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*Corresponding author: Kathryn A.A.O Assefuah, University of Professional Studies, P. O Box LG 149, Legionowo, Ghana
E-mail: kathy_by_grace@yahoo.co.uk

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David McMillan, University of Stirling, Stirling, UK

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Pension funds and capital market development in Africa: The role of institutional quality

Kathryn A.A.O Assefuah[1]*, Joshua Y. Abor[2], Saint Kuttu[2] and Lordina Amoah[2]

Abstract: This study investigates the effect of pension funds (PF) and institutional quality (IQ) on capital market development in 48 African countries. Using a system GMM regression, the study found that the interaction between PF and IQ significantly negatively affects capital market development. The results of the study suggest that PF in Africa contributes positively to overall financial development, and pension fund managers (PFM) seem to be focusing more on other financial market assets than capital markets. It was concluded that IQ may act as a risk management tool. It is therefore recommended that policies on strong IQ should be put in place to enable fund managers to meet their obligations towards the principal (contributor) during retirement. The study recommends that policymakers should integrate the capital markets by ensuring the cross-listing of some of the national exchanges and cross-border investment and also encourage investments in alternative asset classes.

Subjects: Public Finance; Investment & Securities; Pensions; Risk Management

ABOUT THE AUTHORS

Kathryn A. A. O. Assefua is a lecturer with the Banking and Finance Department at the University of Professional Studies, Accra. Kathryn's interests are in the areas of Pensions, the informal sector, financial inclusion, risk management, and insurance.

Joshua Y. Abor is a Financial Economist, qualified Accountant, and Professor of Finance at UGBS. His research interest includes banking and finance, monetary policy, development finance, FinTech and financial inclusion, SME finance, corporate finance and governance, international trade finance, and international financial flows and growth.

Dr. Saint Kuttu is a Senior Lecturer in Finance and Risk Management at UGBS and has interest in Financial Risk and Volatility Modeling, Empirical Asset Pricing, Financial Econometrics, Empirical Corporate Finance, and Inclusive Growth.

Dr. Lordina Amoah is a Senior Lecturer at the Finance Department of UGBS and her research interest span sustainable/green finance, small business, corporate finance and governance, and financial market development.

PUBLIC INTEREST STATEMENT

Pension funds offer numerous advantages to retirees as well as the general economy. Over the past few years, African pension funds have experienced substantial development. Fund managers may invest funds in assets like stocks in their pursuit of higher returns. However, because funds of this kind are so important, fund managers must exercise caution while making investments with them in order to fulfill their duties to contributors. This study examined the role of institutional quality on pension funds and capital market development. It came to the conclusion that fund managers are more likely to invest in other financial market assets than stocks in an environment with strong institutional support. Therefore, it is crucial that African leaders prioritize the growth of the financial market.

1. Introduction

Many countries migrated from the single pillar system, where contribution was limited to a few (especially public sector workers only), to the three-pillar system proposed by the World Bank, which includes pensions for both public and private workers. Contributions to these schemes have been extended to include informal sector workers, leading to an increase in the overall pension contributions.

The various reforms and flexibilities (expansion in coverage and simplification of pension regulations) resulted in an 8% rise of annual rate in the pension industry in Africa. Nigeria and East Africa, in particular, have witnessed a 20% increase in the previous year's funds (PwC (PricewaterhouseCoopers), 2015). In 2017, approximately USD 41.355 trillion of assets were managed by pension funds Antonelli & Watson (2018). As more workers contribute to pensions, assets grow and funds may be invested in areas that facilitate development and enable contributors to earn their benefits. According to the OECD (2021) Global Pension Study, the assets held by pension funds exceeded USD 56 trillion globally, an increase of 11% from the 2019 statistics of which Africa holds about $700 billion (Soumaré, 2020) (see, Table 5).

Once more, it was observed that assets from the defined contribution and personal plans grew faster than those from the defined benefit plans. Two primary asset types—bonds and equities—provided an average rate of return on real investment of 3.5% (OECD, 2021). Financial markets refer to platforms where individuals and groups perform transactions such as the exchange of goods, securities, and contracts. Frequently, these places may be classified as secondary markets, which include capital markets. One aspect of the financial market where pension funds may be invested is the capital market. According to the World Bank (2020), capital markets refer to the type of financial system that channels an economy's savings to those who require capital.

Globally, capital markets are estimated to be USD 178 trillion in size, making them one of the most powerful drivers of economic growth and wealth creation. One of the key investors in the capital markets is pension funds (World Bank, 2020). Comparison of nominal market capitalization showed that South Africa, Morocco, Egypt, and Nigeria encompass the top four stock exchanges in Africa. Each of these countries has a market value that exceeds $30 billion. However, where data is available, the majority of African stock markets have capitalizations under $6 billion (PwC, 2020). The market capitalization to GDP ratio of South Africa (235%) is greater than the average value of the high-income countries (118.98), and this high percentage may be attributed to the higher number of listed companies (365) and variety of instruments offered by the exchanges (see, Table 6). Bonds and equities market accounted for almost 75% of pension fund investment at the end of 2020 (OECD, 2021; see, Table 7). A number of studies have also reported that there is a positive effect of pension funds on capital market development (see, for example, Bayar & Kilic, 2019; Enache et al., 2015; Moleko & Ikhide, 2016; Zubair, 2016). Capital markets tend to provide more appealing investment alternatives than bank deposits in terms of profits, but the risk involved is higher. Again, the availability of a diverse range of instruments enables capital markets to offer investors a diversified portfolio, thereby contributing to risk management. This is because higher rates of return are required to assure appropriate payouts in the future, which is especially important for pension funds and insurance firms in nations with young populations. Nonetheless, this must be done cautiously owing to the fact that the funds are crucial. Further, developed countries and growing economies in Eastern Europe and Latin America have benefited from substantial work in the areas of pensions and capital market development as compared to the developing economies

First, the study expects that a healthy pension fund market tends to suppress the risky behavior of participants in the capital market, and thereby helps reinforce a desirable relationship between pension funds and the capital market. Likewise, institutions have better mechanisms and capacity to protect the interest of retirees and help maintain a strong capital market. Institutional quality is imbedded in growth. According to modern growth theory, institutional quality can address rent-seeking behaviour, and this is likely to produce a positive growth (North, 1990).

Research on the role of institutions on pension funds-capital market development nexus is scarce. Moreover, the few studies were focused on the direct effects of institutions on capital market development. For example, Eke et al. (2018) found that regulatory quality Granger-caused market capitalization in short-run and market capitalization respond negatively to regulatory quality. Agyemang et al. (2018), on the other hand, found that high institutional quality is relevant in explaining financial market variables such as ease of access to loans and venture capital availability. Manasseh et al. (2017) indicated the existence of a favorable relationship between institutional quality and stock market, and also found that control of corruption and democratic accountability is a key institutional quality indicator for stock market development.

The study adds to existing literature by examining the role that institutional quality plays in the pension funds-capital market development nexus. The rest of the paper is organized as follows: Section 2 provides a review of the literature, Section 3 describes the methodology employed in this study, Section 4 discusses the results of the study, and Section 5 concludes the study by providing relevant recommendations.

2. Literature review

Pension schemes worldwide experience challenges in their setup, management, and distribution of benefits to members. Many stakeholders, who are part of every scheme, have expectations and these expectations ought to be met without compromises. Institutions have the ability to limit the options available to actors. The work of Strumskis and Balkevičius (2016) examined the integration of the interests of participants of second pillar pension as well as fund managers. They argued that for this to be possible, measures must be considered by the state and fund managers to reduce risk. Again, the stability of the pension accumulation system must be ensured to protect the interests of participants. Also, for participants to have understandable information that reflects real performance results, it is prudent that all interested parties have mutual confidence in each other. Given that the ability to earn an income may be completely or partially lost in old age (ILO, 2010a), pensions are crucial for reducing poverty among the elderly, maintaining economic stability and addressing social inequalities (ILO, 2017; Juergens & Galvani, 2020; Stewart & Yermo, 2009). Recently, the inclusion of institutional quality in the growth model has become a common practice (Agyemang et al., 2018; Alesina & Eliana, 2005; Barro, 1997; Eke et al., 2018; Hu et al., 2010; Knack & Keefer, 1995; Manasseh et al., 2017; Rigobon & Dani, 2005; Robert & Charles, 1999; Stroup, 2007). One of the primary arguments in favor of the World Bank model is that pension reform contributes to the growth of capital markets. Davis (1995), Davis (1998c), 2000a and 2003c) examined pension funds and capital markets extensively and particularly in EU countries. Similarly, other early researchers like Holzmann (1997), Catalan et al. (2000), and Impavido et al. (2003) posited that the effect of pension funds on the stock market was phenomenal. Every economy needs investment for longer-term growth and development. Capital market is a medium through which funds are mobilized and allocated for growth and development (Osaze, 2000). Additionally, crucial to the growth of the capital markets and the enhancement of liquidity are pension funds (United Nations, 2019a). For example, Enache et al. (2015) discovered that market capitalization in 10 countries in Central and Eastern Europe increased because of pension fund assets, and Thom (2014) indicated that South African pension funds have improved liquidity and reduced volatility of stock markets. In the same vein, Ertuğrul and Gebeşoğlu (2020) examined the effect of pension funds on Turkish national savings and found that pension funds boosted the national savings. Babalos and Stavroyiannis (2020), on the other hand, concluded that pension fund investments in equities strengthened and increased the stock market development in several

economies when they used Panel VAR to examine the relationship between pension funds and the stock market development in OECD nations. Moreso, Miloş (2012) studied the spillover effects of pension funds on capital markets and found a positive connection between the latter and the former with panel data regression in an old member state of the European Union. This was confirmed by Zubair (2016) who also found a positive relationship between pension fund investments and the capital market.

Bayar and Kilic (2019) found that pension funds affected stock market development in the long term whilst Daradkah et al (2020)) found no statistically significant relationship between pension funds and capital market development in the short run. On the contrary, Moleko and Ikhide () found a positive relationship between pension savings and stock market development but no long-run relationship between pension savings and bond market development. This was achieved by using an ARDL bound-testing approach to investigate the long-term relationship between pension funds and capital market development. In confirmatory studies, Sanusi et al. (2021) concluded that pension funds have no statistically significant effect on the overall investment levels and growth of the South African economy. Nageri et al. (2019), in contrast, discovered a long-term cointegration between variables. Some short-run causalities running from pension funds and inflation to the capital market were reported. That was, however, not the same for real interest rates. Prudent investment, management planning, and policies were required to encourage investors in the Nigerian capital market. Meng and Pfau (2010) posited that the level of financial development is important in determining the success of the funds thus, the higher the level of financial development, the greater and more substantial the impact of pension funds on Capital Markets (CM). Hu (2012) confirmed this and found that pension funds positively affect financial sector development. Bijlsma, Bonekamp, Bijlsma et al. (2018), however, used data from 69 manufacturing sectors across 34 OECD countries between 2001 and 2010 to explore the differential effect of pension funds on the growth of firms that are dependent on external financing. They concluded that higher pension savings are linked to the faster growth of businesses that depend on external financing.

With a dataset of 59 countries, which they divided into OECD and non-OECD coupled with the addition of variables like the banking sector, bonds, and the stock market, Zandberg and Spierdijk (2013) investigated the link between pension assets and economic development. However, there were discrepancies that indicated pension funds may lead to financial development primarily through capital markets, although the link between the two might not translate to a positive growth impact. They argued that earlier studies failed to control for capital market returns of pensions, which they measured as pension assets/GDP.

The development of the financial sector in emerging economies is facilitated by institutional quality, according to a study on the factors that influence financial development in Asia and the Pacific between 1995 and 2011 (Le et al., 2016). Also, Eke et al. (2018) examined the impact of the Nigerian Security Exchange Commission (SEC) regulatory quality on the primary capital market. The authors concluded that market capitalism responded negatively to regulatory quality in the long run, while liquidity respond positively. Likewise, K. B. Ajide's (2014) findings showed that low levels of corruption and effective administration have a positive impact on stock market growth, while the opposite is true when political instability prevails. According to Anwar and Cooray (2012), the level of financial development is influenced by the quality of institutions, which suggests that the extent of the advantages of financial development is dependent on the effectiveness of governance. Similarly, Jain et al. (2017) argued that corruption has a large and detrimental impact on a country's financial system, and as a result, highly transparent nations have lower transaction costs than corrupt nations.

In a study by Asongu (2011) on the effects of government policies and institutions on stock market performance, the results indicated a link between stock market performance measures and the quality of government institutions as significantly positive, suggesting that countries with better-developed government institutions favour stock markets with higher market capitalization,

better turnover ratios, higher value in shares traded and greater number of listed companies. On the other hand, Bolgorian (2011) established a negative association between corruption and financial market development. Likewise, Asongu (2012) and Hooper et al. (2009) also confirmed that higher institutional quality led to a better performance of stock markets.

3. Data and methodology
To investigate the interdependence between pension funds and capital market development (CMD) as well as the role of institutions in this relationship, the study employed panel data on 48 African countries from 1990 to 2017. The data was sourced from the World Development Indicators (WDI) and the International Monetary Fund (IMF). It was a strongly balanced panel data but with a few missing data.

3.1. The model specification

3.1.1. Relationship between pension funds and capital market development
Following the previous studies (Saadaoui, 2014; Sadorsky, 2010, 2011; Doytch & Narayan, 2016), the study examined the impact of pension funds on capital market development. The study showed the role institutions play in the relationship between pension funds and capital market development. Following arguments in the literature (Dhahri & Omri, 2020; Gaies et al., 2020), the study specified the relationship using the Dynamic System Generalised Method of Moment (system GMM) estimations. The empirical models may be summarized as follows:

$$\text{Capital Market Development}'_{it} = \beta_0 + \beta_1 \text{Capital Market Development}'_{it-1} + \beta_2 \text{Pension Funds}_{it}$$
$$+ \beta_3 \text{Institutions}_{it} + \sum_{k=4}^{N} \beta_k C_{it} + \varepsilon_{it} \tag{1}$$

where subscript *i* denotes cross-sectional dimension (country specifics), *i* = 1, ..., M; *t* denotes the time-series dimension (time), *t* = 1, ..., T.

β_0 is a constant term in the model; β_1 represents the coefficient of the lag of the dependent variable in equations 1 (i.e., capital market development indicators); β_2 represents the coefficient of pension funds; β_k represents the coefficient of institution's variable, β_k : k = 4, ..., N, represent the regression coefficient parameters for vector C to be estimated. C is a vector of control variables that explain the two equation models.

ε_{it} is the idiosyncratic error terms for equation 1 which controls for unit-specific residual in the models for the ith *country* at *period t*.

In equation 1, capital market development is the dependent variable. We decompose capital market development into five indicators, namely: (1) stock market capitalization, (2) bond market capitalization, (3) financial development index, (4) financial market index, and (5) financial institution index.

Stock market capitalization is the total dollar market value of a company's outstanding shares of stock. It is measured as the market capitalization of listed domestic companies as a percentage of GDP. Data were obtained from the World Development Indicators. Bond market capitalization is the total debt outstanding. This was measured as government domestic bonds as a percentage of GDP with data obtained from the World Development Indicators. Following the financial development database of the IMF, the study provided additional proxies of capital market development indicators. These indicators (financial development index, financial market index, and financial institution index) considered the complex multidimensional nature of financial development.

Data on financial development index, financial market index and financial institution index were obtained from the financial development database of the IMF. These indicators were normalized

between 0 and 1. Thus, the highest (lowest) value of a given variable across time and countries is equal to one (zero), and all other values are measured relative to these maximum (minimum) values. As such, the five indicators are defined so that higher values indicate greater capital market development.

Following earlier studies by Sadorsky (2010, 2011) as well as Doytch and Narayan (2015), pension funds were used as the key independent variable in equation 1. Pension funds are defined as any plan, fund or scheme that provides retirement income. It is measured as pension fund assets to percent GDP. Data was obtained from the Global Financial Development of the World Bank for this study. Higher values indicated greater contributions to the funds at a given time, across the countries.

In equation 1, we controlled for institutions, an aggregate of six indicators (rule of law, government effectiveness, control of corruption, political stability, regulatory quality, and voice and accountability), inflation, real GDP per capita, population (log of population in million people), real interest rates, money supply (broad money to GDP) and gross domestic savings and institutions. We obtained data on the control variables from the Global Financial Development database.

3.1.2. Interactions

In what follows, the study argues that institutions play a role in moderating the relationship between pension funds and capital market development. We expand equation 1 by introducing interaction terms to moderate the relationship between pension funds and capital market development indicators. To capture possible unobserved heterogeneity and to analyze the impact of institutions on the pension funds and capital market development nexus, the study specified the following model that includes the interaction terms:

$$
\begin{aligned}
Capital\ Market\ Development'_{it}) = {} & \varphi_0 + \varphi_1 Capital\ Market\ Development'_{it-1} \\
& + \varphi_2 Pension\ Funds_{it} + \varphi_3 Institutions'_{it} \\
& + \varphi_4 (Pension\ Funds_{it} * Institutions'_{it} \\
& + \varphi_5 y_{it} + \gamma_i + \psi_t + \varepsilon_{it}
\end{aligned}
\tag{2}
$$

where,

- $\varphi_0, \ldots, \varphi_5$ are the coefficient parameters and ψ_i is the unobserved country-specific effect assumed to be independent and identically distributed.

- y_{it} represents other control variables

- ε_{it} is the stochastic component defined as $\varepsilon_{it} \sim i.i.d.(0, \sigma_\varepsilon)$, and $E(\psi_i \varepsilon_{it}) = 0$

Following Brambor (2006), the study interpreted the results by computing the marginal effects of pension funds and capital market development in equation 3 and 4, respectively. This interpretation makes economic sense as it reports how institutions affect pension funds and the capital market development nexus.

Thus, we compute the marginal effect from equation 2 as follows:

$$
Marginal\ Effect => \frac{\partial Capital\ Market\ Development_{i,t}}{\partial Pension\ funds_{i,t}} = \varphi_1 + \varphi_4 Institutiions_{it} = 0
\tag{3}
$$

From equation 3, the study expected institutions to enhance the impact of pension funds on capital market development indicators.

3.2. Estimation technique

Both equations were estimated using the System Generalised Method of Moment (system GMM) proposed by Blundell & Bond (1997). A potential problem associated with the model specified above was the problem of endogeneity. Based on the dynamic term and bi-causal relationship that may have existed between some of the explanatory variables and the dependent variable, both the Ordinary Least Squares (OLS) and fixed effects may not have been useful. The study applied the dynamic system GMM to handle the endogeneity problem. The dynamic system GMM is an improved technique over the difference GMM proposed by Arellano and Bond. The system GMM tends to avoid finite sample bias due to weak instruments, especially, in the presence of unit root. It does so by introducing higher lags[1] either than first lag (as in the case of Arellano-Bond GMM) as instruments for the lagged dependent variable, so that there is zero correlation between the random component and the lagged dependent regressor. In addition, the system GMM corrects for any correlation between the unobserved country-specific effect and the difference variables, hence allowing for the use of lagged first difference as instruments for levels. This quality renders the system GMM a more efficient estimator than the static fixed-effect estimator (Buam, Checherita-Westphal & Rother, 2013). For robustness, the Im, Pesaran, and Shin (IPS) (2003) test for stationarity and the Sargan test for over-identification to investigate the validity of instruments

Table 1. Descriptive statistics					
Variables	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Stock market capitalization	1318	26.046	23.336	0.01	311.101
Stock market total value	1423	7.802	16.335	0.00	163.32
Government domestic bonds	1447	28.11	46.259	0.00	289.845
Corporate bond issuance	1454	1.135	1.063	−0.783	3.815
Financial development index	1456	0.163	0.115	−0.008	0.616
Financial markets index	1411	0.068	0.122	−0.365	0.583
Financial institutions index	1456	0.254	0.134	0.095	0.769
Pension fund assets	1412	12.26	18.359	0.001	99.66
Institutions avg	988	−0.628	0.588	−2.1	0.88
Inflation consumer price	1262	44.84	699.58	−11.686	23,773.131
Real GDP pc	1390	7.097	1.047	5.102	9.929
Population total	1450	17,100,000	25,000,000	69,507	1.909e+08
Real interest rate	869	10.461	49.649	−93.513	1158.026
Imports of goods and services	1315	39.867	22.248	7.066	236.391
Broad money of GDP	1342	34.54	27.837	.024	251.618
Gross domestic saving	1258	13.555	19.694	−141.974	83.287

Source: **Authors own computation**

were conducted. Also, to correct for autocorrelation, Arellano and Bond (1991) test for serial correlation was conducted.

4. Results and discussion
The section discusses the results from the empirical estimation. This includes the descriptive statistics, correlation matrix, and the regression results.

4.1. Descriptive statistics
Table 1 presents the descriptive statistics. It was noted that the stock market is 26% of GDP over the sample period and this suggested that the stock market plays an important role in the financial development of African countries. Pension funds with a mean of 12% to GDP also indicated the important role it plays in the financial development of African countries. Institutional quality, on the other hand, has a negative mean of 0.6%, and this indicates that the quality of institutions in Africa is low. Inflation with a mean of 44% shows that Africa has recorded relatively higher inflation during the period under study. There has been less growth in GDP as GDP recorded a mean of 7%. However, interest rates in Africa are high with a mean of 10%. Whilst imports and broad money are relatively high in African countries (mean of 39.9% and 34.5%, respectively), savings levels are low with a mean of 13.5%.

4.2. Correlation results
The results of the correlation matrix are presented in Table 2. Generally, the correlation results in Table 2 show that none of the variables are highly correlated with each other, even though some of the relationships are insignificant. The correlation results show only the association between two variables without controlling for the effect of other variables and therefore have limited insight about multicollinearity. The variance inflation factor results in Table 3, however, show that the variables used for the estimation have no multicollinearity with a mean of 2.1.

4.3. Empirical results
The lag of all the dependent variables was positive and statistically significant in Table 3 except financial development index, which was negatively significant. This indicates that historic facts may have greater influence on the development of capital markets but not necessarily on the financial market development in Africa. The stock and bond data are likely to possess some lags; hence, the estimation results provided evidence. This implies that poor performance of the capital market from previous year is likely to cause poor performance of capital market in the current year. However, good performance from prior year is likely to induce good performance of the market in the current year. Similar results are observed in Table 4. The GMM estimator that was employed in the setting of a dynamic panel suggests that the emphasis of this study is on the dependent variable's short-term dynamics. The strongly significant coefficient on the dependent variable's lag value in each equation indicated that the dependent variable has a substantial persistence. Tests on the residuals indicated that there is no serial correlation, and thus, supports the chosen specification and instruments.

Institutional quality variable was negative and significant for both stock market capitalization and corporate bond as well as government bond. The negative relationship suggests that African countries have weak quality of institutions that limit the promotion of capital market development. This agrees with the work of Bolgorian (2011) who reported that institutional quality reduces capital market development. This means stronger institutions may minimize investment into the capital market whilst weaker institutions are likely to allow fund managers invest more into the capital market. Institutional quality may, therefore, be viewed as a form of risk management tool for investing in the capital market in relation to pension funds. On the contrary, there was a positive and highly significant effect of institutional quality on financial market development. This proved that because institutional quality may restrict fund managers from investing in capital markets, the fund managers may concentrate more on short-term financial instruments that provide reliable income sources and, hence, promote financial market development. The

Table 2. Correlation matrix

Variables	VIF	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Pension funds	1.061	1.000								
(2) IQ	1.861	0.028	1.000							
		(0.379)								
(3) Inflation	1.207	−0.012	−0.082	1.000						
		(0.686)	(0.014)							
(4) GDP	3.531	0.017	0.372	−0.038	1.000					
		(0.540)	(0.000)	(0.184)						
(5) Population	1.445	0.207	−0.188	0.032	−0.059	1.000				
		(0.000)	(0.000)	(0.255)	(0.027)					
(6) Interest rate	1.215	−0.043	−0.131	−0.450	−0.055	−0.033	1.000			
		(0.215)	(0.001)	(0.000)	(0.105)	(0.327)				
(7) Imports	3.031	−0.159	0.200	−0.029	0.236	−0.321	0.039	1.000		
		(0.000)	(0.000)	(0.322)	(0.000)	(0.000)	(0.265)			
(8) Broad money	2.027	−0.048	0.304	−0.041	0.431	0.022	−0.033	0.299	1.000	
		(0.082)	(0.000)	(0.162)	(0.000)	(0.427)	(0.346)	(0.000)		
(9) Savings	3.725	0.033	0.073	−0.007	0.593	0.162	−0.115	−0.315	0.014	1.000
		(0.242)	(0.031)	(0.816)	(0.000)	(0.000)	(0.001)	(0.000)	(0.633)	
Mean VIF	2.123									

Stock Market is given by Stock Market capitalization as a % of GDP, Pension Funds is given by Pension fund asset to GDP, IQ is the aggregate of the six indicators from the World Governance Indicators, namely, rule of law, government effectiveness, control of corruption, political stability, regulatory quality and voice and accountability. Inflation is the consumer price index, population refers to the total population, interest rates are real as a % of GDP, Imports is imports of goods and services as a % of GDP, Savings are gross national savings divided by GDP
Source: **Authors own computation**

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Table 3. System GMM Estimation

| | Stock Market | | Bond Market | | | Financial Market | |
| VARIABLES | Stock market capitalization | Stock market to GDP | Government domestic bond to GDP | Corporate Bond to GDP | Financial Development Index | Financial Market Index | Financial Institution Index |
	model 1	model 2	model 3	model 4	model 5	model 6	model 7
Pension funds	−0.109	−0.0759	−0.180*	0.00722***	0.000864**	0.000590**	0.000814*
	(0.0835)	(0.0576)	(0.102)	(0.00114)	(0.000316)	(0.000266)	(0.000423)
IQ	−4.192**	0.222	−22.67***	−0.109*	0.0768***	0.0648***	0.0908***
	(1.481)	(1.035)	(4.142)	(0.0606)	(0.00610)	(0.00883)	(0.00819)
Inflation	−0.0336	−0.0721***	0.131	−0.00107	−4.08e-05	0.000278*	−0.000259
	(0.0252)	(0.0247)	(0.201)	(0.00179)	(0.000172)	(0.000152)	(0.000245)
GDP	0.208	1.712	−4.818	−0.0235	0.0159***	0.0296***	0.00493
	(0.959)	(1.347)	(3.435)	(0.0699)	(0.00522)	(0.00609)	(0.00579)
Population	−2.99e-08*	1.92e-08	2.03e-07***	−4.58e-09**	−5.31e-11	−1.82e-10	1.19e-10
	(1.51e-08)	(1.63e-08)	(4.86e-08)	(1.74e-09)	(1.30e-10)	(1.27e-10)	(1.98e-10)
Interest rate	0.0270	0.00645	0.762*	0.00401	−0.000651	0.000441	−0.00131
	(0.0493)	(0.0964)	(0.372)	(0.00276)	(0.000749)	(0.000478)	(0.000873)
Imports	0.194***	0.235***	0.395**	0.00709**	−0.000305	−0.000557**	4.56e-05
	(0.0581)	(0.0421)	(0.175)	(0.00305)	(0.000180)	(0.000223)	(0.000220)
Broad money	0.0881	0.0391	0.346***	−0.00419*	−0.000476**	−0.000318	−0.000695**
	(0.0590)	(0.0553)	(0.113)	(0.00231)	(0.000218)	(0.000325)	(0.000325)
Savings	0.215***	0.197***	0.480**	0.00138	−0.000133	−0.000608**	0.000492
	(0.0669)	(0.0360)	(0.191)	(0.00303)	(0.000212)	(0.000214)	(0.000305)
Stock market capitalization$_{t-1}$	0.285***						
	(0.0951)						
Stock market total value $_{t-1}$		0.859***					

(Continued)

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Table 3. (Continued)

VARIABLES	Stock Market		Bond Market		Financial Development Index	Financial Market	
	Stock market capitalization	Stock market to GDP	Government domestic bond to GDP	Corporate Bond to GDP		Financial Market Index	Financial Institution Index
	model 1	model 2	model 3	model 4	model 5	model 6	model 7
Government bonds $_{t-1}$	(0.0945)		0.335***				
			(0.0909)				
Corporate bond $_{t-1}$				0.933***			
				(0.0285)			
Financial development index $_{t-1}$					−0.225***		
					(0.0422)		
Financial markets index $_{t-1}$						−0.146**	
						(0.0604)	
Financial institutions index $_{t-1}$							−0.240***
							(0.0402)
Constant	2.236	−21.35**	3.289	0.0190	0.120***	−0.0979***	0.307***
	(4.308)	(9.778)	(19.68)	(0.432)	(0.0327)	(0.0315)	(0.0388)
Observations	383	447	462	464	468	428	468
Number of year	19	19	19	19	19	19	19
Number of Groups	31	31	34	34	29	29	29
Number of instruments	18	18	18	18	19	19	17
F-Statistics (p-value)	643.40	19.31	39.92	15.51	25.75	4.47	24.22
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
AR(1)	−2.61	−2.30	−2.14	−1.90	−2.54	−3.71	−1.90
	(0.011)	(0.076)	(0.033)	(0.057)	(0.0124)	(0.004)	(0.057)

(Continued)

Table 3. (Continued)

VARIABLES	Stock Market		Bond Market		Financial Market		
	Stock market capitalization	Stock market to GDP	Government domestic bond to GDP	Corporate Bond to GDP	Financial Development Index	Financial Market Index	Financial Institution Index
	model 1	model 2	model 3	model 4	model 5	model 6	model 7
AR(2)	−2.48	−2.14	−2.35	−2.51	−1.08	−1.08	−0.46
	(0.013)	(0.025)	(0.073)	(0.0612)	(0.282)	(0.281)	(0.642)
Sargan Test	46.59	125.19	15.87	44.39	81.97	108.07	76.28
	(0.000)	(0.000)	(0.026)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen Test	8.72	4.70	8.33	4.57	7.03	10.27	13.50
	(0.274)	(0.696)	(0.304)	(0.712)	(0.534)	(0.246)	(0.036)

Standard errors in parentheses

*** p < 0.01, ** p < 0.05, * p < 0.1

Source: **Authors own computation**

estimation results presented in Table 3 show a negative and significant relationship between pension funds and government domestic bonds (Model 3), but a positive and statistically significant effect on the corporate bond market (Model 4) and financial development variables (see models 5, 6 and 7). This suggests that pension funds reduce government bonds but increase corporate bonds and improve financial development. The implication is that countries with more pension funds channel more of those funds into corporate bonds and other financial assets other than stock markets, thus enhancing the development of the bond market and financial market. Resultantly, as pension funds grow, fund managers may focus on investing in the money market instruments that offer risk-free returns and more reliable income compared to the stock market, which is comparatively risky. Further, even if fund managers decide to invest in the capital market, they may be more likely to do so in corporate bonds than stocks because of the volatile nature of the stocks. This confirms the findings of Hu (2012). The negative effect of pension funds on government bond market may be due to the underdeveloped nature of such markets in Africa, while the positive impact of pension funds on corporate bonds and financial development indicators are attributable to the attractiveness of the corporate bond market and the financial market. The negative relationship may also imply that in a strong institutional environment, fund managers may prefer more of some financial market assets other than stocks and bonds. For instance, investment in infrastructure, which is also long term in nature, has become increasingly attractive to institutional investors such as pension funds. Most studies that found a positive relationship observed such in the long run (see for example, Meng & Pfau, 2010; Daradkah and Al-Hamdoun, 2020; Bayar & Kilic, 2019). Meng and Pfau (2010) argued that pension funds have positive influence on capital markets in countries with relatively high financial sector development, while Africa—with a low level of financial development—may account for the negative relationship. According to the Bright Africa Pension Report—2019, most African countries, apart from South Africa, Botswana, and Namibia, have their asset allocations skewed to fixed income securities (RisCura, 2020).

Table 4 presents the results of the role institutional quality plays in moderating the effect of pension funds on capital market indicators. In Model 8, the coefficient of the constitutive term (unconditional effect) of pension funds was negative, while the estimated marginal effect was −0.1278. This suggests that the negative effect of pension funds on the stock market indicators was reduced at higher levels of institutional quality. It may be noted that the existence of stronger quality of institutions may restrict the amount of pension fund assets that could be invested in the stock market, and weaker institutional quality may allow for a larger portion of the pension fund assets to be invested in the stock market. However, considering the crucial nature of the pension funds and the perceived risks associated with the stock markets, stronger institutional quality may act as a risk management instrument against investing in the capital market. In other words, institutional quality may act as a risk-reducing agent that tends to reduce the negative impact of the capital market on pension funds especially, in Africa, where the capital market is generally underdeveloped. In Model 10, it may be observed, based on the marginal effect, that institutional quality enhances the negative effect of pension funds on government bonds. Also, it is noteworthy in Table 4 that pension funds have a positive and statistically significant unconditional effect on the financial development indicators.

In Models 12 and 13, it may be highlighted, based on the marginal effect, that the positive effect of pension funds on the financial development index and the financial market index is reduced in a strong institutional quality environment. Thus, stronger institutions may likely minimize the amount of pension fund assets that are directed towards investment in financial markets. In Model 14, it is observed, based on the marginal effect, that institutional quality magnifies the positive effect of pension funds on financial institution. Thus, pension funds improve the development of financial institutions in countries with strong institutional quality.

In general, the conclusion can be made that the development of the capital market through pension funds is influenced by the quality of institution. This is evident in the positive relationship of the interactive term with the bond market variable and the negative relationship of the

Table 4. System GMM estimation_ interactions

VARIABLES	Stock Market		Bond Market		Financial Market		
	Stock market capitalization	Stock market to GDP	Government domestic bond to GDP	Corporate Bond to GDP	Financial Development Index	Financial Market Index	Financial Institution Index
	model 8	model 9	model 10	model 11	model 12	model 13	model 14
Pension funds	−0.232***	−0.0554	−0.180*	0.00726***	0.000821**	0.000574*	0.000769*
	(0.0739)	(0.0514)	(0.102)	(0.00117)	(0.000343)	(0.000293)	(0.000441)
IQ	−3.103*	−1.192	−27.27***	−0.102	0.0792***	0.0677***	0.0944***
	(1.559)	(1.186)	(4.567)	(0.0711)	(0.0101)	(0.0119)	(0.0107)
Pension fund * IQ	−0.166***	0.141***	0.601**	−0.000681	0.433**	0.413***	−0.138*
	(0.0281)	(0.0433)	(0.218)	(0.00327)	(0.217)	(0.112)	(0.0768)
Inflation	−0.0306	−0.0833***	0.0316	−0.00104	2.51e-06	0.000304*	−0.000216
	(0.0222)	(0.0228)	(0.182)	(0.00185)	(0.000207)	(0.000162)	(0.000281)
GDP	0.231	1.001	−8.771**	−0.0203	0.0173***	0.0317***	0.00858
	(1.073)	(1.268)	(3.566)	(0.0704)	(0.00579)	(0.00644)	(0.00713)
Population	−4.01e-08***	3.23e-08	2.29e-07***	−4.64e-09**	−6.21e-11	−2.02e-10	9.76e-11
	(1.28e-08)	(2.09e-08)	(4.27e-08)	(1.79e-09)	(1.34e-10)	(1.29e-10)	(1.81e-10)
Interest rate	0.0267	−0.0100	0.644	0.00409	−0.000599	0.000486	−0.00123
	(0.0450)	(0.0921)	(0.379)	(0.00283)	(0.000784)	(0.000528)	(0.000916)
Imports	0.183***	0.265***	0.533***	0.00693**	−0.000359	−0.000628**	−4.69e-05
	(0.0542)	(0.0395)	(0.168)	(0.00309)	(0.000230)	(0.000254)	(0.000286)
Broad money	0.110*	0.0397	0.339***	−0.00422*	−0.000476**	−0.000317	−0.000706**
	(0.0616)	(0.0517)	(0.0972)	(0.00236)	(0.000216)	(0.000350)	(0.000327)
Savings	0.202***	0.229***	0.646***	0.00112	−0.000190	−0.000700***	0.000363
	(0.0600)	(0.0364)	(0.174)	(0.00294)	(0.000215)	(0.000236)	(0.000365)
Stock market capitalization $_{t-1}$	0.257**						

(Continued)

Table 4. (Continued)

VARIABLES	Stock Market		Bond Market		Financial Market		
	Stock market capitalization	Stock market to GDP	Government domestic bond to GDP	Corporate Bond to GDP	Financial Development Index	Financial Market Index	Financial Institution Index
	model 8	model 9	model 10	model 11	model 12	model 13	model 14
Stock market total value $_{t-1}$	(0.103)	0.821***					
		(0.0836)					
Government bonds $_{t-1}$			0.295***				
			(0.0825)				
Corporate bond $_{t-1}$				0.934***			
				(0.0296)			
Financial development index $_{t-1}$					−0.231***		
					(0.0455)		
Financial markets index $_{t-1}$						−0.149**	
						(0.0599)	
Financial institutions index $_{t-1}$							−0.244***
							(0.0414)
Constant	3.388	−18.13*	25.12	0.0101	0.113***	−0.109***	0.288***
	(4.585)	(8.759)	(20.26)	(0.426)	(0.0323)	(0.0303)	(0.0458)
Observations	383	447	462	464	468	428	468
Number of year	19	19	19	19	19	19	19
Number of Groups	31	34	34	34	29	29	29
Number of instruments	19	19	19	19	20	20	18
Marginal Effect	**−0.1278**		**−0.5574**		**−0.2711**	**−0.2588**	**0.0874**
F-Statistics (p-value)	763.00	26.95	48.19	24.35	31.72	4.54	136.57

(Continued)

Table 4. (Continued)

VARIABLES	Stock Market		Bond Market		Financial Market		
	Stock market capitalization	Stock market to GDP	Government domestic bond to GDP	Corporate Bond to GDP	Financial Development Index	Financial Market Index	Financial Institution Index
	model 8	model 9	model 10	model 11	model 12	model 13	model 14
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
AR(1)	−2.59	−2.50	−2.13	−1.90	−2.53	−2.70	−2.14
	(0.011)	(0.0617)	(0.033)	(0.057)	(0.0126)	(0.048)	(0.032)
AR(2)	−1.48	−1.32	−2.33	−2.67	−2.82	−1.06	−2.12
	(0.138)	(0.188)	(0.0739)	(0.050)	(0.041)	(0.288)	(0.09)
Sargan Test	47.03	130.60	15.80	40.64	66.38	106.81	47.35
	(0.000)	(0.000)	(0.027)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen Test	8.81	5.11	8.50	4.69	7.16	10.37	10.43
	(0.267)	(0.646)	(0.290)	(0.698)	(0.519)	(0.240)	(0.108)

Standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5. Total pension funds in selected African countries from 2015 to 2020							
Country	Unit	2015	2016	2017	2018	2019	2020
Angola	US Dollar, Millions	1,761	897	903	765	877	865
Botswana	US Dollar, Millions	.	.	8,310	7,523	8,768	.
Egypt	US Dollar, Millions	5,512	2,665	3,598	3,965	4,873	5,635
Ghana	US Dollar, Millions	1,231	1,617	2,496	2,700	3,138	3,823
Kenya	US Dollar, Millions	7,957	9,588	10,463	11,452	12,811	.
Malawi	US Dollar, Millions	456	523	727	944	1,154	1,320
Mauritius	US Dollar, Millions	482	528	633	189	1,517	.
Namibia	US Dollar, Millions	.	10,008	12,496	11,628	12,196	12,112
Nigeria	US Dollar, Millions	26,913	20,213	24,560	28,136	33,284	32,299
South Africa	US Dollar, Millions	259,622	302,975	346,106	312,355	.	.
Tanzania	US Dollar, Millions	4,115	4,155	4,444	.	.	.
Zambia	US Dollar, Millions	562	634	752	689	616	.

Source: OCED 2021

interactive term with the stock market variable. This suggests that the effect of pension funds on the development of the capital market is likely to be influenced by the quality of institutions. Thus, as pension funds increase, strong institutions may discourage investment into the stock market whilst simultaneously encouraging investments into the bond markets. This may be attributed to the volatile nature of the stock market.

In terms of the controls, GDP was positive and statistically significant with the financial development index, even though it was insignificant for any of the capital market variables in Table 3. This suggests that improvement in income levels may not necessarily lead to development in the capital markets as capital market development may be less of a focus for African countries. As mentioned earlier, concentration may be shifted to the money market and other instruments, which may spur improvement in financial development, hence the positive effect. Similar results are observed in Table 4.

On the other hand, inflation was negatively significant with the stock market total value to GDP variable in Table 3, and this suggests an inverse relationship. With this inverse relationship, high inflation may deter fund managers from investing in the capital market more so due to the volatile nature of stocks. Ostensibly, a high inflation is detrimental to good conditions in relation to investment in stocks. The reverse is also true and consistent with theory and literature as an increase in inflation leads to higher economic uncertainties. See, for instance (Impavido et al., 2003; Moleko & Ikhide, 2016).

Further, population was reported to be significant for stock and bond market. There was a negative effect on the stock market, but a positive effect on government bonds. Savings was positive and significant with stock market and government bonds in both Table 3 and Table 4. This

Table 6. *Stock Market Capitalization of some selected African countries from 2015 to 2020.* Source: World **Bank (2020)**

COUNTRY	2015	2016	2017	2018	2019	2020
South Africa	212.27	293.99	322.71	213.74	272.3	313.46
Morocco	45.39	55.73	61.13	51.72	54.57	57.16
Mautitius	61.91	61.87	73.48	69.44	61.34	56.37
Kenya						21.26
Tunisia	19.26	19.05	21.16	19.51	20.36	20.16
Namibia		21.8	22.61	17.99	20.8	17.68
Ghana						13.2
Nigeria	10.27	7.36	9.9	7.94	9.8	13.09
Ivory coast	27.27	25.78	24.2	14.57	13.84	11.95
Egypt	16.76	10.02	19.75	16.82	14.58	11.32
Tanzania						10.39
Algeria	0.09	0.26	0.21	0.21		

Definition: market capitalization (also known as market value) is the share price is the number of outstanding shares (including their several classes) for listed domestic companies. Investment funds, unit trusts and companies whose only business goal is to hold shares of other listed companies are excluded. Data are end-of-year values

also indicates that the more African countries save—of which Pension funds could be one of the means of saving—the more money is invested into capital markets, hence the growth. Imports remained positive and highly significant for both stock and bond market variables. This stands to reason that the more goods and services are imported into African countries, the tendency for them to lead to the development of the capital markets. It may also mean that most of these transactions are conducted using the capital markets. Similar results are found in Table 4. Broad money was only significant and negative at 10% for the corporate bond market variable and financial market index but had a positive and statistically significant relationship with government bond. This is an indication that the financial market seems illiquid for African countries, and this is a negative incentive for the development of the capital market.

Real GDP was significant and negative only for government bonds but had a statically positive effect on financial development. The implication being that even though African countries may not have capital markets as their focus, increases in income levels may lead to investments in other instruments like the money market, hence, the positive effect on financial development.

5. Conclusion and policy recommendation

Pension funds are huge financial assets that have the potential to transform the capital market and promote economic growth. The study examined the effect of pension funds and institutional quality on capital market development in Africa using a system GMM estimation method. The study found that pension funds and institutional quality have a negative impact on capital market development. This means that pension funds affect capital markets. When pension funds, as a variable, was interacted with institutional quality, it was proven to have a negative impact on the capital market development. This may be as a result of the underdeveloped nature of Africa's financial system. However, both pension funds and institutional quality had a positive and highly significant relationship with financial development. This indicates that fund managers are more likely to invest in bonds than stocks because of their volatile nature and may shift more focus to the money market—because of the fixed and reliable income it provides—than the capital market where stocks are volatile in nature. According to Bright Africa Pension Report 2019, most African countries, apart from South Africa, Botswana and Namibia, have their asset allocations skewed to fixed income securities (RisCura, 2020).

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Table 7. PPG, bonds, (NFL current US$) of some selected African countries from 2015 to 2020. Source: WDI 2020

Country	2015	2016	2017	2018	2019	2020
Angola	1,500,000,000	0		3,500,000,000	2,000,000,000	0
Cote d'Ivoire	1,000,000,000	136,377,000	1,135,786,000	1,927,785,000	403,923,000	477,999,000
Congo, Rep.	−18,156,000	−22,695,000	−27,234,000	−27,234,000	−27,234,000	−27,234,000
Egypt, Arab Rep.	1,500,000,000	−1,250,000,000	6,400,000,000	5,867,975,000	7,886,633,000	2,646,242,000
Gabon	500,000,000		−18,129,000	−14,000,000		250,000,000
Ghana	1,000,000,000	750,000,000		1,228,079,000	2,716,802,000	2,520,558,000
Guinea-Bissau	7,755,000	−481,000	40,638,000	28,197,000	29,482,000	86,296,000
Kenya			2,000,000,000	1,350,000,000	0	
Morocco	1,109,584,000	0	0	0	1,239,283,000	3,000,000,000
Nigeria	0	0	4,800,000,000	4,868,352,000		0
Senegal		1,100,000,000	2,181,255,000	0	−103,803,000	
Tunisia	1,000,000,000	500,000,000	1,259,654,000	590,627,000	48,741,000	−706,588,000
South Africa	−10,098,663,000	10,089,142,000	10,816,818,000	−3,677,962,000	11,687,000,000	−3,679,884,000

The findings have implications for policymakers, investors (fund managers), and scholars. As pension funds were found to impact negatively on the capital market in the presence of institutions, there has to be stronger institutional quality in place to serve as a check on any rent seeking behaviour of pension fund managers as a way to prevent the locking of funds of pensioners and the inability to fulfill fund managers' obligation towards pensioners. African governments need to implement measures to develop the financial markets since fund managers focus more on other assets from the financial markets than assets from the capital market. This provides investors with diverse options to diversify their portfolios, which in turn brings development to the financial sector by minimizing the risks that investors are exposed to. Capital markets in Africa experience a lot of challenges because of their underdeveloped nature. However, the demutualization of exchanges (Abukari & Otchere, 2020; Sial et al., 2015) and integration of capital markets via ensuring the cross-listing of some of the national exchanges and cross-border investment are few strategies for market development. This may be implemented by increasing the number of listing companies (demutualization and integration) as well as increasing the number of instruments traded on the exchange. Investment in alternative asset classes such as infrastructure also proves to be helpful.

Governments in Africa ought to strengthen the reforms, especially the third tier—which includes private contribution—to cover all sectors. According to Bright Africa Pension Report 2019, only 8.5% of working Africans have pension coverage compared to 32.5% of their global counterparts (RisCura, 2020). The third tier makes room for people from the informal sector to also make contributions towards their old-age income. Considering the large size of the informal sector (85%) in Africa, it is prudent to encourage the third-tier contribution, which does not only deepen the assets of the funds but also help alleviate poverty in the informal sector. Certain micropension schemes, which can be emulated by others, have been introduced by a few African countries.

Finally, it is prudent that scholars investigate further for other factors that account for the negative relationship between PF, institutional quality, and capital market development.

Author details
Kathryn A.A.O Assefuah[1]
E-mail: kathy_by_grace@yahoo.co.uk
ORCID ID: http://orcid.org/0000-0003-1826-3186
Joshua Y. Abor[2]
ORCID ID: http://orcid.org/0000-0002-3424-7760
Saint Kuttu[2]
Lordina Amoah[2]
[1] Department of Banking and Finance, University of Professional Studies, Accra.
[2] Department of Finance, University of Ghana Business School, Legon, Ghana.

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Notes
1. The use of higher lags of the respondent variable as instruments hinges critically on the assumption of no autocorrelation in the initial disturbance term.

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