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Does the Structure of SSA Economies Explain Their Low Stock Market Capitalization and Small Number of Listed Companies? A Dynamic Panel Analysis

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Abstract
Excluding South Africa, the number of listed firms and stock market capitalization in Sub-Saharan Africa (SSA) has remained relatively low and practically static. This study develops and tests a theoretical model using a dynamic panel analysis. Increases in the agricultural and service sectors have slight adverse effects on the number of listed companies. Industry and services are found to have a positive influence on market capitalization. In contrast, the externality and network effects of the service sector negatively influences capitalization. Both capitalization and number of listed firms have a dynamic relation with their past values. The results suggest that number of listed firms may be less sensitive to market variables.
Keywords: Stock market, Sub-Saharan Africa, Structure of the economy.
JEL: E44, G10, O16.

1. INTRODUCTION

Sub-Saharan Africa (SSA) is one of the least developed regions. To remedy this, a number of stock exchanges were established in the latter half of the 1990s to encourage rapid industrialization and growth (Singh, 1999). The underlying objective was to attract foreign and local capital to stimulate speedy significant domestic real investment. This, however, has not been completely achieved (African Securities Exchange Association, 2017). In the first place, the number of operating stock markets in SSA still remains at 18, less than half the 45 countries in the sub-region. Added to this, most of the SSA stock markets have relatively few listed firms and low market capitalizations. Some of reasons for these include: high cost of doing business, inadequate and inappropriate infrastructure, inappropriate fiscal and monetary policies, economic and political instability as well as weak domestic political governance and institutions (Yartey and Adjasi, 2007c). Other factors are: as well as potential state appropriation of private property. Additionally, and obsolete technologies limit expanded stock market capitalization (Cherif and Gazdar, 2010; Yartey, 2008).

The problem statement of this paper is indicated the observation that even after significant economic and related reforms as well as enhanced governance and institutional development, SSA stock markets have improved but not as expected (Allen, Otchere, and Senbet, 2011; African Securities Exchange Association. 2017). This is despite having some of the highest economic growth rates in the world. The study notes a literature gap in existing studies. As such, while acknowledging the significant contribution of prior literature, this study delves and extends deeper into general economic theory linking the macro economy and financial markets by hypothesizing that the structure of SSA economies restricts rapid stock market development because they are largely commodity and primary goods producers. The study infers that economies with such an economic structure lack critical demand for the type of capital offered by stock markets. Therefore, stock exchanges respond by staying small, stunted and illiquid. Moreover, low per capita income earned from raw and semi-processed goods produced in these economies, results in insufficient domestic supply of investable funds for rapid stock market development.

This study adds to existing body of knowledge. The study, therefore, begins with an introduction. The second chapter critically reviews relevant literature. The third section explains the analytical methodology and data used herein. Chapter four presents the results of the analysis and discusses the findings. The final section concludes and summarizes.

2. LITERATURE REVIEW

Theoretically, determinants of stock market development may be categorized into two, namely: economic and institutional or legal. Additionally, they can be classified as demand or supply-side factors (Andrianaivo and Yartey, 2009). Institutional economics posits that stock markets are financial systems where contracts between participants are traded (Cherif and Gazdar, 2010). Therefore, the underlying legal and regulatory environment is critical to stock market development. The former determine governance and institutional quality. The institutional economics school of thought, therefore, emphasizes enforcement of laws and regulations, political stability, private property rights and rule of law (Yartey, 2007a). These institutional factors determine the costs and income of financial transactions on stock markets. Furthermore, basic facilities and infrastructure are essential (Yartey, 2007b). They minimize the costs and risks inherent in financial markets. Such also encourage

market development as its aids in effective functioning of markets. Therefore, there is more efficient information dissemination and sharing, price discovery and rationing of goods, services as well as resources. These have been confirmed empirically by: Asaolu Ogunmuyiwa (2011), Cherif and Gazdar (2010), Yartey (2007a); Yartey, (2008).

A direct causal relation exists between economic factors and stock markets (Beck, Demirguc-Kunt and Levine, 2003; Ben Naceur *et al.*, 2007; Levine and Smith, 2001; Yartey, 2008). This occurs in a number of ways. Firstly, listed firms are part of the economy. Therefore, as the economy expands, demand for their products and services rises. Their current earnings and future prospects improve, with a resultant rise in their capitalization, the present value of their earnings, future prospects and underlying assets (Osamwonyi and Evbayiro-Osagie, 2012). Some critical macroeconomic variables identified include: inflation, interest rates, per capita income, risk and savings rate (Boako, Omane-Adjepong and Frimpong, 2016). This school of thought assume that economic growth stimulates stock market development. However, several SSA countries have had significant annual growth over the past decade and yet their stock market development is marginal. This suggest that growth alone is insufficient. On the whole, empirical studies have confirmed the critical importance of macroeconomic factors (Yartey, 2007a)

A derivative of business cycle theory states that encouraging economic conditions favor the issuance of financial instruments to raise capital to finance production (Alam and Uddin, 2009; Naes, Skjeltorp and Odegaard, 2011; Rebelo, 2005). Such promising economic conditions reinforce positive market expectations of the fortunes of existing companies, highlighted by their increasing capitalization and eventual number of listed firms.

Development and macroeconomic theories postulate that less developed economies are characterized by low value-added output (Todaro and Smith, 2012). This is because they mainly depend on the contribution of agriculture and primary production to national output. However, enhanced processing and value-added to primary goods and services creates demand for investment capital and funds. Consequently, firms issue more securities to fund enlarged production.

Externality and system theories, also, indicate that in networks, component parts are interconnected. As a result, the economy and its stock market are two interrelated networks. The economy exerts significant externalities on the latter (Barabási, 2002; Barabási and Réka, 2002; Barabási, Newman and Watts, 2006). Economic development theory posits that greater industry value added has more enhancing externalities on other systems, such as financial markets. These externalities may include better infrastructure, efficient resource utilization, more advanced applied technology and stable energy.

3. ANALYTICAL FRAMEWORK, DATA AND METHODOLOGY

3.1 Analytical framework:

Economic theory states that an economy may be categorized into the following sectors: primary (*A*), industry (*I*) and service (*S*). Let VA_i denote the contribution or value added of sector *i*. Using the gross domestic product (GDP) accounting approach: $GDP = VA_A + VA_I + VA_S$ (Blanchard and Johnson, 2013). If $VA_A > VA_I$ and $VA_A > VA_S$, the country may be termed as agrarian or agricultural. To normalize the equation, it is divided by *GDP*.

Assume that stock market capitalization, $M.C_i$, is the present value of assets as well as current and future earnings of listed firms at time *i*. Let $M.C_i$ be the sum of the present value (*PV*) of last year's market capitalization, $M.C_{t-1}$, and that of the current and future years' capitalization, $\sum_{t=1}^{\infty} M.C_{t+0}$. Therefore,

$$M.C_i = PV[M.C_{t-1}] + PV[\sum_{t=1}^{\infty} M.C_{t+0}] \quad (1)$$

Using an expectation formulation, $E(M.C_i) = E(PV[M.C_{t-1}]) + 0$, because $PV[\sum_{t=1}^{\infty} M.C_{t+0}]$ is a random stochastic term. Let P_A, P_I and P_S be the average price of primary, industrial and service commodities

respectively. Assume that $P_I > P_S$ and $P_I > P_A$. Further, $0 < P_I$, P_S and $P_A < +\infty$. Let $\pi_I = \frac{1}{1-P_I}$ be the multiplier estimating the effect of industry value added on *M.C*. Assume that π_A and π_S are similarly defined. As well, suppose that $M.C_i = f(V.A_A, V.A_I, V.A_S)$. Consequently:

$$E(M.C_i) = \pi_A VA_A + \pi_I VA_I + \pi_S VA_S \quad (2)$$

Incorporating externality and network theories, equation (2) becomes:

$$E(M.C_i) = \pi_A VA_A + \pi_I VA_I + \pi_S VA_S + (1 - e^{A,HDI}) + (1 - e^{I,HDI}) + (1 - e^{S,HDI}) \quad (3)$$

In equation (3), $\log_{VA,A}^{MC,A}$, $\log_{VA,I}^{MC,I}$ and $\log_{VA,S}^{MC,S}$ denote the externality and network effects of the following respective sectors: agricultural or primary, industry and service. They indicate the influence on market capitalization.

If $M.C_i$ is approximated by the product of average market capitalization, $\overline{M.C_t}$, and number of listed firms, n_i, then $n_i = \frac{M.C_t}{\overline{M.C_t}}$. Therefore, when considering how the structure of an economy determines number of listed companies, equation (3) becomes:

$$n_i = \xi_{A,M.C} + \xi_{I,M.C} + \xi_{S,M.C} + \varphi^{HDI,A} + \varphi^{HDI,I} + \varphi^{HDI,S} \quad (4)$$

Note, however, that in equation (4), $\frac{\pi_A V.A_A}{\overline{M.C_t}} = \xi_{A,M.C}$; $\frac{\pi_I V.A_I}{\overline{M.C_t}} = \xi_{I,M.C}$; $\frac{\pi_S V.A_S}{\overline{M.C_t}} = \xi_{S,M.C}$; $\frac{(1-e^{A,HDI})}{\overline{M.C_t}} = \varphi^{HDI,A}$; $\frac{(1-e^{I,HDI})}{\overline{M.C_t}} = \varphi^{HDI,I}$ and $\frac{(1-e^{S,HDI})}{\overline{M.C_t}} = \varphi^{HDI,S}$.

Equations (3) and (4) incorporate externality and network theories.

3.2 Data

The variables used in this study are: agriculture value added to GDP ratio, human development ranking, industry value added to GDP ratio, number of listed firms, services value added to GDP ratio and stock market capitalization to GDP ratio. The study covers the years 1990-2017. The year 1990 is selected because majority of SSA stock exchanges were established in or just after that year. The examined SSA economies are: Botswana, Cote d' Ivoire, Ghana, Kenya, Malawi, Mauritius, Namibia, Nigeria, South Africa, Swaziland, Uganda, Zambia and Zimbabwe. All other countries were excluded because of insufficient data. The study uses STATA 16 for its analysis. The panel dataset is unbalanced as the said stock exchanges were established in disparate years. The data is obtained from United Nations Development Program (2017) and World Bank (2017).

3.3 Analytical methodology:

In associated studies, Adelegan (2008) uses an event study methodology while Boako, Omane-Adjepong and Frimpong (2016) use a Bayesian quantile regression methodology and causality analysis. However, other related empirical research use dynamic panel econometric analysis based on the Generalized Method of Moments (GMM) approach outlined in Arellano and Bond (1991) and Kiviet, Pleus and Poldermans (2016). The following studies use a similar mthodology: Andrianaivo and Yartey, 2009; Asaolu and Ogunmuyiwa, 2011; Cherif and Gazdar, 2010; Gwama, 2014, Huang (2010) and Yartey (2008). Consequent to this, the GMM modifications to equations (3) and (4) become (5) and (6) respectively denoted hereafter:

$$M.C_{t-1} = M.C_{t-2} + \pi_A VA_A + \pi_I VA_I + \pi_S VA_S + (1 - e^{A,HDI}) + (1 - e^{I,HDI}) + (1 - e^{S,HDI}) \quad (5)$$

$$n_i = n_{t-1} + \xi_{A,M.C} + \xi_{I,M.C} + \xi_{S,M.C} + \varphi^{HDI,A} + \varphi^{HDI,I} + \varphi^{HDI,S} \quad (6)$$

4. ANALYSIS, FINDINGS AND RESULTS

4.1 Pre-regression diagnostic tests

i. Multi-collinearity:

Table 1 presents the following computed multi-collinearity test indicators for all considered variables: condition index, eigenvalue, r-squared, tolerance factor, variance inflation factor (VIF) and VIF square root (Gujarati, 2009; Huang, 2010; Wooldridge, 2013; Yartey, 2008).

Table 1: Multi-collinearity tests

Variable	VIF	VIF square root	Tolerance factor	R-squared	Eigen-value	Condition index
Agriculture value-added	1.42	1.19	0.70	0.30	1.54	1.16
Industry value-added	1.69	1.30	0.59	0.41	1.19	1.31
Services value-added	1.18	1.09	0.85	0.15	1.00	1.43
Stock market capitalization	1.45	1.20	0.69	0.31	2.06	1.00
Number of listed companies	1.20	1.10	0.833	0.17	0.99	1.45
Agricultural sector externality	1.15	1.07	0.86	0.13	0.98	1.45
Industrial sector externality	1.00	1.00	0.99	0.00	0.89	1.52
Services sector externality	1.04	1.02	0.97	0.03	0.33	2.50

Source: own computation (2017).

All the VIFs are greater than 0.10 and all less than 10 (Gujarati, 2009; Huang, 2010; Wooldridge, 2010). This means there is no multi-collinearity. The condition indices, eigenvalues and tolerance factors further confirm this.

ii. Stationarity:

Table 2 has the panel stationarity test results for each variable. Because an unbalanced panel data is used, the Fisher-type augmented Dickey-Fuller (ADF) and Philps-Perron stationarity indicators are computed. The underlying null hypothesis states that the examined variables have a unit root. The alternative hypothesis, asserts that the panel is stationary. The applicable p-value is 5 percent. Table 5 indicates that the considered variables are stationary (Asaolu and Ogunmuyiwa, 2011; Gujarati, 2009; Huang, 2010; Wooldridge, 2013; Yartey, 2008, Yong and Shaowen, 2001).

Table 2: Panel stationarity tests

Variable	ADF statistic	P-value	Philip-Perron Statistic	P-value
Agriculture value-added	91.54	0.00	52.85	0.00
Industry value-added	73.99	0.00	43.03	0.00
Services value-added	66.40	0.00	38.86	0.00
Stock market capitalization	38.13	0.00	23.15	0.00
Number of listed companies	45.72	0.00	26.42	0.00
Agriculture value-added externality	38.27	0.00	22.08	0.00
Industry value-added externality	37.39	0.00	22.30	0.00
Services value-added externality	52.50	0.00	36.74	0.00

4.2 Empirical results

i. *Number of listed companies:*

Table 3 reports the Arellano-Bond dynamic panel regression results. The results reveal that there is a positive marginal dynamic relation between current and past number of number of listed companies. However, this momentum effect is slight (Alam and Uddin, 2009; Andrianaivo and Yartey, 2009; Hardouvelis, G.A. 1988).

In line with development and macroeconomic theories, agriculture value added is found to have an adverse effect on number of listed firms (Gwama, 2014; Todaro and Smith, 2012). Although it has less than a unit proportionate effect, it means that an undue expansion of agriculture's contribution could retard stock market development as less firms would list on the exchange.

Table 3, further illustrates that services has a similar effect as agriculture value-added. A possible reason for this could be that there may be a dominance of basic services in Africa, such as retail and trade, that is debilitating to the number of listed firms. There may be negative demand and supply-side effects of the two

sectors on the number of listed firms (Laopodis, 2006). On the one hand, the agricultural and service sectors in SSA are highly informal and small-scale. They are, additionally, formally unregistered and managed by a single owner / manager. Informal enterprises in these sectors do not intend to list on the stock exchange (Yartey and Adjasi, 2007c). They are mainly established to provide a source of income and livelihood for the individual, nucleus family and / or close relatives. As such, they are engaged in subsistence farming or production. They may also not be willing to share control with external shareholders (Kenny and Moss, 1998; Okeahalam, 2001; Singh, 1999).

Table 3: Number of listed companies regression results – Dynamic panel regression results

Variables	Coefficient	Standard error	Z-statistic	P-value
Lagged number of listed firms	0.05	0.01	3.74	0.00
Agriculture value-added	-0.45	0.23	-1.96	0.05
Industry value-added	-0.09	0.17	-0.53	0.59
Services value-added	-0.31	0.08	-3.92	0.00
Agriculture value-added externality	0.00	0.00	0.17	0.87
Industry value-added externality	0.00	0.00	0.35	0.73
Services value-added externality	0.00	0.00	1.15	0.25

Table 4 presents the salient regression diagnostics. The Wald statistic is significant with a p-value of 0.00. The Sargan test statistic indicates that the over-identifying restrictions are valid. As such, the regression model is not over-identified. The first-order autocorrelation Arellano-Bond test illustrates that there is no first-order autocorrelation. The same results are found for the second-order autocorrelation test. As well, the Breusch-Pagan Lagrange multiplier test confirms that the fixed effects best explain the relation between the dependent and independent variables (Gujarati, 2009; Huang, 2010; Kiviet, Pleus and Poldermans, 2016; Wooldridge, 2010).

Table 4: Dynamic panel regression diagnostic indicators

REGRESSION DIAGNOSTIC INDICATOR	VALUES
Wald-statistic	37.10
P-value	0.00
Sargan test (H_0: over-identifying restrictions are valid)	5.32
P-value	1.00
Arellano-Bond test (H_0: no autocorrelation) – first order	-0.20
P-value	0.83
Arellano-Bond test (H_0: no autocorrelation) – second order	-1.20
P-value	0.23
Breusch-Pagan Lagrange multiplier test (H_0: random effect is dominant)	46.22
P-value	0.00

ii. Stock market capitalization:

This segment concentrates on the effect of the economy's structure on stock market capitalization. The dynamic panel regression results are presented in table 5. Similar to the results on number of listed firms, there is a dynamic relation between past and current market capitalization. This confirms the findings of Hardouvelis (1988), Huang (2010); Naes, Skjeltorp and Odegaard (2011). It highlights a potential momentum effect of past capitalization. Comparatively, the dynamic effect of capitalization is more significant than that of number of listed companies.

Industry value added is found to have a slight positive effect on market capitalization. This confirms the previously highlighted business cycle, development and macroeconomic theories. Consequently, capitalization is not sensitive to industry's contribution in SSA (Afful and Okeahalam, 2005; Allen, Otchere and Senbet, 2011; Irving, 2000; Singh, 1999; Yartey, 2007b)

Capitalization, however, is more sensitive to the contribution of services. It has a more significant multiplier of 2.87 compared to that of industry, 0.03. (Yartey and Adjasi, 2007c). This is opposite to the conclusions of theoretical literature. Past studies assert that relative to the service sector, industry should have a more significant effect on both market capitalization and number of listed firms (Blanchard and Johnson, 2013; Todaro and Smith, 2012). However, in SSA, the opposite is found for services. This indicates that the structure of SSA economies is not in tandem with development and macroeconomic theories.

Table 5: Stock market capitalization (dependent variable) regression results

Variables	Coefficient	Standard error	Z-statistic	P-value
Lagged stock market capitalization	0.28	0.02	13.16	0.00
Agriculture value-added	-0.62	0.65	-0.94	0.35
Industry value-added	0.03	0.01	4.99	0.00
Services value-added	2.87	0.23	12.51	0.00
Agriculture value-added externality	0.00	0.00	1.27	0.20
Industry value-added externality	0.00	0.00	0.13	0.89
Services value-added externality	-0.01	0.00	-2.87	0.00

In contrast, the externality and network effects of services on capitalization was found to be marginal and negative, -0.01. This contrasts the conclusions and predictions of the theories discussed in the literature review (Barabási, 2002; Barabási and Réka, 2002; Barabási, Newman and Watts, 2006). One possible reason is that the services sector in SSA is highly fragmented. Additionally, it requires relatively little setup as well as operational costs. There is, therefore, little impetus to produce on a large scale requiring the flotation and issuance of securities. It may be that services in SSA are based on rudimentary technology that rather increases the costs and risks of contracts and transactions in formal financial markets, such as the stock market. As such, left to itself, it does not encourage financial deepening. This means that both the economy and stock markets in SSA are individually incomplete and inappropriately functioning network.

This, however, is expected to change as the influx of information and communication technologies has allowed African economies to leapfrog significant bottlenecks in its economic development. Former financially excluded individuals can now easily surmount existing obstacles. These technologies have significantly decreased contract and transaction costs (Gwama, 2014; Mbulawa, 2015; Williamson, 2005). Despite their rapid uptake by significant portion of the populace, there is still little or no integration of some of these platforms into SSA stock markets (Allen, Otchere and Senbet, 2011).

Table 6: Stock market capitalization (dependent variable) regression diagnostics

REGRESSION DIAGNOSTIC INDICATOR	VALUES
Wald-statistic	65.67
P-value	0.00
Sargan test (H_0 : over-identifying restrictions are valid)	7.52
P-value	1.00
Arellano-Bond test (H_0 : no autocorrelation) – first order	0.39
P-value	0.69
Arellano-Bond test (H_0 : no autocorrelation) – second order	0.11
P-value	0.90
Breusch-Pagan Lagrange multiplier test (H_0 : random effect is dominant)	76.41
P-value	0.00

Table 6 has the relevant regression diagnostics for the market capitalization analysis. The Wald statistic highlights that the regression is correctly specified as well as functionally appropriate. It has a p-value of 0.00. From the Sargan test results, it may be concluded that the regression model is not over-identified. Both the first- and second-order Arellano-Bond tests reveal that there is no autocorrelation (Gujarati, 2009; Huang, 2010; Kiviet, Pleus and Poldermans, 2016; Wooldridge, 2010). Additionally, the Breusch-Pagan Lagrange multiplier test demonstrates that, similar to the number of firms regression, fixed effects best explain the influence of the considered variables on market capitalization in SSA.

A comparison of tables 3 and 5 suggests that the number of companies listed on a stock exchange in SSA is less sensitive to the examined factors. This implies that they are not determined by economic and market determinants. Also, the industrial sector has no influence at all on the number of listed firms. Possibly, other variables such as the cultural, personality or taste and preference characteristics of the Chief Executive Officer, Board Chairman or significant shareholders are more influential in determining whether a privately held company floats its shares to the public. This may explain the number of listed firms on SSA stock exchanges have increased marginally annually, compared to more significant increases in their market capitalization.

5. CONCLUSION AND SUMMARY

This study investigated the hypothesis that it is the structure of SSA economies that is responsible for their few

listed companies and relatively small market capitalizations. The study first develops its own analytical framework. Subsequent to this, it gathers data on pertinent variables and computes dynamic GMM panel econometric regressions.

The results indicate that number of companies listed is not as affected by the structure of the economy and the pertinent externality or network effects. On the other hand, it is found that market capitalization is more sensitive to the service industry than the industrial sector. Further, it is slightly adversely impacted by the externality and network effects of the service sector. Both market capitalization and number of listed companies have a dynamic relation with their past values. It is hoped that the findings of this paper will stimulate further research.

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