growth in net official development assistance received from 6.048% of GDP in 2016 to 6.289% of GDP in 2019. For Thailand, net official development assistance received declined from 0.24% of GDP in 2001 to 0.093% of GDP in 2006 and then further decreased by 0.02 percentage points between the period from 2006 to 2011. Net official development assistance received for Thailand marginally went up by 0.01 percentage points between 2011 and 2016 and then experienced a 0.02 percentage points decline, from 0.087% of GDP in 2016 to 0.067% of GDP in 2019.

Turkey's net official development assistance received went down from 0.07% of GDP in 2001 to 0.003% of GDP in 2006, marginally went up during the subsequent five-year period (by 0.002 percentage points), declined by 0.002 percentage points during the period between 2011 and 2016 before going up from 0.003% of GDP in 2016 to 0.005% of GDP in 2019. South Africa's net official development assistance received massively increased from 0.32% of GDP in 2001 to 3.79% of GDP in 2006, went up by 0.47 percentage points during the period between 2006 and 2011. It declined by 0.50 percentage points between 2011 and 2016 before recording a growth of 0.70 percentage points during the next three years, from 3.77% of GDP in 2016 to 4.47% of GDP in 2019.

For the Republic of Korea, net official development assistance received declined from 0.02% of GDP in 2001 to 0.01% of GDP in 2006 and then marginally went up by 0.004 percentage points between year 2006 to 2011. Net official development assistance received for the Republic of Korea slightly declined from 0.009% of GDP in 2011 to 0.008% of GDP in 2016 and then remained unchanged during the period ranging from 2016 to 2019.

According to Figure 2, Brazil's tax revenue went up from 12.42% of GDP in 2001 to 13.29% of GDP in 2006, increased by 1.56 percentage points between 2006 and 2011, declined by 1.14 percentage points between 2011 and 2016 before marginally increasing from 13.71% of GDP in 2016 to 13.74% of GDP in 2019. Colombia's tax revenue trend was like Brazil, the only difference being the figures involved. Indonesia's tax revenue increased from 11.58% of GDP in 2001 to 12.67% of GDP in 2006, declined by 1.51 percentage points between 2006 and 2011 before further going down by 0.82 percentage points during the subsequent five-year period (2011 to 2016). Indonesia's tax revenue then declined from 10.34% of GDP in 2016 to 9.75% of GDP in 2019.

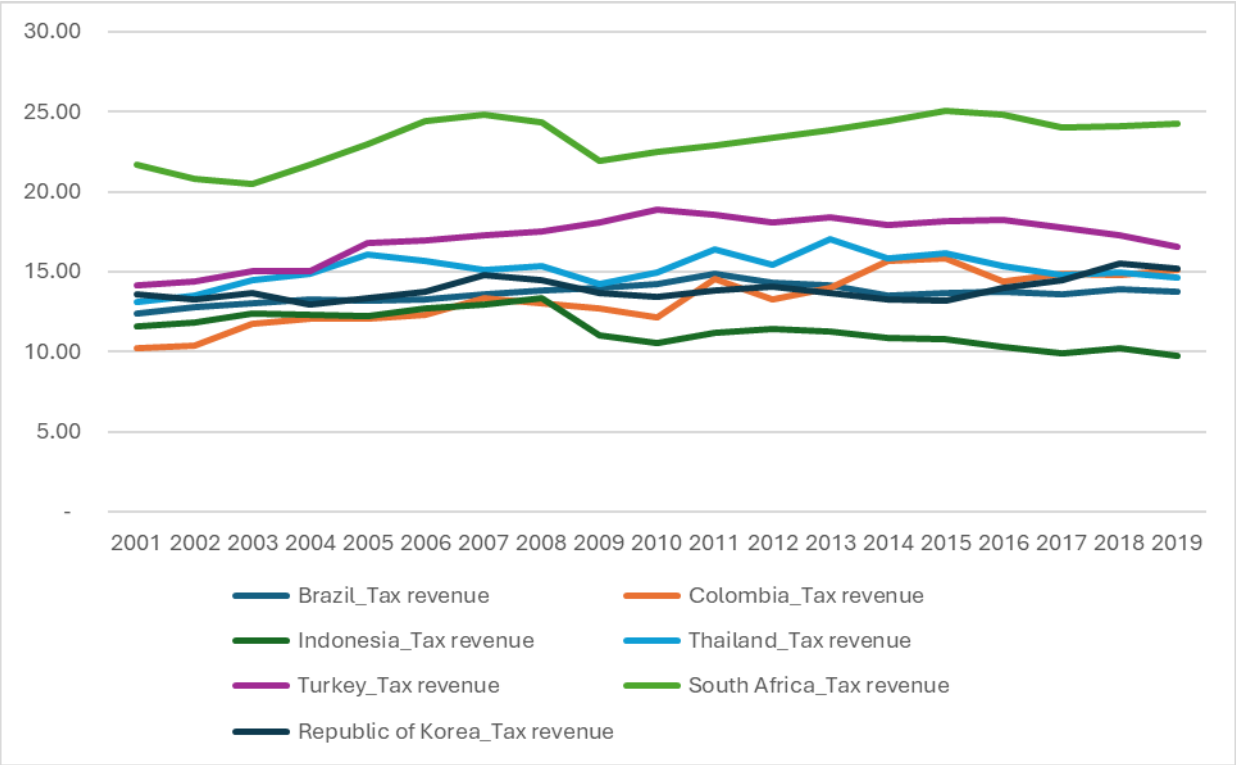

Figure 2. Tax revenue (% of GDP) trends

Tax revenue for Thailand increased from 13.07% of GDP in 2001 to 15.64% of GDP in 2006, grew by 0.72 percentage points between 2006 and 2011, declined by 1 percentage points during the subsequent five-year period (2011-2016) before further declining from 15.36% of GDP in 2016 to 14.65% of GDP in 2019. Turkey's tax revenue trend mimicked that of Thailand during the period under study. As for the Republic of Korea, its tax revenue went up from 13.55% of GDP in 2001 to 13.73% of GDP in 2006 and further increased by 0.12 percentage points between 2006 and 2011. The period between 2011 and 2016 saw Republic of Korea's tax revenue going up by 0.13 percentage points before further experiencing a growth of 1.22 percentage points, from 13.98% of GDP in 2016 to 15.20% of GDP in 2019.

Table 2 presents correlation results of the study.

Table 2. Correlation

	TR	FAID	FIN	HCD	FDI	INFR	OPEN	UNEMP
TR	1.00							
FAID	0.03	1.00						

FIN	0.13	-0.32***	1.00					
HCD	-0.30***	-0.49***	0.60***	1.00				
FDI	-0.19**	-0.17*	-0.23***	-0.18**	1.00			
INFR	0.05	-0.31***	0.65***	0.67***	-0.18**	1.00		
OPEN	0.07	-0.15*	0.68***	0.19**	-0.15*	0.08	1.00	
UNEMP	0.71***	0.20**	-0.41***	-0.44***	-0.06	-0.17*	-0.52***	1.00

*Source: author. ***and ** denote 1% and 5% levels of significance, respectively*

The weakness of correlation analysis is that it does not show direction of causality hence it is of no importance when it comes to informing policy decision making. Stead (2007) argued that multicollinearity problem exists when correlation value is at least 70%. It is according to this reasoning that multicollinearity was found to exist only between tax revenue and unemployment (see Table 2).

Descriptive statistics (Table 3)'s main purpose is to determine the character and nature of the data used. To find out the existence of extreme values, skewness and abnormal distribution of the data sets.

Table 3. Descriptive statistics

	TR	FAID	FIN	HCD	FDI	INFR	OPEN	UNEMP
Mean	15.39	1.28	63.11	0.75	2.19	38.01	60.76	8.83
Median	14.33	0.05	59.48	0.75	1.98	34.89	51.09	8.37
Maximum	25.05	9.95	151.26	0.94	7.03	96.16	140.44	25.54
Minimum	9.75	0.002	14.01	0.60	0.01	2.02	22.11	0.25
Standard deviation	3.80	2.40	36.72	0.08	1.38	26.90	32.04	6.40
Skewness	1.14	1.85	0.69	0.58	0.56	0.40	1.14	0.86
Kurtosis	3.53	5.28	2.33	2.80	2.78	2.01	3.23	3.04
Jarque-Bera	30.23	104.52	12.97	7.70	7.27	8.99	28.93	16.34
Probability	0.00	0.00	0.00	0.02	0.03	0.01	0.00	0.00

Source: Author

Financial development and trade openness have extreme values because they are characterized by range values exceeding 100. All the data sets are positively skewed, hence the data for the variables is not normally distributed. The probability values of all the data sets is either zero or almost zero, meaning all the data is not normally distributed.

7. Main Results Presentation, Discussion and Interpretation

To deal away with spurious results emanating from autocorrelation, multicollinearity problem, abnormal distribution and extreme values, the whole data set was transformed into natural logarithms before its use in main data analysis, consistent with Tsaurai (2018).

Table 4. Stationarity tests –Individual intercept

Level				
	ADF	LLC	PP	IPS
TR	23.74**	-2.92***	19.43	-1.888**
FAID	37.13***	-4.62***	38.31***	-3.46***
FIN	18.25	-3.08***	11.34	-0.64
HCD	28.51**	-3.65***	35.34***	-2.57***
FDI	34.57***	-3.70***	52.20***	-3.25***
INFR	28.55**	-3.58***	313.40***	-1.55*
OPEN	18.97	-1.87**	20.17	-0.93

UNEMP	12.30	-0.15	12.03	0.38
TR	40.41***	-3.59***	76.24***	-3.79***
FAID	55.66***	-6.03***	128.04***	-5.50***
FIN	29.48***	-7.17***	47.16***	-2.65***
HCD	94.38***	-11.19***	179.82***	-9.41***
FDI	85.46***	-7.92***	456.98***	-8.49***
INFR	40.81***	-4.42***	83.70***	-3.91***
OPEN	62.35***	-7.54***	115.15***	-6.20***
UNEMP	34.31***	-3.36***	70.10***	-3.19***

*Source: author. ***and ** denote 1% and 5% levels of significance, respectively*

The data for all the variables was stationary at first difference (integrated of order 1). The results paved way for Kao (1999) panel co-integration tests (see Table 5 for results).

Table 5. Panel co-integration

Series	ADF t-statistic
TR FAID FIN HCD FDI INFR OPEN UNEMP	-1.7336***

*Source: author. ***and ** denote 1% and 5% levels of significance, respectively*

The long run relationship which was observed in Table 5 allowed the study to proceed to main data analysis, whose results are presented in Table 6 (fixed effects), 7 (pooled OLS) and 8 (FMOLS).

Table 6. Fixed effects

	Model 1	Model 2	Model 3
FAID	-0.04	-0.04*	-0.06***
FIN	0.15***	0.04	0.02
FAID.FIN	0.01*	0.01	0.01***
HCD	0.41	-0.23	0.07
FDI	0.16	-0.23	0.001
INFR	0.02	0.02	0.001
OPEN	0.25***	0.18***	0.13*
UNEMP	-0.002	-0.001	0.01
Adjusted R-squared	0.76	0.93	0.93
F-statistic	57.68	53.80	56.95
Prob (F-statistic)	0.00	0.00	0.00

*Source: author. ***and ** denote 1% and 5% levels of significance, respectively*

The difference between model 1, 2 and 3 is that model 1 used domestic credit to private sector by banks as a ratio of GDP to proxy financial development, model 2 used stock market capitalization ratio as a measure of financial development whereas model 3 used total value of stocks traded as a ratio of GDP to measure financial development. In Table 6 (fixed effects), model 1 shows that foreign aid negatively affected tax revenue in an insignificant way. Model 2 and 3 under fixed effects indicates that foreign aid had a significant deleterious influence on tax revenue. Similar results were

observed under pooled OLS and FMOLS methods across all the three models. These results agree with authors such as Gupta et al. (2003) whose study asserted that foreign aid inflow leads to a decrease in domestic tax revenue if governments reduce the tax burden on the people to improve economic growth. The results also agree with Pack and Pack (1990) whose study mentioned that foreign aid reduces tax revenue if profit making public enterprises begin to make losses because of privatisation triggered by donor community conditions.

Tax revenue was non-significantly enhanced by financial development under fixed effects (model 2 and 3) and in model 2 under the FMOLS approach. Financial development's impact on tax revenue was noted to be positive and significant under fixed effects (model 1), pooled OLS (model 1,2 and 3) and FMOLS (model 1 and 3). These findings mean that financial development is an integral part in the country's efforts to improve tax revenue generation, consistent with Masiya et al. (2015) whose study argued that a developed financial sector enhances economic growth (through helping to improve liquidity, risk management, bridge between deficit and surplus sectors of the economy) hence expanding the tax base in the economy.

Table 7. Pooled OLS

	Model 1	Model 2	Model 3
FAID	-0.29***	-0.21***	-0.10***
FIN	0.35***	0.20***	0.13***
FAID.FIN	0.07***	0.04***	0.03***
HCD	0.18*	0.79***	0.84***
FDI	0.47	-0.003	0.01
INFR	0.03**	0.03**	0.05***
OPEN	0.21***	0.318**	0.37***
UNEMP	-0.17***	0.14***	0.20***
Adjusted R-squared	0.65	0.63	0.69

*Source: author. ***and ** denote 1% and 5% levels of significance, respectively*

This study also examined the effect of complementarity variable (foreign aid. financial development) on tax revenue in emerging markets. Model 2 (fixed effects) and model 1 and 2 (FMOLS) show a non-significant positive relationship running from the complementarity variable towards tax revenue. Model 1 and 3 (fixed effects), model 1, 2 and 3 (pooled OLS) and model 3 (FMOLS) produced results which show that the complementary variable significantly contributed to the improvement of tax revenue in emerging markets. The results generally agree with Masiya et al. (2015) and Amoh and Adom (2017) whose studies pointed out that foreign capital inflow through a formally developed, structured and dynamic financial sector enhances economic growth and consequently domestic tax revenue growth. The findings also support Gupta et al. (2003)'s assertion that the influence of foreign aid on tax revenue depends on certain characteristics in the receiving country. The results mean that financial development is a channel which enhances foreign aid's ability to improve tax revenue.

Table 8. FMOLS

	Model 1	Model 2	Model 3
FAID	-0.07**	-0.07*	-0.07***
FIN	0.13**	0.0003	0.05**
FAID.FIN	0.12	0.01	0.01***
HCD	0.18	-0.15	0.05
FDI	0.59	0.0007	0.0004
INFR	0.01	0.03**	0.02*
OPEN	0.27***	0.24***	0.21***
UNEMP	-0.02	-0.003	-0.01
Adjusted R-squared	0.73	0.79	0.72

*Source: author. ***and ** denote 1% and 5% levels of significance, respectively*

Model 1 and 3 (fixed effects and FMOLS) indicates that human capital development insignificantly improved tax revenue whilst models 1, 2 and 3 (pooled OLS) show a significant positive relationship running from human capital development towards tax revenue. These results generally agree with Chilima (2005) whose study noted that high levels of human capital development enable majority of the people to better understand and cooperate with tax authorities regarding the tax rules, ethics, codes, methods and procedures hence increasing the likelihood of domestic tax revenue increase. Model 2 (FMOLS and fixed effects) noted that human capital development non-significantly deleted tax revenue during the period under study, in stark contrast to available literature.

A non-significant positive influence of FDI on tax revenue was observed in models 1 and 3 (fixed effects and pooled OLS) and models 1, 2 and 3 (FMOLS). These findings generally support an argument put forward by Amoh and Adom (2017) which says that FDI directly enhances economic growth through provision of additional liquidity, skills, managerial skills and financial resources hence helping to expand the tax base in the economy. Model 2 under fixed effects and pooled OLS indicates a non-significant deleterious impact of FDI on tax revenue, in stark contradiction with existing literature.

Models 1, 2 and 3 under the fixed effects and model 1 under FMOLS shows a non-significant positive impact of infrastructure development on tax revenue. All three models under pooled OLS and models 2 and 3 under FMOLS show a significant positive influence of infrastructure development on tax revenue. These results are consistent with Yoshino and Abidhadjaev (2017) whose study argued that infrastructure development enhances economic growth and consequently tax base through enabling the people to have easy access to markets, transport their farming produce to the markets, smoothening communication and provision of clean water.

All three models under fixed effects, pooled OLS and FMOLS show that the influence of trade openness on tax revenue was positive and significant, in line with Castro and Camarillo (2014) who

argued that high level of trade openness allows the growth and profitability of local industry as they can acquire production related materials from anywhere in the world and be able to access international financial and commodity markets hence contributing more tax to the national fiscus.

A non-significant negative influence of unemployment on tax revenue was observed in models 1 and 2 under fixed effects and across all three models under the FMOLS method whilst model 1 under the pooled OLS indicates a significant negative relationship running from unemployment towards tax revenue. These results support a finding by Pissarides (1998) whose study argued that high unemployment levels promote tax evasion as the people try to avoid parting with the little financial resources that they have. Pooled OLS (models 2 and 3) shows that unemployment's impact on tax revenue was positive and significant, in contradiction to existing literature.

Table 9. Hausman and Wald tests

	Fixed effects			Pooled OLS			FMOLS		
Test	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Hausman (Chi2)	17.14***	28.31***	47.28***	8.18***	6.23***	14.74***			
Wald tests (Chi2)	3.21	8.33	24.84	32.81***	25.74***	17.17***			

*Source: author. ***and ** denote 1% and 5% levels of significance, respectively*

The results in Table 9 indicates that the use of fixed effects cannot be rejected (probability values of zero). Moreover, the probability values of F-statistics equal zero hence the regression models fitted well with the used data.

8. Conclusion

This study had three objectives. Firstly, to find out the influence of foreign aid on tax revenue in emerging markets using panel data (2001-2019) methods such as fully modified ordinary least squares, pooled ordinary least squares and fixed effects. Secondly, to explore the tax revenue influence of the complementarity between foreign aid and financial development in emerging markets using the same data set. Thirdly, to examine if financial development enhances the tax revenue influence of foreign aid in emerging markets. The absence of consensus in the literature on the impact of foreign aid on tax revenue motivated the author to contribute on the subject matter, using emerging markets as a focal point of analysis. Foreign aid and tax revenue were found to have an inverse relationship. Financial development's influence on tax revenue was found to be significantly positive in majority of instances. The complementarity variable's impact on tax revenue was also positive and significant. The study also observed that financial development in majority of cases was proven to be channel through which tax revenue is enhanced by foreign aid. The study proved that increase in foreign aid inflow without being matched by a developed financial sector in the receiving country does not lead to increased tax revenue. Emerging markets are therefore urged to implement policies that strengthens financial sector development to increase tax revenue and as a way of improving foreign aid's favourable impact on tax revenue in emerging markets. A threshold study is recommended to provide a better insight into the subject matter.

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