

The Determinants of Tax Revenues among EAC members

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Abstract

A tax revenue mobilization in less developing countries is an empirical debate and has received a lot of attention. Reflecting this, increasing tax to GDP ratio is a policy option that needs special attention in developing countries, especially the lower income economies. Meanwhile, this study intends to examine the determinants of Tax revenue to GDP ratio among four East African Community Countries (EAC-4). Analysis is conducted using Fixed and Panel data approach using most recent data from 2010-2020. The sample countries are four (4) East African Community (EAC) members. The results suggest that, economic growth has significantly positive contribution to tax revenues while growth of the agricultural sector retards tax revenue collections. The impact of manufacturing sector and service sector on tax revenue is insignificant. To improve tax revenue performance, an improvement and implementation of the designed tax policy is needed in these countries to properly tap growth of all economic sectors.

Keywords: EAC, tax revenues, Fixed approach, tax to GDP ratio.

1. Background

The East African Community (EAC) which is made of members including Burundi, Kenya, Rwanda, Tanzania, South Sudan and Uganda practice different tax regimes from one another. Some of their huge differences include definitions of their tax bases, leading to unfair and inequality of taxation (Mutsotso, 2010). The developing countries including EAC countries are challenged by the ever increasing public demand forcing the governments to find more resources to finance public services and infrastructure. Scarcity of resources is a result of the rise in the cost of public services, socio-economic programs and implementation of poverty reduction in the lower income economies. They are always in a high demand low income conundrum. Thus, the government needs to pay special attention towards resources mobilization,

especially in securing new resources, in order to finance its economic activities (Ayenew, 2016; Terefe and Teere, 2018).

Taxation is an important instrument in fiscal policy to secure resources in order to finance different social projects, funding the health sectors and paying the government servants' salaries. The mismatch between government expenditure and limited tax revenue is more apparent as years gone by. Yet, the challenge to raise taxes in low-income countries might result in a more aggravating plight (David, 2000; Saibu and Olasunbo, 2013; Joyce, 2014; Garner, 1999; OECD, 2008). Moreover, insufficient collection of tax among East African countries, may result in deterioration of their financial institutions, baring them to external shocks (Bersley and Persson, 2014; IMF, 2015; Langford and Ohlenburg, 2016)

It is pertinent that tax policies cover the optimal strategies to ensure effective and efficient tax collection. Minimizing preferences in tax policies helps broadens tax base. It is a major source after borrowing and foreign aid for EACs. Meanwhile, effective and efficient tax administration need a special focus from the policymakers. This includes ensuring good relationship between tax administrators and taxpayers.

This paper intends to determine the sectors that contributes significantly to tax revenues of EAC member countries. This hopefully helps the EACs to identify its biggest contributors and broaden the tax base to other non-contributing sectors. The focus is to lessen the burden on one sector and securing more tax in the future for the purpose of funding public expenditure.

No doubt, foreign aids have helped EACs' economic growth in the past (Hansen and Tarp, 2001). Having said that, there is a need to lower foreign dependence through foreign aid and borrowings, so as to achieve macroeconomic stability and robust economic growth. Reflecting this, increasing tax to GDP ratio is the best policy option for these economies. As studies on East African Community tax revenues are still very scarce (Agbeyegbe et al., 2006; Kenny and Winer, 2006; Gupta, 2007; Mahdavi, 2008; Lee et al., 2012, Victor Mauricio Castaneda Rodrigues, 2018), and that we need to help them reduce other sources of revenue, this paper focuses on identifying sector laggards in the tax department. Previous studies looked at the determinants of tax revenues of individual country and most of them explored Asian and other developing countries including those by Ayenew (2016), Amoh and Adom (2017), Terefe and Teera (2018) and Al-Qudah, (2021).

When it comes to EAC, Petersen (2009) wrote a report called Tax System and Tax Harmonisation in the East African Community (EAC). Among many he covered, emphasis was on tax harmonisation and equality of taxation, especially avoidance of double taxation in the system.

Panel methods which give conclusive policy implications are needed. Panel estimation approaches are more suitable for a panel of 4 –EAC members as they share common histories and characteristics in their tax regime and systems. Thus, panel data approach is more useful in determining main determinants of tax revenues.

Previous literature of EAC that uses panel data approach is limited with only that of Terefe and Teera (2018) found thus far. This study uses panel approach and more recent data (2010-2020) as well as broader data set of explanatory variables namely GDP ratios from services, agricultural and manufacturing sectors.

An Overview of East African Community (EAC)

The cooperation between the East African countries was initially between Kenya, Uganda and Tanzania. EAC which began in 1967. Cooperation between them was renewed in 2000, when Treaty for the Establishment of East African

Community was signed, which was when the EAC was formed. On the 1st July 2005, Republic of Rwanda and Burundi became new members of EAC. South Sudan is its newest member since 2016.

See Annex: Figure 2.1 Trend of Tax to GDP ratio for EAC members

Figure 2.1 shows the tax ratio to GDP for five (5) EAC members, excluding South Sudan. Among the selected members, Kenya has the highest tax ratio to GDP while Tanzania has the lowest since 2010 to 2020. On average, the tax ratio to GDP for EAC members increased from 12 percent in 2010 to 13 percent in 2020. The tax to GDP ratio ranges between 10 percentages to 16 percentages for the last decade. The overall trend shows that, there was a slight decline in 2015, before it goes upwards again from 2016 to 2020. Better economic policies and trade openness that attracted FDI inflows as well as improvement in the manufacturing sectors within the EAC region have resulted in the improvement of tax revenue collections over the last four years (EAC, 2019).

2. Literature Review

Tanzi (1992) suggested that, import share, foreign debt share, per capita income are main determinants of tax revenues for 88 developing countries for the 1978-1988 period. Agricultural share, however, has a negative effect on tax revenues.

Bird et al. (2004) suggested that, population growth, agricultural shares, inequality and shadow economy and entry regulations all have negative effects on tax revenue of 110 developing countries. Only per capita GDP and institutional quality have positive effect.

Institutional structure of a country (justice, financial institutions, business characteristics, the quality of institutions; tax and customs administrations) has a positive link to volume of tax revenues (Brun et al., 2007). Bayu (2015), after using time series data (1974-2010) on Ethiopia for tax buoyancy and its determinants, found positive but insignificant effect of industrial on value-added share of GDP. Aggrey (2013), using time series data (1988-2008) under ARDL method, claimed that real GDP has negative and significant effects on tax revenues in the long and short runs.

Basirat et al. (2014) applied ARDL to look at determinants of tax revenues in Iran for the 1974-2011 period. A positive correlation was found for value-added industry and tax revenue but the relationship between value-added of agricultural sector and tax revenue is a negative one. Castañeda Rodríguez (2018) used static and dynamic panel method (1976–2015) and found that determinants of tax revenues include agricultural share of GDP, education, population share above 65 years, quality of government, financial intermediation and democracy.

Similarly, Wawire (2017) suggested a positive relationship between international trade and population growth and Value-Added Tax revenue in Kenya. Amoh and Adom (2017), using

time series approach on Ghana, found positive correlations between tax revenues and manufacturing value-added, services value-added, foreign direct investment (FDI), government expenditure, external debt stocks and government consumption expenditure.

Terefe and Teera (2018) suggested that, in the long run, foreign aid, share of agricultural, share of industry, GDP per capita, share of services contribute positively to tax revenues in East Africa. Only inflation and exchange rate have negative effect on tax revenues. Their sample size ranges from 1992 to 2005. Boukbech (2018) claimed that, in the early years of the new millennium (2001-2014), the value-added of agriculture and per capita GDP positively affecting tax revenues for 29 lower middle-income countries.

Piancastelli and Hirlwall (2021), after using panel data for 1996-2015 period, found GDP per capita, trade openness, financial deepening, agricultural sector and service sector to have positive impact on tax revenues. However, the effect of service sector on tax revenue was of a negative nature. Tsaurai (2021) after using GMM (2007-2017) found that, several macro-economic factors including population growth, financial development, FDI and economic growth have positive effects on tax revenue for upper middle-income countries. On the other hand, exchange rate and trade openness show negative impact on tax revenues. Al-Qudah (2021) after using ARDL method (1990-2019) in Jordan, suggested that, GDP, government expenditure and fiscal deficit have positive relationship with tax revenues in the short and long runs while, foreign aid has a negative relationship. The effects of economic openness and industrial sector on tax revenue are positive and significant in the short run but insignificant in the long run.

In summary, there is still a research gap in examining determinants of tax revenues especially for EAC members. Wawire (2017) used time series approach in Kenyan data while Terefe and Teera (2018) used panel approach on EAC members. Our study differs from previous studies by including sectors such as manufacturing, services and agricultural with more recent data (2010-2020).

3. Methodology

Conceptual Framework

Chelilah (1971) and Gupta (2007) suggested that, the process of identifying tax determinants in a model is subjective, derived from a random stage of a development, stuck in traditions and structure of the respective economy (Castañeda Rodríguez, 2018). Previous empirical studies have employed macro-economic factors such as sectoral (manufacturing, agriculture and service) shares, GDP per capita, trade openness, as a determinants of tax revenues (Chelilah, 1971; Gupta, 2007; Bird et al., 2004; Basirat et al., 2014; Amoh and Adom, 2017; Castañeda Rodríguez, 2018; Tsaurai, 2021; Piancastelli and Hirlwall, 2021).

Tanzi (1992) also found per capita income, agriculture share, trade and openness to be the determinants of tax revenue by more than 50 percent, in 8 East Asian countries. Some literature also found institutional factors such as a rule of law, entry regulations and institutional quality as determinants of tax revenues (Bird et al., 2004; Castañeda Rodríguez, 2018)

See Annex: Figure 1.0 Determinants of Tax revenues Model Specification

We derived our framework from the production function whereby dependent variables (Tax Revenue/GDP) is a function of several explanatory variables. The panel econometric equation is specified as follows

Hence, Y_{it} , assumed to be the dependent variable which is the ratio of tax revenue to GDP for country i at time t , is explained by a set of several independent variables which can be macro-economic factors, demographic factors and institutional factors represented by X . The X values are taken in two dimensions, individual and time, whereby i is the individual country and t is the time dimension ϵ_{it} refers to the individual effects, and ϵ_{it} is the error terms.

As explained in conceptual framework and Figure 1, we selected a set of macroeconomic variables, demographic factors and institutional quality as variables. The macroeconomic factors include GDP per capita, agriculture share to GDP, service share to GDP, manufacturing share to GDP. From these factors, we therefore derived the following final econometric equation;

From equation (2), we defined the variables, hypothesis, and our references as presented in Table 2. The symbol i and t implies country and time respectively.

Method of Estimation

Panel estimation methods are more suitable for a panel of 5 EAC members as they share similar history and tax regime. Due to inclusion of four (4) different countries, it is usual to note a presence of heterogeneity among the data set, as a result, a common approach of ordinary least square may not be suitable. The panel data approach allows to control for random and fixed individual differences. In a panel data, the number of countries (N) is recorded with each observation (n) is taken at different time (T) period.

The method provides great consistency over time and provide general behavior of the observations (N). The total number of observations is determined by a product of N and T ($N*T$). In this study, the time period selected is 2010-2020 ($T=11$ years). The number of “ N ” is the four main EAC members ($N=4$); Rwanda, Kenya, Tanzania and Uganda.

We used traditional panel approach of Fixed Effect (FE) and Random effect (RE). The method is suitable to control for fixed and individual differences (random) within EAC. However, before regressing with fixed panel approach, we utilized Breuch-Pagan test to identify the best approach between pooled ordinary least Square (OLS) and Fixed

Effect. Hausman test was also used to determine the best approach. If fixed effect was preferred, then the estimation results would use the Fixed Effect approach. A significant Hausman test implies Fixed Effect as the best approach.

4. Data sources and Sample size

This study retrieved secondary data from World Bank Development Indicators online database (2022). As explained earlier, the EAC was officially reformed in 2000. The sample size ranges from 2010-2020. This period was selected due to the exuberant economic growth for all EAC members and taxation revenues (EAC, 2018,2019). The sample countries are from 4 out of 6 EAC members namely Burundi, Uganda, Kenya, Rwanda and Tanzania. South Sudan and Burundi were excluded from the study due to limited data availability. Meanwhile, our total observations are 44 ($N*T$, $n=4$, $T=11$). See Annex; *Table 1 provide summary of the data sources and descriptions*

5. Findings and discussions

Descriptive statistics

Before running the regression using fixed effect panel, we initiated a descriptive and correlation analysis. The descriptive statistics for variables used in the tax determinant model are shown in Table 2 below. On average, the values of all given variables in the study have standard deviations lower than the mean value, signifying that there is no significant variation among tax determinants in the EAC region. The mean value of tax revenue for 4 -EAC members was 12.59 percent with the highest value was 15.50 percent. Kenya has the highest mean value (15.5 percent) in 2010 while Uganda had the lowest value (9.75 percent). Generally, variables standard deviations that are less than the average mean demonstrate least variation among them.

See Annex; *Table 2: Descriptive Statistics*

Correlation Matrix

Correlation of the key variables used in this study is presented in Table 3. The tax revenue correlations with economic growth (0.64) and service sector (0.61) are positive. This indicates GDP and services roles in tax bases. In contrast, negative relationships are recorded between tax revenue and agriculture sector (-0.65) as well as manufacturing sector (-0.40). This signifies their insignificant contributions to tax revenue of EAC economies.

See Annex; *Table 3: Pairwise correlation matrix*

Selected Method of analysis

The procedure of selecting an appropriate method of analysis was carefully adhered to ensure the chosen technique allows for accurate estimate of relationship between taxation and its determinants. Three traditional panel methods (Pooled OLS method, Random effect and Fixed effect model) were compared and after intensive tests, the Fixed Effect model was chosen as the most appropriate technique when its Hausman's test being statistically significant at 5 percent. Therefore, Fixed Effect model was applied to examine the impact of

various determinants of taxation on tax revenue among the EAC member states.

Regression Results: The determinants of tax revenue in EAC member states.

The results of random and fixed effects models are presented in Table 5. The fixed effect, presented in column (2), was recommended as the best approach, with statistical significance at 10 percent in Hausman's test. The adjusted R-squares for all regressions are more than 70 percent, satisfying the condition that all explanatory variables are fit to explain the variation of the tax revenue among EAC members. Also, our regression is free from the problem of heteroscedasticity as the coefficient of Breuch-Pagan test are not significant.

The results presented under fixed effect suggest that, economic growth (LnGDP) has a positive contribution (LnGDP=0.60) to tax revenues of EAC members. The random effect also shows a positive relation to tax revenue. Similar results were also reported by scholars such as Piancastelli and Hirlwall (2021) and Tsaurai (2021). This demonstrates the importance of economic development for EAC to not only improve socioeconomy of their citizens, but to boost their tax revenues. This is also in agreement with our correlation result in Table 3 which shows a strong correlation between LnGDP and LnTax (Corr=0.64).

In contrast, the agricultural sector (LnAGR=-0.15) has a negative and significant relation to tax revenues. This implies despite the growth of the agriculture sector, it retards tax revenue of EAC members. This is in line with results by Tanzi (1992); Bird et al. (2004) and Basirat et al. (2014). It is so difficult to tax the agriculture sector as it is done as traditions by many in small scale, which holds true in EAC countries (Tanzi,1992; Bird et al., 2004; and Basirat et al., 2014). Besides, in many developing countries, agricultural produce is not taxed when sold in the domestic market (Khan, 2001). Agriculture makes up a huge percentage of the Tanzania's economy but it is merely enough for domestic consumption, with challenges such as drought and lack of technology loom.

Therefore, unless agriculture focuses on export trade, its growth would not have an impact on tax revenue. Despite that, there are previous studies which found positive effect between agriculture and tax revenues (Castañeda Rodríguez, 2018; Terefe and Teera, 2018; Boukbech, 2018; Piancastelli and Hirlwall, 2021). Our correlation results also proved a negative correlation for agricultural sector (corr= -0.65) (Table 3).

As for manufacturing sector (LnMANF=0.20) it has a positive coefficient but not statistically significant. Service sector (LnSRC), on the other hand, has a negative coefficient (LnSRC=-0.10) but also not statistically significant. This implies that EAC members has to work harder in designing better policies in order to be able to secure better tax revenue from their manufacturing and services sectors.

See Annex; *Table 5: Determinants of Tax revenue in 4 EAC members*

6. Summary and Conclusion

Taxation is an important instrument in fiscal policy, used to mobilize resources in order to finance public spending. A mismatch between the ever increasing government expenditure and limited tax revenue has always left many developing countries in a conundrum. The challenge to raise tax is more prominent in low-income countries, knowing the kind of struggle the public is in and the need to promote compliance among the regular taxpayers. Insufficient collection of tax in the East African countries would result in the deterioration of their financial institutions, exposing them to external shocks.

Therefore, effective and efficient tax administration has to be the main focus of policymakers. This includes among others the maintenance of good relationship between tax administrators and tax payers and the preservation of compliance behaviour in taxpayers. Having said that, efforts to increase tax revenue to boost government coffers could be directed to factors proven to enhance it.

Several macro-economic factors have been identified as determinants of tax revenue including GDP per capita, agricultural shares, manufacturing shares, industrial share, service sector shares, and trade openness. This study looked at GDP and three economic sectors namely manufacturing, agriculture and services as determinants of tax revenue in four (4) EAC member countries, Rwanda, Kenya, Tanzania and Uganda. With data gathered from World Bank online database for the 2010-2020 period (11 years), fixed effect model was used to determine the role played by the four variables in their tax revenue.

The results suggest that, economic growth (LnGDP) has positive contribution (LnGDP=0.60) to tax revenues of the EAC members. This implies that, a growth in the economy will be in line with growth of their tax collection. Agricultural sector (LnAGR=-0.15) shows a negative but significant effect on tax revenues. This is expected as similar results have been shown by previous literature. It is because the agricultural sector is a hard sector to tax considering its traditional nature, practised by many for a living. Unless the agriculture produce is exported, those in domestic market is not taxable in many countries. As it is, the EAC face many hurdles in the sector to boost yield due to poor rainfall and lack of technology.

Unfortunately, the other two sectors show insignificant results despite manufacturing being positive (LnMANF=0.20) and services negative (LnSRC=-0.10). This implies a lack of tangibility, which explains the poor revenue collection drawn by the EAC members. Whilst agriculture is a sector facing many challenges to increase yield, let alone export, EAC needs to work hard to formulate better policies concerning manufacturing and service sectors that would in turn promote tax revenues. Whilst economic growth generates more tax revenue, it also demands more public spending (Tanzi, 2001). The current average 13% tax-to-GDP ratio held by the EAC is

2% lower than the ideal level recommended by the World Bank. Thus, it is imperative that the tax policy be amended to increase collection or any loophole be closed by reducing evasion.

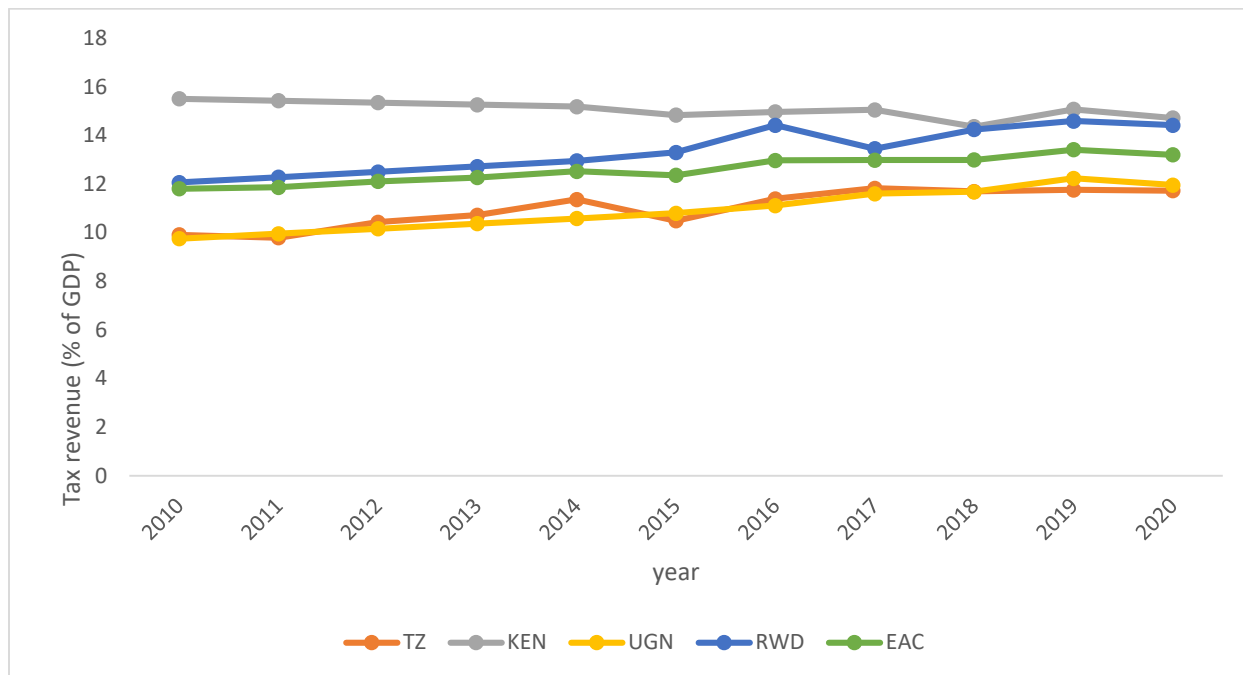
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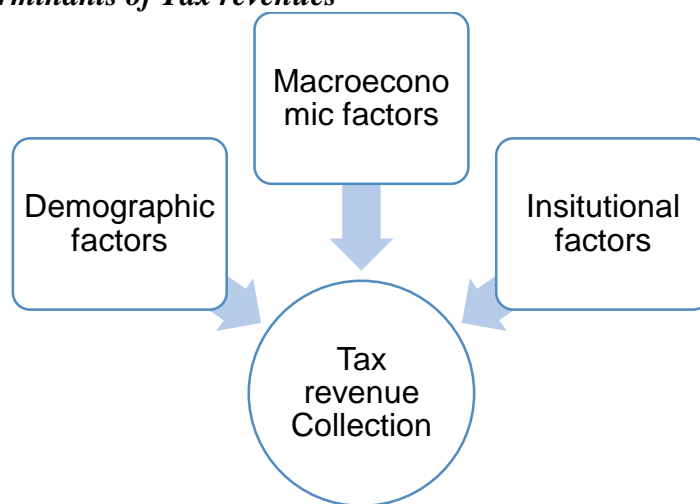
Annex

Table 1. Summary of variables, their hypothesized signs and explanations



Source: Author’s calculation

Figure 1.0 *Determinants of Tax revenues*



Source: Author’s compilation from literature

Table 2: Descriptive Statistics

	TAX	LnMAN F	LnGDPC	LnSRC	LnAGR
Mean	12.59	10.52	6.82	47.10	24.13
Std. DEV	1.89	3.45	0.24	6.27	3.18
OBS	44	44	44	44	44

Source: Author's Calculation.

Variable	Description	Measurements	Previous Authors	Data Source	Hypot hesis
Dependent variable					
TR	Total revenue measures the effectiveness of a country's tax collection	Ratio of Total Tax Revenue to GDP (US\$)	Tanzi (1992), Amoh and Adom (2017), Piancastelli and Hirlwall (2021)	World Bank (2021)	
Independent Variables					
GDP	The income per capita shows how the income levels of people contribute to tax revenue	GDP per capita (US\$)	Boukbech (2018), Tsauroi (2021)	World Bank (2021)	+
MF	Manufacturing sector performance	Manufacturing share to GDP (US\$)	Tanzi (1992), Basirat et al., (2014), Amoh and Adom (2017),	World Bank (2021)	+
AGR	Agriculture sector performance	Agricultural share to GDP (US\$)	Boukbech (2018), Piancastelli and Hirlwall (2021)	World Bank (2021)	+/-
SRC	Services sector performance	Service sector share to GDP (US\$)	Piancastelli and Hirlwall (2021). Amoh and Adom (2021)	World Bank (2021)	+

Table 3: Pairwise correlation matrix

Variables	Tax	LnGDPC	LnAGR L	LnAGR	LnMAN F
Tax	1.0000				
LnGDPC	0.6459	1.0000			
LnAGRL	-0.6575	-0.6408	1.0000		
LnSRC	0.6186	0.5520	-0.5900	1.0000	
LnMANF	-0.4088	-0.0675	0.0454	-0.1531	1.0000

Source: Author Compilation

Table 5: Determinants of Tax revenue in 4 EAC members

	[1]	[2]
	Random Effect Model (REM)	Fixed Effect Model (FE)
LnMANF	-0.1714 [0.0373]	0.2063 [0.13093]
LnSRC	0.1397 [0.0336]	-0.1084 [0.0811]
LnAGR	-0.1426** [0.0710]	-0.1545** [0.0331]
LnGDP	1.6817** [0.6784]	0.6019** [1.2586]
C	-0.2204 [6.0296]	-27.702 [12.1250]
Hausman	(19.0)*	
LM test	(0.90)	
Adj_R-square	0.8272	0.7017

Source: Author's computation