

# Exploring the nonlinear effect of size on profitability: evidence from an insurance brokerage industry in an emerging market

The nonlinear effect of size

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## Abstract

**Purpose** – This study examines the possible nonlinear effect of size on stakeholder and shareholder profitability in the Ghanaian insurance brokerage industry.

**Design/methodology/approach** – This study employs a panel dataset of 64 Ghanaian insurance brokerage firms spanning 2011–2015. Static [ordinary least squares (OLS), fixed effect and random effect and dynamic (two-step generalized method of moments (GMM))] estimation techniques are employed to analyze the data.

**Findings** – The study finds the existence of both economies and diseconomies of scale and scope theories in the Ghanaian insurance brokerage industry confirming the existence of nonlinear nexus between size and performance. This finding is consistent for both stakeholder and shareholder profit performance. Thus, the results show that size improves profitability of insurance brokerage firms, but beyond a certain threshold, the relationship turns negative as size negatively affects profitability.

**Practical implications** – The research findings have implications for both policy and research; the study recommends that Ghanaian brokerage managers should understand that not all growth is good and exercise a duty of care when applying growth strategies by monitoring size effect on performance so as not to go beyond the inflection point. Further research can be done to examine this effect in other contexts, timeframes and jurisdictions.

**Originality/value** – This research is unique in that it employs a panel dataset consisting of 96% of insurance brokerage firms in Ghana whilst employing both static and nonstatic regression models to examine the effect of size. The research analysis adopted is robust, and the findings are significant. Also, the lack of empirical studies on the operations and dealings of auxiliary institutions such as the insurance brokerage firms adds value to this research.

**Keywords** Diversification, Organization, Insurance brokerage firms, Profitability, L25 – firm performance: size, Scope < L2 – firm objectives, Behavior < L – industrial org

**Paper type** Research paper

## Introduction

Financial institutions are in the business of transforming asset maturities, matching financial market participants, creating liquidity, evaluating projects for efficient and effective allocation of resources, pooling and sharing risk, and providing credit information for better or informed lending decisions (Choi *et al.*, 2013, 2016; De Haan *et al.*, 2009; Kotey and Abor, 2019; Kotey, 2019; Kotey *et al.*, 2019, Kusi *et al.*, 2017; Madura, 2006; Mishkin and Eakins, 2006). Across industries and economies, these businesses undertaken by financial institutions propel economic growth and development (Becks and Levine, 2004; De Haan *et al.*, 2009; Demircuc-Kunt *et al.*, 2003; Kargbo and Adamu, 2009). In light of this, financial institutions carry huge risks and if they fail, can cause significant negative effects on the



whole financial system. The insurance sector exists to resolve this problem by mitigating the risks associated with doing business in the financial sector (Owusu-Sekyere and Kotey, 2019).

Due to the potential risk effects associated with financial institution practices (the 2007–08 financial crises being a case in point (see Crotty, 2009)), practitioners, policymakers, academics and researchers have continually investigated and critically scrutinized the actions of financial institutions with the aim of curbing future occurrences and to control the risk-taking behavior of these institutions. The majority of these investigations focus on banking financial institutions (including microfinance institutions, commercial, universal, rural, development and investment banks) because of their ability to affect the stability of the financial system. Because risk cannot be completely eradicated from the financial system, insurance companies and their associated auxiliaries play a key role in stabilizing the financial system.

Thankfully, the insurance sector continues to receive much-needed attention in terms of research and advocacy, especially in Africa (Alhassan and Biekpe, 2017, 2018). This is summed up by Akotey *et al.* (2013) who highlight that the risk absorption function of the insurance sector promotes a “sense of peace within the business world.” But despite this increased attention, to the best of our knowledge, there are inadequate empirical studies on the operations and dealings of the auxiliary institutions (such as insurance brokerage firms) that support and promote the ability of insurance firms to perform their duties. It may be argued that the survival and sustainability of these auxiliary institutions are crucial for the efficient and effective functioning of the insurance sector, thereby influencing its ability to stabilize the financial system.

The findings of Owusu-Sekyere and Kotey (2019) bring to bear the need for further research into the size–profitability nexus in the insurance brokerage sector, as firm size has been proven to be a significant controlling factor. The theories of economies and diseconomies of scale and scope purport that the size of a firm is crucial for survival and profit performance and may either propel or derail performance. But this has been less studied and discussed in the insurance brokerage empirical literature. Given that the economies and diseconomies of scale and scope literature suggest that there are economic benefits and costs associated with size, there is a possibility that a nonlinear relationship may exist between size and profitability performance in the insurance brokerage industry of Ghana. Thus, similar to a study by Jaisinghani and Kanjilal (2017), we suspect that depending on the level, firm size may exhibit a linear positive relationship on firm profitability, where firm size positively affects firm profitability. But beyond a certain limit (or threshold), the relationship may turn inverse signaling a nonlinear relationship where bigger-sized (or overgrown) firms exhibit a negative relationship on firm profitability. We find no empirical evidence in the insurance brokerage literature, hence the motivation for this research.

Again, following the literature on stakeholder and shareholder profitability or performance (see Kotey *et al.*, 2019; Kusi *et al.*, 2017, 2018), the effect of firm size on shareholder and stakeholder profitability has not been extensively examined; for example, is the effect linear or nonlinear, direct or indirect? Is the effect the same on stakeholder (measured by return on assets [ROA]) and shareholder (measured by return on equity [ROE]) profitability or are there significant differences? If there is evidence of nonlinearity, what is the threshold? These unanswered questions justify the need to deeply examine the size effects on profitability.

Hence, this study attempts to contribute to the literature on size and performance by providing empirical evidence on the nonlinear relationship between size and stakeholder and shareholder profitability or performance using a Ghanaian insurance brokerage dataset. The rest of the paper is organized into overview, theoretical review, empirical review and hypothesis development, model specification, findings and discussions, robustness diagnostics, concluding remarks and recommendations, as well as references.

## General overview

The Ghanaian insurance sector consists of 24 life insurance, 27 nonlife insurance, 3 reinsurance and 78 insurance brokerage companies (National Insurance Commission (NIC) Report, 2016). Between 2011 and 2016, the sector has seen 35 additional companies registered representing a 36% growth. The insurance brokerage sector has however seen more growth compared to the life, and nonlife insurance sectors showing how economically vibrant the sector is. While the brokerage companies have increased by 25 companies between 2011 and 2016 (representing a 47.17% growth), life, nonlife and reinsurance companies have increased by 6, 3 and 1 companies between 2011 and 2016 (representing 33.33%, 12.5 and 50%) respectively (See Table 1).

In 2015, Ghanaian insurance brokers earned commission totaling GHC 64.7 million from 48.6 million the previous year, representing a 33% growth (See Table 2). By 2016, commission earned had risen by 13% to GHC 73 million. From 2009 to 2016, brokerage commission earned grew by almost 423%, averaging about 53% per year. This sustained growth trend within the period shows the brokerage sector is economically viable. The authors estimate this growth to have been significantly influenced by certain occurrences: the IFRS adoption in 2012, the oil find leading to oil and gas exploration, and mining revenues accrued within the period. It is also important to note that the top ten insurance brokerage firms consistently bag over 60% of total annual commissions earned. In 2015, for example, KEK insurance brokers received GHC 40.5 million in commission and by 2016, their earned commission increased by GHC 5 million. Whilst these figures indicate the top companies have more market control, it promotes the idea of the presence of more market growth opportunities through market entry, innovation, creativity and competitive trading.

A number of factors explain the positive growth trend in the insurance sector. Aforetime, insurance has principally being sold by insurance companies and their direct agents. However, new trends have emerged where insurance companies have leveraged on bank

	2016	2015	2014	2013	2012	2011	Average growth
Life	24	24	20	18	18	18	33.33%
Nonlife	27	27	25	25	25	24	12.50%
Brokers	78	74	70	60	57	53	47.17%
Reinsurers	3	3	3	2	2	2	50.00%
Total companies	132	128	118	105	102	97	35.75%

Source(s): the National Insurance Commission (NIC) Reports, 2011–2016

**Table 1.**  
Trends in the establishment of companies in the insurance sector of Ghana

Year	Commission earned (GHC)	Earnings by top 10 insurance brokers (GHC)	Percentage earnings	Percentage change
2016	73,144,221	45,138,831	62.00	13.01
2015	64,722,972	40,544,266	63.00	33.11
2014	48,623,536	30,640,273	63.00	38.24
2013	35,173,727	23,539,265	67.00	27.21
2012	27,651,046	19,060,875	68.00	34.35
2011	20,581,124	14,124,111	68.00	21.73
2010	16,907,668	11,939,132	71.00	20.91
2009	13,983,561	10,315,913	74.00	
Overall average	37,598,482	24,412,833	67.00	26.94

Source(s): the National Insurance Commission (NIC) Reports, 2009–2016

**Table 2.**  
Contribution of top ten insurance broking companies to total commission

relationships to sell their insurance products to bank customers. With the added convenience, ease and flexibility, more customers are opting for these bancassurance products. From the insurance company’s perspective, they are able to sell their products to customers at reduced operational and transaction cost. With bank-based insurance products becoming a “national favourite”, brokers are left to reinvent themselves to stay relevant or phase-out of the market. Also, the imposition of a “No Premium, No Cover directive” by the National Insurance Commission (NIC) has had a significant impact on the industry as a whole (NIC report, 2014). This directive abolished the 90-day premium warranty, which allowed insurance holders to buy insurance on credit. Insurance brokers were significant in educating clients on why their premiums payments had changed. Another factor accounting for growth in the insurance sector is the 400% increment on motor tariffs by the Ghana Insurers Association which agitated insurance buyers (Larbi, 2015). Through industry collaborations, the increment was staggered over three instalments which satisfied insurance buyers (Larbi, 2015).

The yearly increase in premiums from 2010 and the relatively stable premium growth rate show a boisterous Ghanaian insurance market with the tendency to grow and develop (See Table 3). Because the insurance market is linked to the insurance brokerage market, growth in the former could positively affect the later. Although the commission growth rates may have fallen since 2015, the yearly insurance brokerage revenues from 2010 to 2016 show an upward trend indicating economic viability, hence creating more opportunities for insurance brokers.

**Theoretical review**

The theoretical literature on size is based on the economies and diseconomies of scale and scope (Kusi *et al.*, 2017; Terraza, 2015; Naceur and Orman, 2011; Dietrich and Wanzenried, 2011; Athanasoglou *et al.*, 2008). The economies and diseconomies of scale and scope are two opposing views on how size affects the performance of firms. The economies of scale and scope advance that there are cost benefits associated with size; economies of scope state that there is an average cost advantage when a firm offers more variety of products whilst economies of scale is a decrease in average cost per unit a firm benefits from by producing more of a product (Stigler, 1958). Insurance brokerage firms increase in size through either channel; offering a variety of services (e.g. consumer tailored services) or selling more of a product through innovative channels (e.g. bancassurance). Terraza (2015) posits that larger institutions have the financial muscles to undertake more business opportunities and provide services at a lower cost, hence propel performance. Other authors also argue that larger institutions have market power and dominance through information asymmetry, which enables them to amass a majority of the profits in an industry (Armstrong *et al.*, 2011; Kale and Loon, 2011). Hence, there are efficiency gains and financial benefits associated with size which positively improves the performance of firms (Terraza, 2015).

Year	Total gross premium (GHC)	Prem. growth rate (GHC)	Commission (GHC)	Comm. growth rate (GHC)
2016	1,928,838,573	24%	73,144,221	13.01%
2015	1,567,400,946	26.42%	64,722,972	33.11%
2014	1,239,853,442	17.85%	48,623,536	38.24%
2013	1,052,090,982	23.68%	35,173,727	27.21%
2012	850,657,054	35.34%	27,651,046	34.35%
2011	628,528,775	37.20%	20,581,124	21.73%
2010	458,117,751	33.60%	16,907,668	20.91%

**Table 3.**  
Growth rates of premium and commissions

**Source(s):** the National Insurance Commission (NIC) Reports, 2010–2016

On the other hand, [Kasman \(2010\)](#) and [Terraza \(2015\)](#) advance that size may reduce the performance of firms through diseconomies of scale and scope; diseconomies of scope occur when the long-term benefit of expanding the scope of the business negatively affects profits whilst diseconomies of scale occur when the complexity and bureaucracy emanating from the long-run increase in firm size negatively affects profits. The authors argue that diseconomies of scale and scope can cause larger institutions to be bureaucratic, have low levels of supervision and monitoring and duplication of functions, which reduces the efficient use of resources and slows down decision-making leading to reduced profits.

Given these opposing views on the firm size, it is intuitive to argue that there is a possibility of a nonlinear relationship between size and performance. Hence, we hypothesize and test the economic theory that a nonlinear nexus exists between the size of insurance brokerage firms and firm profitability.

On the issue of profit maximization, two theories shape our thinking: stakeholder and shareholder theory. The shareholder profit maximization theory has remained dominant in the value maximization discourse ([Friedman, 1970](#); [Greene, 1993](#); [Jackson, 2011](#)) while the stakeholder profit maximization theory is a more recent and less dominant perspective ([Freeman, 1984](#); [Jackson, 2011](#)). While the shareholder value maximization theory advances that the business belongs to shareholders and must be run in the sole interest of shareholders (premised on the fact that managers are hired as agents of the shareholders to run the business for their economic benefit and therefore have legal and moral obligation to serve the interest of shareholders), the stakeholder value maximization theory advances a broader scope by justifying that although shareholders are the owners of the business corporation, managers have a wider responsibility to all other persons or groups (shareholders, suppliers, creditors, employees, competitors, customers and the community) of whom the actions of the business may affect and recognizes the responsibilities of managers beyond economic and legal perspectives to cover ethical and philanthropic perspectives.

Though the shareholder and stakeholder theories are both profit maximization perspectives, they vary in approach and measurement (see [Table 4](#)) ([Kusi et al., 2017](#); [Kochan and Rubinstein, 2000](#)). Given how profitability measured, it is possible for size to have varying effects on firm performance. Based on this, we adopt two measures of profitability; ROA to support the stakeholder theory and ROE to support the shareholder theory.

### Empirical review and hypothesis development

Literature on profit performance on insurance brokerage firms remains scanty. Therefore, where possible, we explore the profitability of other institutions like banks and manufacturing companies to augment our literature because of its applicability.

	Shareholder theory	Stakeholder theory
Purpose	Maximizes shareholder value	Pursues multiple objectives of parties with different interests
Governance	Principal-agent model	Team production model
Governance process	Control and ownership	Coordination, cooperation and conflict resolution
Performance metrics	Shareholder value sufficient to maintain investor commitment	Fair distribution of value created to maintain commitment of multiple stakeholders
Residual risk holders	Shareholder	All stakeholder

Source(s): Adapted from [Kochan and Rubinstein \(2000\)](#)

**Table 4.** Difference in shareholder and stakeholder value maximization theories

Niresh and Thirunavukkarasu (2014) explored the size–profitability effects of 15 listed manufacturing firms in Sri Lanka between 2008 and 2012. Using ROA as a proxy for profitability and total assets and total sales for size, they found no size–profitability relationship in the data. Analyzing the data of 100 listed Indonesian manufacturing companies from 2009 to 2014, Kartikasari and Merianti (2016) found that size had a significant negative impact on profitability. Doğan (2013) conducted a similar study using 200 listed companies on the Istanbul Stock Exchange (ISE) between 2008 and 2011. However, he found a positive relationship between size and profitability using ROA as an indicator for firm profitability and total assets, total sales and number of employees as indicators for size. John and Adebayo (2013) used similar variables on an eight-year data of Nigerian manufacturing firms, and the positive size–profitability nexus was also realized. These studies, with varying results, have not explored the size effect on ROE (supported by the stakeholder theory) as a measure of profitability.

Another study by Titko *et al.* (2015) explored the drivers of profitability among banks in Latvia and Lithuania using data from 2008 to 2014. The authors found a positive relationship between profitability and size whilst using profitability ratios as a measure of firm performance. Lun and Quaddus (2011) also studied the nexus between firm size, use of electronic commerce and performance of container transport operators in Hong Kong. They identified that sale growth is positively related to firm size and electronic commerce. Owusu-Sekyere and Kotey (2019) also examined the factors that determine the profitability of insurance brokers in a Ghanaian panel dataset of 64 insurance brokerage firms over a five year period (2011–2015). They found that firm size positively affected profitability. However, they did not examine the long-term effects of size, whether its relationship on profit was linear or nonlinear.

Furthermore, Terraza (2015) investigated the effects of bank capital and liquidity ratios on banks' profitability by observing the behavior of the banks in terms of risk. Using a sample of 1,270 European banks spanning 13 years (2005–2012), she analyzed the banks according to size by categorizing them into small, medium and large banks. Her result showed that medium-sized banks had a positive and significant effect on profitability. Similarly, Fernández *et al.* (2019) examined whether the relative importance of firm and industry effects in explaining performance variation is the same regardless of the firm size. Their results show that the performance of small and large firms is mainly explained by the firm effect while the performance of medium-sized firms is explained by industry effects. Thus, firm size positively affects performance in the form of sales growth. These studies imply different size levels have different profit effects. These studies, however, do not examine size from a long-term perspective.

The above studies show the importance of size as a determinant of firm performance. The gaps identified show the limited exploitations of the relationship between firm size and profitability in the insurance brokerage context, especially from a Ghanaian perspective. Again, economies and diseconomies of scale and scope theory suggest a linear relationship between size and performance. However, we argue and hypothesize that a nonlinear relationship may exist between size and performance where both economies and diseconomies of scale and scope may exist. Moreover, following the literature on stakeholder and shareholder profitability performance, we hypothesize that size may affect shareholder and stakeholder profitability differently. However, there is no empirical evidence to support this, hence the need for this research.

### **Model specification and procedure**

In this study, a panel data framework, which consists of both time series and cross-sectional data, is employed. It is argued that the panel data framework captures both time and firm-

level variations and controls for omitted variable biases (Wooldridge, 2009; Brooks, 2008). Secondary data on insurance brokerage firms is obtained from the annual financial statements of 64 insurance brokerage firms between 2011 and 2015. The sample represents 96% of insurance brokers in Ghana. The choice of data and time frame is influenced by data availability [1] and convenience. Macroeconomic variables including gross domestic product (GDP) and inflation are extracted from the World Development Indicators (WDI). The panel data framework is expressed as

$$Y_{it} = \alpha_i + \gamma_t + \beta X_{it} + \varepsilon_{it} \tag{1}$$

where subscript  $i$  signifies the cross-sectional dimension (i.e. brokerage firm)  $i = 1 \dots N$  and  $t$  signifies the time-series dimension (i.e. year),  $t = 1 \dots T$ ;  $Y_{it}$  is the dependent variable;  $\alpha_i$  is the scalar and constant term for all periods ( $t$ ) and specific to a firm fixed effect ( $i$ );  $\gamma_t$  is the time fixed effect  $t$ ;  $\beta$  is a  $k \times 1$  vector of parameters to be estimated on the independent variables;  $X_{it}$  is a  $1 \times k$  vector of observations on the independent variables comprising input variables in the model, which includes controlled variables and  $\varepsilon_{it}$  which is iid is the error term.

The model is adopted from Owusu-Sekyere and Kotey (2019) and modified to examine the nonlinear effect of size on profitability (ROE and ROA). The study employs a number of estimation strategies including static and dynamic strategies. Specifically, ordinary least squares, generalized least squares (fixed and random) and two-step generalized methods of moments are used to ensure consistency and reliability in the results and findings. Following the literature on dynamic models, especially GMM (Asongu and Tchamyou, 2016; Arellano and Bond, 1991; Arellano and Bover, 1995), the GMM estimator is suitable for data structure where the number of entities (firms) is more than the number of years (time span) (Arellano and Bond, 1991; Arellano and Bover, 1995) which is a case for the data used in this study. Again, while endogeneity can be resolved by identifying an instrumental variable which is correlated with the endogenous independent variable but not the error term, the identification of a suitable instrumental variable that is consistent with literature is often very difficult and near impossible. Hence, the next best alternative is the GMM estimator, which generates its own instruments internally to control the endogeneity suspected (Arellano and Bond, 1991; Arellano and Bover, 1995). For the GMM results to be valid, efficient and reliable, the arguments of Asongu and Ach-Anyi (2019) are examined and reported. That is, (1) the number of firms (insurance brokerage firms (64)) is significantly larger than the number of periods in each cross-section (5 years – 2011 to 2015), (2) the dependent variable exhibits persistence given the correlational values of 0.857 and 0.910 between the dependent variables (ROA and ROE) and their lag terms, respectively, which are the rule of thumb threshold of 0.800 required for establishing persistence, (3) the GMM strategy, which employs a panel structure, captures cross-firm variations, (4) accounts for endogeneity arising from simultaneity in the independent variables through an instrumentation process on the one hand and controlling unobserved heterogeneity with time invariant indicators on the other hand and corrects biases that are features of difference estimator.

The static and dynamic models estimated are expressed as

*Shareholder profitability model*

$$ROE_{it} = \beta_0 + \beta_1 SIZE + \beta_2 SQSIZE_{it} + \beta_3 RISK_{it} + \beta_4 FLEX_{it} + \beta_5 LNFIXED_{it} + \beta_6 TDTA_{it} + \beta_7 INFLATION_t + \beta_8 GDP_t + \varepsilon_{it}$$

(1 - Static Model)

$$ROE_{it} = \beta_1 ROE_{it-1} + \beta_2 SIZE + \beta_3 SQSIZE_{it} + \beta_4 RISK_{it} + \beta_5 FLEX_{it} + \beta_6 LNFIXED_{it} \\ + \beta_7 TDTA_{it} + \beta_8 INFLATION_t + \beta_9 GDP_t + \varepsilon_{it}$$

(2 - Dynamic Model)

*Stakeholder profitability model*

$$ROA_{it} = \beta_0 + \beta_1 SIZE + \beta_2 SQSIZE_{it} + \beta_3 RISK_{it} + \beta_4 FLEX_{it} + \beta_5 LNFIXED_{it} + \beta_6 TDTA_{it} \\ + \beta_7 INFLATION_{it} + \beta_8 GDP_{it} + \varepsilon_{it}$$

(3 - Static Model)

$$ROA_{it} = \beta_1 ROA_{it-1} + \beta_2 SIZE + \beta_3 SQSIZE_{it} + \beta_4 RISK_{it} + \beta_5 FLEX_{it} + \beta_6 LNFIXED_{it} \\ + \beta_7 TDTA_{it} + \beta_8 INFLATION_t + \beta_9 GDP_t + \varepsilon_{it}$$

(4 - Dynamic Model)

SIZE and SQSIZE are our main variables of interest meant to capture the nonlinear effect of size on profitability. SQSIZE is the squared value of SIZE. It is meant to capture the long-term effect of size. If the effect of size is linear, the coefficients of both variables would have the same sign (i.e. positive or negative). But if the signs of the coefficients are different, it means the relationship of size on the dependent variable is not linear. The technique is well supported by empirical literature (see [Baños-Caballero et al., 2012](#); [Kebewar, 2013](#)). The dependent variable, variables of interest and control variables are all defined and explained in [Table 5](#). Additionally, the measurement, expected signs, underlying theories and source of variables are also presented.

**Empirical results and discussions**

[Table 6](#) presents the summary statistics of the variables employed in the study. From the table, ROA on average is 8.5% over the period under study while ROE is nearly 1%. This shows that return to stakeholders which is represented by the ROA is higher compared to return to shareholders represented by ROE. The mean values of size (which is a logged value) and sqsize (size squared) implies that size shows an average growth and squared of growth of 12.82 and 166.07% between the periods under study. Risk, which measures the variations in earnings before interest and tax (EBIT) averaged 1.56 units implying that the earnings of Ghanaian insurance brokerage firms varied by 1.56 units. Liquidity (flex) of the insurance brokerage firms is averagely 62.8% of total assets indicating insurance brokerage firms keep large amounts of monetary or liquid assets on average. Tangibility (lnfixed), which measures the availability and use of fixed asset (a logged variable) reports a value of 11.48% growth on the average in fixed assets. Leverage (tdta), which is debt financing, also constitutes about 30% of the total financing options used by the brokerage firms within the period under study. With regards to the macroeconomy, inflation over the period averaged at 12.4% while GDP growth averaged 7.7%. For a developing economy, these macroeconomic indicators suggest a stable and conducive state of economy in the period under study.

The Pearson's correlation matrix is used to check for multicollinearity ([Table 7](#)). A cursory look at the ROA column shows there is very low correlation among the variables, an indicator of the presence of no multicollinearity. To further ensure that this is the case, we conduct a variance inflation factor (VIF) test (see [Appendix 1](#)). The VIF test figures for our variables of interest and the mean VIF were below 2, which is lower than the rule of thumb of 4.

Symbol	Meaning and interpretation	Source	Underlying theory	Expected sign
ROA	Return on assets. Measures how efficient management is in using the firm's assets to generate returns. It is measured as earnings before interest and tax divided by total assets	Computed by authors based on the financial statements of brokerage firms	Stakeholder theory	
ROE	Return on equity. Measures the returns management get from the total equity invested by shareholders. It is measured as net profit divided by total equity		Shareholder theory	
size	Natural logarithm of total assets. This variable is employed as a proxy to measure the size of the brokerage firm		Economies and diseconomies of scale and scope theory	+
sqsize	Squared of natural logarithm of total assets. This variable is employed as a proxy to measure extreme increase in size of the brokerage firm		Economies and diseconomies of scale and scope theory	-
tdta	Total debt to total assets. Measures the total debt of the brokerage firm as a ratio to its total assets		Financial distress theory	-/+
lnfixed	Natural log of fixed assets. This measures the amount of tangible assets kept by insurance brokers		Going concern concept of finance and accounting	-/+
flex	Monetary assets to total assets. The variable also measures how much of the total assets are not fixed assets (or current assets)		Liquidity premium theory	+/-
risk	Standard deviation of EBIT to average value of EBIT. This variable as a proxy for measuring risk of the brokerage firm		Standard asset pricing theory	-/+
inflation	Inflation. Measured as a percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services at specified intervals	World Bank database	Purchase power theory	-
GDP	Gross domestic product (GDP) growth rate. It is the percentage of change of the monetary value of all the finished goods and services produced within a country's borders in a specific time period		Economic growth theory	+/-

Table 5. Summary of variables

Variable	Obs.	Mean	Std. dev.	Min.	Max.	SWILK
ROA	214	0.085	0.311	-2.156	0.810	8.873***
ROE	214	0.0096	1.195	-13.215	0.9516	8.368***
size	215	12.824	1.274	10.159	16.771	3.539***
sqsize	215	166.071	33.589	103.211	281.272	4.743***
risk	307	1.559	7.087	-42.369	95.766	11.895***
flex	215	0.628	0.303	0.021	1.416	5.687***
lnfixed	207	11.481	1.755	6.122	15.616	3.229***
tdta	214	0.295	0.286	-0.163	1.834	7.153***
inflation	335	0.124	0.034	0.087	0.171	7.063***
GDP	335	0.077	0.038	0.039	0.141	7.165***

**Note(s):** ROA – return on assets (stakeholder profit); ROE – return on equity (shareholder profit); size – natural log of total assets; sqsize – squared natural log of total assets; risk – standard deviation of earnings before interest and tax; flex – liquidity; lnfixed – tangibility; tdta – leverage; inflation – economic stability; GDP – gross domestic product growth rate; SWILK – Shapiro–Wilk test results ; significance level: \*\*\* $p < 0.01$ , \*\* $p < 0.05$  and \* $p < 0.1$

**Table 6.**  
Summary statistics

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) ROA	1.000									
(2) ROE	0.637	1.000								
(3) size	0.229	0.207	1.000							
(4) sqsize	0.212	0.195	0.998	1.000						
(5) risk	0.003	0.019	0.071	0.069	1.000					
(6) flex	0.246	0.156	-0.112	-0.114	0.045	1.000				
(7) lnfixed	0.070	0.089	0.689	0.686	-0.004	-0.621	1.000			
(8) tdta	-0.257	-0.305	0.204	0.206	0.044	0.030	0.165	1.000		
(9) inflation	-0.078	0.020	0.186	0.177	0.098	-0.131	0.170	-0.124	1.000	
(10) GDP	0.065	-0.013	-0.206	-0.196	-0.161	0.121	-0.167	0.105	-0.607	1.000

**Note(s):** ROA – return on assets (stakeholder profit); ROE – return on equity (shareholder profit); size – natural log of total assets; sqsize – squared natural log of total assets; risk – standard deviation of earnings before interest and tax; flex – liquidity; lnfixed – tangibility; tdta – leverage; inflation – economic stability; GDP – gross domestic product growth rate; significance level: \*\*\* $p < 0.01$ , \*\* $p < 0.05$  and \* $p < 0.1$

**Table 7.**  
Pearson's correlation matrix

Tables 8 and 9 present results on the nonlinear effect of size on stakeholder and shareholder profitability, respectively, in the dataset. For each of the two tables, seven models are estimated and presented on the nonlinear relationship between size and stakeholder and shareholder profitability. Specifically, we present the results on random effects (see Models 1, 2, 8, 9), fixed effects (see Models 3, 4, 10 and 11), ordinary least squares (OLS) (see Models 5, 6, 12 and 13) and two-step GMM (see Models 7 and 14) in Tables 8 and 9. For each of the static models, we include robust estimations to control for biased standard errors (see models 2, 4, 6, 9, 11 and 13). These regression results are based on the estimated static and dynamic models presented in the previous chapter.

Size of insurance brokerage firms, our variable of interest, presents a positive and significant relationship on ROA across all the models in Table 8. This results indicate that the short-term effect of increment in the size of insurance brokerage firms positively affects stakeholder profits. This finding agrees with Owusu-Sekyere and Kotey (2019). It is consistent with the economies of scale and scope theories which advance that there are economic, efficient and cost reduction benefits associated with size increments, which enable firms improve their performance. However, a significantly high increase in the size of

Variables	(1) Random	(2) Robust random	(3) Fixed	(4) Robust fixed	(5) OLS	(6) Robust OLS	(7) Two-step GMM
size	1.311*** (0.274)	1.311** (0.601)	1.662*** (0.354)	1.662** (0.662)	1.107*** (0.256)	1.107** (0.477)	1.708* (1.018)
sqsize	-0.0462*** (0.0101)	-0.0462** (0.0209)	-0.0554*** (0.0133)	-0.0554** (0.0225)	-0.0389*** (0.00926)	-0.0389** (0.0166)	-0.0600 (0.0363)
risk	-0.00137 (0.00213)	-0.00137 (0.00113)	-0.00106 (0.00220)	-0.00106 (0.000891)	-0.000758 (0.00243)	-0.000758 (0.00105)	-0.000589 (0.00130)
flex	0.272* (0.156)	0.272* (0.159)	0.139 (0.207)	0.139 (0.178)	0.268* (0.148)	0.268 (0.170)	0.170 (0.158)
lnfixed	0.0151 (0.0407)	0.0151 (0.0368)	0.0210 (0.0488)	0.0210 (0.0465)	0.0100 (0.0365)	0.0100 (0.0365)	-0.578*** (0.184)
tdta	-0.406*** (0.0715)	-0.406*** (0.147)	-0.363*** (0.0892)	-0.363** (0.165)	-0.401*** (0.0697)	-0.401*** (0.124)	-0.00516 (0.0379)
inflation	-1.743 (1.265)	-1.743 (1.414)	-2.262* (1.320)	-2.262 (1.528)	-1.583 (1.512)	-1.583 (1.379)	-3.339 (3.008)
GDP	-0.340 (1.332)	-0.340 (1.402)	0.0308 (1.375)	0.0308 (1.490)	-0.00712 (1.578)	-0.00712 (1.404)	-1.456 (3.771)
L.ROA							-0.0945 (0.172)
Constant	-9.026*** (1.786)	-9.026** (4.013)	-11.94*** (2.378)	-11.94** (4.642)	-7.610*** (1.637)	-7.610** (3.122)	-11.19* (6.626)
Observations	198	198	198	198	198	198	133
R-squared	0.3354	0.3354	0.368	0.368	0.310	0.310	60
Number of firms	64	64	64	64	64	64	1.45*
Inflection	2.86***	2.08**	1.62*	1.54*	2.73***	2.23**	10.41 (0.238)
Turning Point	14.189 <sup>1</sup>	14.189	15 <sup>2</sup>	15	14.229 <sup>3</sup>	14.229	6.72 (0.568)
Hansen							-2.23 (0.026)**
AR(1)							0.74 (0.461)
AR(2)							18

**Note(s):** ROA – return on assets (stakeholder profit); ROE – return on equity (shareholder profit); size – natural log of total assets; sqsize – squared natural log of total assets; risk – standard deviation of earnings before interest and tax; flex – liquidity; lnfixed – tangibility; tdtta – leverage; inflation – economic stability; GDP – gross domestic product growth rate; significance level: \*\*\* $p < 0.01$ , \*\* $p < 0.05$  and \* $p < 0.1$  – standard errors in parentheses;  $[-1/2] \times [1.311/-0.0462] = 14.189$  (GHC 1,451,795.593),  $[-1/2] \times [1.662/-0.0554] = 15$  (GHC 3,268,017.372);  $[-1/2] \times [1.107/-0.0389] = 14.229$  (GHC 1,511,770.1)

**Table 8.**  
Nonlinear effect of insurance brokerage size on stakeholder profits in Ghana

**Table 9.**  
Nonlinear effect of  
insurance brokerage  
size on shareholder  
profits in Ghana

Variables	(8) Random	(9) Robust random	(10) Fixed	(11) Robust fixed	(12) OLS	(13) Robust OLS	(14) Two-step GMM
size	2.888*** (0.696)	2.888 (1.759)	5.152*** (1.056)	5.152** (2.511)	2.663*** (0.676)	2.663 (1.613)	4.809*** (1.785)
sqsiz	-0.0993*** (0.0253)	-0.0993 (0.0617)	-0.166*** (0.0398)	-0.166** (0.0802)	-0.0917*** (0.0244)	-0.0917 (0.0568)	-0.167** (0.0635)
risk	-0.000720 (0.00632)	-0.000720 (0.00253)	-0.00157 (0.00656)	-0.00157 (0.00254)	3.20e-05 (0.00642)	3.20e-05 (0.00248)	-0.000619 (0.00639)
flex	0.199 (0.401)	0.199 (0.364)	-0.243 (0.618)	-0.243 (0.681)	0.228 (0.392)	0.228 (0.328)	-0.197 (0.429)
lnfixed	-0.0366 (0.107)	-0.0366 (0.0790)	-0.139 (0.146)	-0.139 (0.195)	-0.0198 (0.105)	-0.0198 (0.0672)	-1.574** (0.749)
tdta	-1.091*** (0.188)	-1.091* (0.638)	-1.250*** (0.266)	-1.250 (0.800)	-1.063*** (0.184)	-1.063* (0.600)	-0.0896 (0.0979)
inflation	-5.075 (3.854)	-5.075 (4.209)	-8.719** (3.942)	-8.719 (5.652)	-4.554 (3.993)	-4.554 (4.172)	-12.70 (9.212)
GDP	-1.092 (4.038)	-1.092 (3.036)	-0.819 (4.106)	-0.819 (3.724)	-0.563 (4.169)	-0.563 (3.161)	-8.782 (10.76)
L.ROE							-0.00340 (0.127)
Constant	-19.12*** (4.474)	-19.12* (11.15)	-35.05*** (7.101)	-35.05** (16.46)	-17.83*** (4.325)	-17.83* (10.25)	-29.97*** (11.01)
Observations	198	198	198	198	198	198	133
R-squared	0.3562	0.3562	0.385	0.385	0.266	0.266	60
Number of firms	64	64	64	64			199**
Inflection	2.21**	1.36*	1.19	1.24	2.16**	1.36*	14.398 <sup>4</sup>
Turning point	14.542 <sup>1</sup>		15.518 <sup>2</sup>	15.518	14.520 <sup>3</sup>		1.68 (0.989)
Sargan							4.67 (0.792)
Hansen							-1.86 (0.063)*
AR(1)							0.81 (0.420)
AR(2)							18
Instrument							

**Note(s):** ROA – return on assets (shareholder profit); ROE – return on equity (shareholder profit); size – natural log of total assets; sqsize – squared natural log of total assets; risk – standard deviation of earnings before interest and tax; flex – liquidity; lnfixed – tangibility; tdt – leverage; inflation – economic stability; GDP – gross domestic product growth rate; significance level: \*\*\* $p < 0.01$ , \*\* $p < 0.05$  and \* $p < 0.1$  – standard errors in parentheses; <sup>1</sup> $[-1/2] \times [2.888/-0.0993] = 14.542$  (GHC 2,067,379,762); <sup>2</sup> $[-1/2] \times [5.152/-0.166] = 15.518$  (GHC 5,487,988.15); <sup>3</sup> $[-1/2] \times [2.663/-0.0917] = 14.520$  (GHC 2,023,166.633); <sup>4</sup> $[-1/2] \times [4.809/-0.167] = 14.398$  (GHC 1,790,854,777)

brokerage firms (represented by *sqsize* which is the squared value of size) is observed to negatively affect ROA across all the models in Table 8. This implies that when insurance brokerage firms become extremely large or increase in size rapidly, the expected positive effect on firm profits reverses showing a fall in firm profits. Based on the diseconomies of scale theory, we suspect the negative effect may be as a result of supervision and monitoring difficulty, and bureaucracy and laxity in decision-making and operations causing firms to be inefficient hence reduced profitability. The results also show an inflection point where the effect of size on profitability changes from positive to negative (see Tables 8 and 9). This implies that size improves the performance of insurance brokerage firms but growth in size beyond a certain threshold leads to a fall in firm profits. Specifically, when we compute threshold points following the approaches of Brambor *et al.* (2006) and Lind and Mehlum (2010), the random effect model (Model 8), fixed effect models (Model 10), ordinary least square models (Model 12) and GMM (Model 14) models in Table 9 report a threshold of GHC 2,067,379, GHC 5,487,988.150, GHC 2,023,166.633 and GHC 1,790,854.777, respectively, implying that beyond the specified monetary value of brokerage firm size, the effect of size on performance changes from a positive effect to a negative effect. This finding suggests the existence of an inverted nonlinear “U-shape” relationship between size and performance of brokerage firms in Ghana. These findings suggest that a nonlinear relationship exists between size and performance where both economies and diseconomies of scale and scope exist separated by an inflection point where size-induced profits is at its peak. Beyond the threshold, the effect of size becomes negative on firm profits. We find similar results reported in Table 8 where the nonlinear effect of size of insurance brokerage firms on stakeholder profitability is examined. This is an indication that size has a nonlinear inverted U-shape effect on both shareholder and stakeholder profitability in Ghanaian insurance brokerage firms.

Furthermore, liquidity is found to be positively and significantly related to profitability in Models 2 and 5 in Table 8. This implies that insurance brokerage firms that are relatively more liquid increase in profitability comparatively. This is not surprising and conforms to the argument that liquidity serves as a booster for client confidence, hence attracting more clients and businesses, which leads to more operations and increased performance. Also, we find that fixed assets reduce performance contrary to the finance and accounting concept that posits that fixed assets are the economic resources of firms, which assist and propel performance. However, we argue following Himmelberg *et al.* (1999) and Margaritis and Psillaki (2010) that when fixed assets are idle, obsolete, worn out and require major repairs and maintenance, they tend to increase the operating cost of firms leading to low performance. This finding is also consistent with Owusu-Sekyere and Kotey (2019) who explained that the acquisition of capital-intensive fixed assets means less liquidity for operations, which affects firm profits. These results are also observed in the two-step GMM models (Model 7 and 14) in Tables 8 and 9. Similarly, the results show that leverage reduces performance across the models with the exception of the two-step GMM models (Models 7 and 14). Following the financial distress theory, leverage increases the risk profile of firms and hence their performance is reduced. This finding is true for both stakeholder and shareholder profitability in the dataset. Finally, the results also show that inflation in Models 3 and 10 reduces stakeholder and shareholder profitability, respectively. Thus, inflation weakens the purchasing power of the local currency, hence the fall in value of both stakeholder and shareholder profitability. From the two-step GMM models, profits are not persistent as the lags of profitability are not significantly related to current year profitability.

### Model diagnostic checks

To enhance reliability, efficiency and accuracy of the result, the study employs a number of techniques. First, using the statistic table, the study screens for outliers in order to reduce the

biases caused by outliers. Hence, no evidence of outliers was identified. Second, the normality of each variable is assessed by the use of the Shapiro–Wilk normality test (Table 6). Third, the study employs the Pearson’s correlation to screen for multicollinearity and realized high correlations between size and its squared which is accepted in nonlinear studies (Allison, 2012). Fourth, the study employs Breusch and Pagan Lagrangian multiplier test (Appendix 2) to justify the use of OLS or the random effects. From the results in Appendix 2, random effects models are preferred to the OLS models for both ROA and equity models. Fifth, the Hausman specification test (Appendix 3) is employed to justify the choice between fixed effects and random effects models. Subsequently, while the Hausman test results for ROA indicates preference for the use of fixed effects models, the Hausman test results for ROE indicate preference for random effects models. Similarly, cross-sectional dependence is tested using the Pesaran (2015) approach because our panel is unbalanced. With a null hypothesis of weak cross-sectional dependence, the Pesaran (2015) results (see Appendix 4) fail to reject the null of weak cross-sectional dependence implying that the severity and presence of cross-sectional dependence can be ignored for both ROA and ROE models, respectively. More so, financial asset pricing theories show that risk and profits have reverse causality characteristics. Hence, to avoid problems of reverse causality leading to endogeneity problems in our results, the GMM estimator is employed. Specifically, the two-step GMM model is employed ahead of the one-step GMM to control for heteroscedasticity, (Appendix 5) which was present in the data. On the problem of autocorrelation, no evidence of first-order autocorrelation is found (see Appendix 6). Given all the processes and procedures undergone, it is safe to say the results are reliable, consistent and efficient, and fit for generalization of insurance brokerage firms in Ghana.

### Conclusion and policy recommendation

This study examines the possible nonlinear effect of size on stakeholder and shareholder profitability in the Ghanaian insurance brokerage industry between 2011 and 2015. The study is motivated by the limited studies on the auxiliary firms, including insurance brokerage firms that support the effective and efficient operation of the insurance industry and the entire financial system. Employing a panel data of 64 insurance brokerage firms in Ghana across both static (OLS, fixed effects and random effects) and dynamic models (two-step GMM), findings are presented on the nonlinear effect of size of insurance brokerage firms stakeholder and shareholder profitability. We find the existence of both economies and diseconomies of scale and scope theories in the Ghanaian insurance brokerage industry implying the existence of a nonlinear inverted *U*-shape nexus between size and performance of insurance brokerage firms. This finding is consistent for both stakeholder and shareholder profit performance. Thus, size improves the performance of the Ghanaian insurance brokerage firms within the period studied but beyond a certain threshold, size impedes or reduces the performance of brokerage firms in Ghana.

These findings have policy implications and recommendations for insurance brokerage managers, researchers and policymakers in the Ghanaian insurance industry. Thus, managers of insurance brokerage firms must manage the firm size carefully by measuring firm performance vis-a-vis size, as an uncontrolled increase in firm size may go beyond the threshold (i.e. the inflection point), which is harmful to stakeholder and shareholder value maximization. Progrowth policies targeting insurance brokers must be well examined and tested, as this research provides proof that not all firm growth is beneficial to firm profits. Researchers are encouraged to exploit these findings by exploring this effect using different insurance datasets to bring out new contexts and perspectives.

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**Note**

1. A database of Ghanaian insurance broker financial statements is virtually nonexistent and most of them do not have electronic copies of their statements online. To conduct this research, the authors relied on individually collected data. The data have been uploaded onto the Mendeley Data Repository (DOI: 10.17632/gx572w29sr.2).

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## Appendix 1

Variable	VIF	1/VIF
size	1.08	0.922145
tdta	1.07	0.937158
lnfixed	1.02	0.978469
risk	1.01	0.991510
Mean VIF	1.05	

**Table A1.**  
VIF test

**Appendix 2**  
**Breusch and Pagan Lagrangian multiplier test for random effects**

Breusch and Pagan Lagrangian multiplier test for random effects (ROA)

$$ROA[\text{firmcode},f] = Xb + u[\text{firmcode}] + e[\text{firmcode},f]$$

Estimated results:

	Var	sd = sqrt(Var)
ROA	0.0985966	0.314001
e	0.0450626	0.2122794
u	0.029569	0.1719565

Test:  $Var(u) = 0$   
 $chibar2(01) = 15.45$   
 $Prob > chibar2 = 0.0000$

Breusch and Pagan Lagrangian multiplier test for random effects (ROE)

$$ROE[\text{firmcode},f] = Xb + u[\text{firmcode}] + e[\text{firmcode},f]$$

Estimated results:

	Var	sd = sqrt(Var)
ROE	0.6464261	0.8040063
e	0.4018667	0.6339296
u	0.0351327	0.1874373

Test:  $Var(u) = 0$   
 $chibar2(01) = 4.40$   
 $Prob > chibar2 = 0.0180$

**Appendix 3**

**Table A2.**  
**Hausman (1978)**  
specification test

	Coef.
<i>Hausman (1978) specification test (ROA)</i>	
Chi-square test value	11.192
P-value	0.191
<i>Hausman (1978) specification test (ROE)</i>	
Chi-square test value	20.169
P-value	0.01

**Appendix 4**  
**Pesaran (2015) test for weak cross-sectional dependence**

**Pesaran (2015) test for weak cross-sectional dependence (ROA)**

Residuals calculated using predict, e from xtreg.  
 (137 missing values generated)  
 Unbalanced panel detected, test adjusted.

---

H0: errors are weakly cross-sectional dependent.

$$CD = -0.793$$

$$p\text{-value} = 0.428$$

The nonlinear  
effect of size

---

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### **Pesaran (2015) test for weak cross-sectional dependence (ROE)**

Residuals calculated using predict,  $e$  from xtreg.

(137 missing values generated)

Unbalanced panel detected, test adjusted.

H0: errors are weakly cross-sectional dependent.

$$CD = -0.519$$

$$p\text{-value} = 0.604$$

### **Appendix 5**

#### **Modified Wald test for groupwise heteroskedasticity**

In fixed effect regression model

H0:  $\sigma^2(i) = \sigma^2$  for all  $i$

$$\chi^2(64) = 5.6e + 36$$

$$\text{Prob} > \chi^2 = 0.0000$$

### **Appendix 6**

#### **Wooldridge test for autocorrelation in panel data**

Wooldridge test for autocorrelation in panel data (ROA)

H0: no first order autocorrelation

$$F(1, 33) = 0.850$$

$$\text{Prob} > F = 0.3632$$

Wooldridge test for autocorrelation in panel data (ROE)

H0: no first-order autocorrelation

$$F(1, 33) = 0.067$$

$$\text{Prob} > F = 0.7977$$

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