Ownership Structure, Firm Size and Scalability: An Analysis of Government, Foreign, and Shareholding Effects of Listed Companies in Ghana

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Abstract: This paper systematically examines the impact of different ownership structures (government, foreign, and private shareholdings) on the size of listed companies in Ghana, focusing on whether these characteristics catalyse a potential for corporate growth and scalability. A sample of 25 listed firms (10 financial and 15 non-financial) covering the period 2011-2021 was included in the study. A panel-corrected standard error modelling technique was adopted while the pooled OLS, fixed-effects, random-effects, RE-GLS autoregressive order one, Arellano-Bond GMM, and system GMM estimators were used for robustness tests. The findings underscore the importance of diverse ownership structures and effective board composition in influencing firm size and scalability in Ghana. The results show that government ownership, foreign ownership, substantial private shares holdings, board size, and having a woman as board chair significantly promote firm size and scalability while having an increased number of nonexecutive directors on corporate boards is detrimental to long-run growth and scalability. The results further reveal that firm profit and women representation on boards do not affect the size and scalability of firms. Excessive board independence is detrimental, hence the need for a balanced approach to governance. Regulations should facilitate and support increased foreign and significant private ownership to foster greater capacity and development of company sizes. The need to emphasize and support the practice of including women as board chairpersons, leveraging the strong, positive links this has with company scale, and prompting the growth of a basis for a push towards improving gender-inclusive corporate leadership roles is further recommended.

Keywords: Ownership Structure, Firm Size, Scalability, Stock Market, Corporate Governance.

1. INTRODUCTION

The interplay between ownership structure and firm size has long captivated academic and practical interest, offering profound implications for corporate governance, strategic decision-making, and economic policy formulation. These ownership structures introduce diverse interests, governance mechanisms, and strategic priorities, potentially leading to varied outcomes in firm growth and development. The architecture of ownership in firms critically shapes their strategic direction, governance, and performance. Different ownership structures - encompassing government stakes, foreign ownership, and substantial private shareholdings - introduce varied influences on firm operations, strategic decision-making, and ultimately, on the firm's size and growth trajectory. This study delves into the intricate dynamics between the ownership structure of firms and their size, particularly focusing on the nuanced roles that government, foreign, and substantial private ownership play in shaping firm outcomes. By investigating listed companies across diverse sectors, this study aims to unravel the complex interplay between ownership configurations and firm size, offering insights into how dif ferent ownership types affect strategic choices that determine firm expansion and scalability.

While the impact of ownership structure on firm performance has been extensively researched, less attention has been given to how these ownership forms specifically influence firm size. Ownership structure can significantly affect a firm's access to resources, its risk-taking behaviour, and its ability to engage in strategic expansions or contractions. Government-owned firms may prioritise social objectives over growth, foreign owners might bring in new competencies and access to international markets, and substantial private shareholders could influence firm strategies towards sustainable long-term growth. However, the specific mechanisms through which these varied ownership structures affect firm size remain underexplored, particularly in emerging markets where the regulatory and economic context adds another layer of complexity. This knowledge gap limits the ability of policymakers and corporate managers to harness ownership structures strategically to influence firm size and competitiveness, especially in emerging economies where these dynamics are most pronounced. Therefore, this paper seeks to fill this gap by systematically examining the influence of different ownership structures on the overall size of firms. With reference to Ghana, the underlying objectives of this study are to:

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- 1. identify the influence of government ownership on firm size
- 2. assess the impact of foreign ownership on firm size
- 3. explore the role of significant private in determining firm size
- 4. compare the effects of these ownership structures across different industries financial and non-financial listed companies.

Therefore, this study commits to providing empirical answers to the following questions:

- 1. How does government ownership affect the size of firms? This question investigates whether and in what ways state participation influences strategic priorities towards expansion or contraction.
- 2. In what manner does foreign ownership contribute to changes in firm size? Here, the focus is on understanding the direct and indirect impacts of foreign stakeholders on firm growth strategies.
- 3. What is the role of significant private shareholdings in shaping the size of firms? This question aims to unravel the strategic decisions driven by private large shareholders and their implications for firm size.
- 4. How do the effects of ownership structure on firm size vary across different sectors? This question seeks to explore industry-specific dynamics that might influence how different ownership structures affect firm size.

This study employs a mix of quantitative and qualitative methodologies to address these objectives and questions, aiming to contribute to the theoretical and practical understanding of how ownership structures impact firm size, with implications for policymakers, investors, and corporate managers.

Investigating the impact of government ownership, foreign ownership, and significant private shareholdings on firm size is not only of academic interest but also of practical importance to a wide range of stakeholders. By enhancing our understanding of these relationships, this research can contribute to more effective corporate governance, investment strategies, and policy formulations that support sustainable firm growth and economic development.

The paper proceeds with literature review, methodological and data issues, presentation and discussion of findings, and recommendations.

2. LITERATURE REVIEW

2.1. Theoretical Foundation

The key theoretical frameworks for this study cut-across the fields of economics, finance, and organisational behaviour jointly provide a conceptual basis for understanding the mechanisms through which ownership configurations can influence firm strategies, resources, and performance outcomes, including firm size.

2.1.1. Agency Theory

Agency theory is central to the understanding of ownership structures and suggests that conflicts of interest between principals (owners) and agents (managers) can lead to inefficiencies unless appropriate governance mechanisms are in place (Jensen and Meckling, 1976). This theory contends that different ownership structures can mitigate or exacerbate agency costs, influencing firm strategies and outcomes, including size. Ownership structure impacts agency costs and control mechanisms, with implications for firm size and expansion strategies. For example, government ownership might introduce different priorities than profit maximisation, affecting firm size through the allocation of resources and strategic decisions. Government and private ownerships bring different levels of monitoring and control, which can impact firm expansion and strategic decisions differently.

2.1.2. Institutional Theory

Institutional theory argues that firms are influenced by the norms, values, and rules of the institutional environment in which they operate and this can shape corporate strategies and structures (DiMaggio and Powell, 1983). This theory can help explain how foreign ownership impacts firm size, as foreign investors may introduce different practices and expectations based on their institutional backgrounds, potentially leading to different growth patterns (North, 1990). This theory helps explain how regulatory frameworks and societal expectations associated with different types of ownership (e.g., government vs. private) can impact firm size by dictating or constraining strategic choices.

2.1.3. Resource Dependence Theory

This theory posits that firms adjust their strategies and structures based on the need to acquire and maintain critical resources (Pfeffer and Salancik, 1978). In other words, ownership structure can influence a firm's access to resources, including capital, technology, and expertise. Foreign ownership might provide firms with access to new markets, technologies, and financing opportunities, potentially influencing their size and growth prospects (Barney, 1991). Similarly, significant private shareholdings might bring in unique competencies and resources, affecting firm strategies and scale.

2.1.4. Political Economy Theory

This theory examines how political and economic factors intersect to influence firm behaviour and outcomes. Government ownership of firms is particularly relevant here, as state-owned enterprises may prioritise social or political objectives over economic ones, which can influence their size and growth differently than privately owned firms (Shleifer and Vishny, 1994).

2.1.5. Transaction Cost Economics Theory

Transaction cost economics theory explores the costs of coordinating and exchanging resources through the market versus within an organisation. Ownership structure can affect these costs and the resultant organisational forms and sizes. For example, firms with significant private shareholdings might minimise transaction costs differently than government or foreign-owned firms, impacting their scale and scope (Williamson, 1981).

2.1.6. The Theory of the Firm

This theory provides a broad framework for understanding how firms make decisions related to production, expansion, and resource allocation (Coase, 1937; Williamson, 1981; Adenutsi, 2013). This theory can be applied to analyse how ownership structures influence firm objectives, including growth, scope and size, through their impact on transaction costs and organisational efficiency.

In conclusion, these theoretical perspectives collectively provide a rich conceptual foundation for exploring the relationship between ownership structure and firm size. They suggest that ownership structures influence firm size and growth through various mechanisms, including governance practices, access to resources, compliance with institutional norms, and efficiency in organisational decisionmaking.

2.2. Empirical Literature

Empirical research on the impact of different ownership structures on the size of firms provides nuanced insights into how government ownership, foreign ownership, and significant private shareholdings shape corporate outcomes.

Studies on government ownership and firm size often highlight mixed outcomes. On one hand, government-owned enterprises might benefit from easier access to capital and support from public policies, potentially facilitating growth and expansion (Megginson and Netter, 2001). On the other hand, the efficiency concerns, bureaucratic constraints, and less profit-oriented objectives associated with government ownership could limit firm size and operational scope (Shleifer and Vishny, 1994).

Firms with significant foreign ownership are often found to be larger and more competitive, attributed to the transfer of technology, management expertise, and access to international markets (Djankov and Murrell, 2002). Foreign investors can provide the capital and global networks needed for expansion, driving firm growth. However, the extent of this impact can vary based on the industry regulatory environment, and the strategic goals of foreign investors (Dunning, 1993).

Significant private shareholdings are often associated with more aggressive growth strategies and innovation, as private shareholders seek to maximise returns (La Porta, Lopez-de-Silanes, Shleifer and Vishny). In a related study, Zandi, Singh, Mohammad, Ehsanullah (2020) report that the ownership structure (the outsider and the insider i.e. managerial ownership) favourably increase the firm performance based on 200 Malaysian listed companies and conclude that both ownership structures have a positive relationship with firm performance.

Galego, Mira and Silva (2019) found a positive relationship between managerial ownership and firm performance where managers are the part of higher management and the corporate board. He and Kyaw (2018) found managerial ownership as a positive predictor of performance but conversely, performance did not predict ownership. In contrast, using panel data, Chen, Lin, Kao, and Wei (2016) found that firm size has a positive relationship with firms owned by insiders and likewise, that idiosyncratic risk has a negative relationship with firms owned by insiders.

Demsetz and Villalonga (2001) reported that there is no evidence to prove any relationship between ownership structure and firm performance. Ali, Shah and Jan (2015) identified a significant relationship between ownership structure and firm performance. Hill and Snell (1988) reported that ownership structure has a direct connection with firm performance, as measured by profitability. This is the strategic decision of the concentrated firms to increase the firms' value. Indeed, as noted by Adenutsi (2024), there is a plethora of conflicting results on how capital structure affect firm performance.

Conclusively, the impact of ownership structure on firm size is multifaceted, with government, foreign, and private ownership each presenting unique advantages and challenges. The balance between these factors determines the extent to which they influence firm growth and market presence. This empirical study further elucidates these relationships in Ghana, an emerging economy where the dynamics of ownership structures and their effects on firm size might differ significantly from those in developed markets. The justification and significance of investigating the impact of different ownership structures - such as government ownership, foreign ownership, and significant private shareholdings - on the overall size of a firm are multifaceted and rooted in both theoretical and practical considerations.

3. METHODOLOGY

3.1. The Empirical Model

The general model for the empirical analysis is of the form, FSize = f[(GOwn, FOwn, SShares) + (Control Variables)], where the control variables are board independence (BIndep), board size (BSize), firm profit (FProfit), type of sector (sector), women representation on boards (WRB), and woman as a board chair (WBChair). The specific empirical is the Panel-Corrected Standard Errors (PCSE) model specified as Equation 1.

$$FSize_{it} = \beta_0 + \beta_1 GOwn_{it} + \beta_3 SShares_{it} + \beta_4 BIndep_{it} + \beta_5 BSize_{it}$$
(1)
+ $\beta_6 F \operatorname{Profitit} + \beta_7 Sector_{it} + \beta_8 WRB_{it} + \beta_9 WBChair_{it} + \mu_i + \varepsilon_{it}$

where *i* indexes the firm, *t* indexes time, β_0 is the constant term, $\beta_1, \beta_2, ..., \beta_9$ are the unknown parameters to be estimated to establish the individual impact of the independent and control variables on the dependent variable, μ_i is the unob-

served firm-specific effect, and \mathcal{E}_{it} is the idiosyncratic error term. The empirical panel-data model is based on the structure, N > T where N = 25 and T = 2011, 2012, ..., 2021=11. The definition and measurement of each variable in this model are presented in Table **1**.

Table 1. Definition and Measurement of Variables.

Variable	Definition and Measurement
FSize	Natural logarithm of total assets of a listed firm

GOwn	Dummy, 1 if a listed firm is controlled by the gov- ernment, 0 otherwise
FOwn	Dummy, 1 if a listed firm is controlled by foreign- ers, 0 otherwise
SShares	Proportion of shares privately held by substantial shareholders (5% and above) in a listed firm
BIndep	Proportion of non-executive directors on the board of a listed form
BSize	Total number of persons (directors plus non- executive directors) on a board
FProfit	Return on Assets (profit before interest and tax divided by total assets)
Sector	Dummy, 1 if a listed firm is a financial institution, 0 otherwise
WRB	Percentage of women on the board of a listed firm
WBChair	Dummy, 1 if the board chairperson is female, 0 otherwise

Source: Author based on audited financial statements and annual reports of GSE-listed firms.

This empirical PCSE model is appropriate when there is a reason to believe that the disturbances are not independently distributed across firms or over time. It is designed to produce consistent and efficient estimates in the presence of panel-specific autocorrelation and heteroskedasticity when analysing panel data that include both time-invariant and time-varying variables.

The strengths of PCSE models include the robustness to heteroskedasticity, which is a common issue in panel data where the variance of the error term differs across crosssectional units; correction for autocorrelation within panels, which can bias the standard errors in a pooled OLS regression; and the capability to account for the possibility of cross-sectional dependence, which occurs when the error terms are correlated across panels. However, the main demerit of the empirical PCSE model is the fact that it assumes a linear relationship between the dependent and independent variables, which may not always hold true in real-world scenarios. Meanwhile, this demerit has been partly addressed because Equation (1) is a log-linear function.

3.2. Estimation Procedures

3.2.1. Diagnostic Tests

Prior to the estimation of the empirical PCSE model, the appropriate diagnostic tests were performed to avoid spurious regression. First, a descriptive statistical summary of the data was undertaken to detect the completeness and nature of each variable included in the estimation. The results of the statistical summary of the data are presented in Table A1. Second, a pairwise contemporaneous correlation analysis was undertaken to determine if there were linear dependency issues among the explanatory variables. The results as reported in Table A2 show no evidence of a high correlation coefficient since the range was 0.5991 and 0.003 with 21 out of the 45 coefficients being less than 0.1. To buttress this evidence, the variance inflation factor multicollinearity test

was performed. As reported in Table A3, the VIF ranged between 2.39 and 1.02 with a mean of 1.50, which is far below the threshold of 7.5 for an N > T dataset.

Next, cross-sectional dependence tests were carried out on each variable. Based on the Breusch-Pagan LM and the Pesaran CD statistics, three variables (FSize, BIndep, and FProfit) could not pass this test consistently at the 5% level of statistical significance. In the presence of cross-sectional dependency, PCSE model estimates remain reliable because this modelling corrects for heteroskedasticity and autocorrelation within panels, which could be as a result of crosssectional dependency. Thus, the empirical PCSE model has the inherent capability to address the inefficiencies and potential biases caused by the presence of cross-sectional dependency in panel data analysis.

Technically, cointegration tests are irrelevant when dealing with data with large N relative to T, and when all the variables are integrated of order one (Table A5). However, to ally reservations in connection with this, the Engle-Granger residual-based test was undertaken and the results are presented in Table A4 and Figure A2.

3.2.2. Data and Sample

Data on 25 firms listed on the Ghana Stock Exchange (GSE) covering the period 2011 to 2021 was used in this study. The sampled listed firms comprised 15 non-financial and 10 financial institutions. The selection of the study period and inclusion of firms was strictly determined by the availability of consistent data. The source of the data was the annual audited financial statements and annual reports published by the GSE on its website.

3.2.3. Robustness Analyses

A variety of estimation techniques, including pooled OLS, panel fixed-effects (FE), panel random-effects (RE), random-effects GLS with autoregressive-one process (RE GLS (AR_1), Arellano-Bond GMM, and system GMM were employed to provide a robust analytical framework. Thus, a set of static and dynamic models was estimated to confirm the consistency and reliability of the estimated PCSE model.

Pooled OLS assumes that the individual (cross-sectional) and time series dimensions are pooled into a single dataset, ignoring any individual or time effects. This model serves as a baseline and its results are useful for comparison with more complex models. The FE model accounts for unobserved heterogeneity when this heterogeneity is constant over time and correlates with independent variables, and it is particularly useful when the focus is on analysing the impact of variables that vary over time. The RE model assumes that the individual-specific effect is random and uncorrelated with the independent variables. This is useful when the individual-specific effects are thought to be uncorrelated with the other covariates. The RE GLS (AR 1) model was estimated essentially because it is more efficient than standard least squares and is applied when individual effects are random and uncorrelated with the independent variables.

On the dynamic side, the Arellano-Bond one-step estimation was carried out because it is useful for dealing with potential endogeneity issues within the lagged dependent varia-

Table 2. Empirica	d Results of the	Panel-Corrected	Standard E	error Model
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-	Coefficient	Standard Error	z-Static	z-Probability	
Government Ownership	0.99325	0.08709	11.40***	0.000	
Foreign Ownership	0.76202	0.06808	11.19***	0.000	
Substantial Shares	0.94667	0.13597	6.96***	0.000	
Board Independence	-1.72731	0.56038	-3.08***	0.002	
Board Size	0.26749	0.03280	8.16***	0.000	
Firm Profit	-0.00000	0.00000	-1.01	0.312	
Sector	0.87925	0.05720	15.37***	0.000	
Women Representative on Boards	-0.91264	0.61966 -1.47		0.141	
Women as a Board Chair	0.44539	0.20245	2.20**	0.028	
Constant	5.57235	0.26176	21.29***	0.000	
R-squared	0.5236	Estimated Covariances		325	
Wald (X2)	7818.96	Estimated Autocorrelations		0.0	
Probability	(0.0000)	Estimat	Estimated Coefficients		

Source: Author's estimation***/** denotes 1%, and 5% respectively.

ble, particularly when T is small and N is large, while the system GMM modelling technique is well-known for its ability to using more levels equations and adding more instruments, hence the most efficient for reducing bias and improving efficiency when the instruments are weak in T < N panels.

Each of these models offers certain advantages depending on the structure of the data and the nature of the relationships between variables. The PCSE model is preferred when dealing with panel data that has a large cross-sectional dimension (N) and a shorter time dimension (T), as it corrects for disturbances that are heteroskedastic and contemporaneously correlated across panels, a common issue in panel data sets (Adenutsi, 2014).

Each of the aforementioned estimatorshas its demerits. For example, pooled OLS does not account for individual heterogeneity, while fixed-effects models cannot estimate the effects of time-invariant variables. Random-effects models assume no correlation between individual effects and explanatory variables, which might not hold in practice. The validity of GMM estimators relies heavily on the choice and strength of instruments, which may not always be available or appropriately strong, and conditioned on very large N.

4. RESULTS

The estimated results are presented in Table 2. The model demonstrates a substantial overall fit with an R-squared of 0.5236, indicating that over 50% of the variability in the dependent variable can be explained by the model's predictors. The significant Wald statistic (7818.96) with a probability of 0.0000 confirms the overall significance of the model.

The key findings from this study are:

- 1. Government ownership has a significant positive impact with a coefficient of 0.99325, indicating that increases in government ownership are associated with an increase in firm size.
- 2. Foreign ownership has a significant positive effect of 0.76202, suggesting foreign ownership positively influences firm size.
- 3. Substantial private shareholding positively determines firm size with an impact factor of 0.94667.
- Board independence has a significant negative impact (-1.72731) on firm size, suggesting that under certain conditions, increased board independence is associated with a decrease in firm size.
- 5. Board size is positively associated with firm size, implying that larger boards contribute to an increase in firm size with an impact factor of 0.26749.
- 6. Firm profit has no impact on firm size.
- 7. Sector has a significant positive impact, suggesting industry-specific factors (in this case, being a financial institution) positively influence firm size with an impact factor of 0.87925.
- 8. Women representation on boards has no long-run impact on firm size.
- 9. Women as chairpersons of corporate boards have a significant positive effect on firm size with an impact factor of 0.44539.

5. DISCUSSION

Overall, ownership structure in terms of government ownership and foreign ownership is a significant determinant of firm size in the long run. This finding validates previous results reported by Ali, Shah, Jan (2015), Demsetz and Villalonga (2001), Megginson and Netter (2001), and Hill and Snell (1988).

The negative impact of board independence on firm size gives credence to the agency theory, requiring aligning interests between management and shareholders, because much independence of a corporate board may impede effective decision-making and growth. This result confirms that of Zandi Singh, Mohamad and Eshanullah (2020), but contradicts the findings reported by Galego et al. (2019), He and Kyaw (2018), and Chen et al. (2016) probably as a result of differences in sample, time and data analytical framework.

The significant positive effects of government ownership, foreign ownership, and sector-specific factors on firm size highlight institutional pressures and legitimacy benefits driving firm growth, aligning with institutional theory. These results reveal the long-run positive impact of ownership, notably government, foreign, and private shareholding effects, on firm size and scalability. These results affirm the conclusions drawn by Chen et al. (2016), Djankov and Murrell (2002), Megginson and Netter (2001), and La Porta et al (1999). However, these results contrast those reported by Shelifera and Vishny (1994) and Dunning (1993) most likely because of differences in time and method of analysis.

The positive relationship between board size, foreign ownership, and firm size supports resource dependence theory, indicating that access to diverse resources and external networks through such ownership and board structures facilitates firm expansion. Also, the positive effect of government ownership on firm size aligns with the political economy theory, suggesting that political connections and support can provide strategic advantages, enhancing firm growth.

The lack of impact from firm profit on firm size seems to suggest that transaction costs associated with scaling operations could offset profitability gains, a perspective informed by the transaction cost economics theory.

The positive impacts of ownership structures and board characteristics on firm size reflect the theory of the firm which is concerned with how organisational structures and governance mechanisms influence firm capabilities and scope in the long run.

6. CONCLUSION

The general objective of this study, which is to examine the impact of ownership structures, including government ownership, foreign ownership, and significant private shareholdings, on the size and scalability of listed firms in Ghana has been achieved. Based on the findings, it is concluded that government and foreign ownership, along with substantial private shareholding, significantly enhance firm size, indicating the importance of diverse ownership structures in corporate growth. However, increased board independence correlates negatively with firm size, suggesting potential overgovernance. The positive impact of board size and women chairpersons on firm size highlights the value of board diversity and effective leadership. Consistent with these findings, the research questions posed are answered as follows:

1. How does government ownership affect the size of firms?

Government ownership positively influences firm size, suggesting state participation might steer strategic priorities towards expansion, leveraging governmental support and resources.

2. In what manner does foreign ownership contribute to changes in firm size?

Foreign ownership has a significant positive effect on firm size, implying that foreign shareholders might have been injecting capital, introducing global practices, and networks that contribute to firm growth and scalability in Ghana.

3. What is the role of significant private shareholdings in shaping the size of firms?

Significant private shareholdings positively impact on firm size, highlighting the role of large private shareholders in strategic decision-making that favours expansion and scalability of listed firms in Ghana.

4. How do the effects of ownership structure on firm size vary across different sectors?

The effects of ownership structure on firm size demonstrate variability across different sectors, with firms within the financial sector, showing stronger positive impacts, suggesting sector-specific dynamics play a crucial role in how ownership structures influence firm size and scalability in Ghana.

Based on the findings, this study advances the following action-oriented recommendations for relevant stakeholders:

- *Government Agencies*: Increase strategic investments in firms, emphasizing sectors where government involvement can significantly enhance firm growth and scalability.
- *Foreign Investors*: Incentivize foreign investments in listed firms, leveraging the positive impact on firm size and contributing to the local economy.
- *Private Shareholders*: Engage actively in strategic decision making, leveraging significant sharehold-ings to positively influence firm size and market position.
- Corporate Boards: Corporate governance guidelines should be revisited to find a balanced level of board independence that supports growth without impeding decision making.
- Increase the size of the board where necessary to incorporate diverse perspectives that contribute to firm expansion.
- Encourage gender diversity, particularly in leadership roles, to enhance decision making and firm performance.

• Review governance guidelines to support balanced board independence without hampering firm growth.

APPENDICES

Table A1. Statistical Summary of Data.

• Promote policies that enhance women's representation and leadership on corporate boards.

DECLARATION OF CONFLICTING INTEREST

The author declares no conflicts of interest regarding the publication of this manuscript.

VARIABLE	Obervations	Mean	Standard Deviation	Minimum	Maximum
Firm Size	275	8.428268	1.37191	5.184379	11.75392
Government Owned	275	0.28	0.4498175	0	1
Foreign Owned	275	0.48	0.5005107	0	1
Substantial Shares	275	0.7008031	0.1804954	0.1498	0.9549
Board Independence	275	0.6644586	0.171457	0.1111111	1
Board Size	275	9.312727	2.105871	5	15
Firm Profit	275	-477603.6	7920160	-1.31E+08	0.37743
Sector	275	0.4	0.4907911	0	1
Women Representation on Boards+	275	0.2129339	0.1362192	0	0.6666667
Woman as Board Chair	275	0.1018182	0.3029604	0	1

Source: Author's estimation

Note: * measured percentage of women on corporate boards

Table A2. Pairwise Contemporaneous Correlation Matrix of Variables.

	FSize	GOwn	FOwn	SShares	BIndep	BSize	FProfit	Sector	WRB	WBchair
FSize	1.0000									
GOwn	0.2458*	1.0000								
FOwn	0.2241*	-0.5991*	1.0000							
SShares	0.1236*	0.1730*	-0.0718	1.0000						
BIndep	0.0730*	0.2595*	-0.0199	-0.0003	1.0000					
BSize	0.5533*	0.2116*	0.2380*	-0.1281*	0.3486*	1.0000				
FProfit	-0.0831	0.0377	-0.0629	0.0050	-0.0913	-0.1060*	1.0000			
Sector	0.4758*	0.0364	0.1961*	0.0771	0.2005*	0.3482*	-0.0740	1.0000		
WRB	-0.0940	-0.2321*	0.0287	0.0431	-0.2162*	-0.1183*	0.0263	0.0721	1.0000	
WBchair	-0.0649	0.0311	-0.1309*	-0.0509	-0.1899*	-0.2503*	0.0203	-0.1031*	0.3953*	1.0000

Source: Author's estimation

Note: * means significant at 10% statistical level

Table A3. Multicollinearity Test Results (VIF).

VARIABLE	VIF	VIF Inverse (1/VIF)
Government Owned	2.39	0.418322
Foreign Owned	2.11	0.473943
Board Size	1.70	0.587456
Women Representation on Boards	1.37	0.727611
Woman as Board Chair	1.34	0.745469
Board Independence	1.25	0.803118
Sector	1.22	0.820739
Substantial Shares	1.13	0.881825
Firm Profit	1.02	0.976455
Mean Variance Inflation Factor (VIF)	1.50333	0.714993

Source: Author's estimation

***,**,* represents 1%,5% and 10% respectively

Table A4. E-G Cointegration Test.

Method	Statistic	Probability	N	Obs.			
Levin, Lin & Chu t*	-5.01488	0.0000	25	225			
Breitung t-stat	-0.88677	0.1876	25	200			
Null: Unit root (assumes com	mon unit roo	ot process)					
Method	Statistic	Probability	N	Obs.			
Im, Pesaran and Shin W-stat	-0.70103	0.2416	25	225			
ADF - Fisher Chi-square	72.8034	0.0256	25	225			
PP - Fisher Chi-square	103.943	0.0000	25	250			
Null: Unit root (assumes individual unit root process)							

Note: E-G denotes Engle-Granger residual-based cointegration test

Table A5. Results of Panel Unit Root Tests.

Variable	LLC	IPS	ADF-Fisher	PP-Fisher
FSize	-3.71457***	0.80614***	53.4713	131.372***
SShares	-34.0469***	-14.8896***	116.3510***	119.296***
BIndep	-2.30853***	-0.05902	38.2693	59.4076**
BSize	-10.4414***	-4.90876***	119.874***	254.802***
FProfit	-2.7767***	-1.10706	57.2225	84.0475***
WRB	-22.9942***	-2.81707***	50.2751	62.9018*

Source: Author's estimation

Note: ***,**,* represents 1%, 5% and 10% respectively



Fig. (A1). Plotted Residuals vs Lagged Residuals.



Fig. (A2). Graphical Representation of the Residual (RESID). **Source**: Author's estimation

Table A5. Robustness Estimations.

		ESTIMATED ST	ESTIMATED DYNAMIC MODELS			
-	Pooled OLS	Fixed Effect	Random Effect	RE-GLS (AR 1)	Arellano-Bond GMM	System GMM
	not applicable	not applicable	not applicable	not applicable	0.52900	0.55481
Firm Size (Lag_1)	not applicable	not applicable	not applicable	not applicable	(0.09345)	(0.07069)
	not applicable	not applicable	not applicable	not applicable	[5.96]***	[7.85]***
	not applicable	not applicable	not applicable	not applicable	0.26964	0.29606
Firm Size (Lag_2)	not applicable	not applicable	not applicable	not applicable	(0.07265)	(0.06012)
	not applicable	not applicable	not applicable	not applicable	[3.71]***	[4.92]***
Government	0.99325	0.00000	1.33228	1.50557	0.00000	0.37661
Ownership	(0.19994)	(omitted)	(0.57177)	(0.55680)	(omitted)	(0.14558)
_	[4.97]***	(omitted)	[3.33]***	[3.70]***	(omitted)	[2.59]**
	0.76202	0.00000	1.05005	1 17222	0.00000	0 2/295
Foreign Ownership	(0.16800)	(omitted)	(0.52263)	(0.522630004)	0.00000 (omitted)	(0.18050)
roreign Ownersnip	[4 51]***	(omitted)	(0.32203)	(0.522030904)	(omitted)	(0.18939)
	[4.31]	(omitted)	[2.01]	[2.50]	(omitted)	[1.01]
	0.94665	-0.09793	-0.01847	-0.04776	-0.63638	-0.29022
Substantial Shares	(0.34320)	(0.36845)	(0.35394)	(0.30142)	(0.33418)	(0.37123)
	[2.76]***	[-0.27]	[-0.05]	[-0.16]	[-1.47]	[-0.76]
	-1.72731	-0.34928	0.31578	0.22415	0.00288	-0.03829
Board Independence	(0.37858)	(0.15934)	(0.15945)	(0.13159)	(0.15897)	(0.15253)
	[-4.56]***	[2.19]**	[1.98]**	[1.70]*	[0.02]	[-0.25]
	0.26749	0.11587	0.11787	0.03167	-0.00176	0.07321
Board Size	(0.03604)	(0.01581)	(0.01585)	(0.01395)	(0.01805)	(0.01691)
	[7.42]***	[7.33]***	[7.44]***	[2.27]**	[-0.10]	[4.33]***
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Firm Profit	(0.0000)	(0.0000)	(0,00000)	(0.0000)	(0.0000)	(0.0000)
rimition	(0.00000)	(0.00000)	(0.0000)	[0.67]	(0.0000)	(0.0000)
	[-0.72]	[0.14]	[0.15]	[0.07]	[0.44]	[0.40]
	0.87925	0.00000	0.86625	0.98621	0.00000	0.73686
Sector	(0.13083)	(omitted)	(0.42646)	(0.41567)	(omitted)	(0.15168)
	[6.72]***	(omitted)	[2.03]**	[2.37]**	(omitted)	[4.86]***
Women	-0.91264	0.95567	0.93767	0.36819	0.43970	0.38868
Representation on	(0.50062)	(0.17)338	(0.17438)	(0.16174)	(0.20062)	(0.19381)
Board	[-1.82]**	[5.51]***	[5.38]***	[2.28]**	[2.19]**	[2.01]**
	0.44538	0.10105	0.1055	0.0585	0.00594	0.0218
Woman Board Chair	(0.22238)	(0.06056)	(0.08098)	(0.06005)	(0.07051)	(0.07000)
	[2.00]**	[1.67]*	[1.30]	[0.97]	[0.08]	[0.31]
	5 57025	6 07207	5 60052	0 57240	2 14725	0.02602
Constant	3.37233	0.97207	3.09933 (0.48001)	9.3/340	2.14/23	0.93093
Constant	(0.43317)	(0.2000 <i>3)</i> [24 1/1***	(0.46901)	(0.40293)	(0.04430)	[2 31]**
	[12.24]	[27.14]	[11.00]	[14.20]	[5.55]***	[2.31]
K-squared	0.5236	0.3125	0.4379	0.4222	not applicable	not applicable
Corr (u_1, Xb)	not applicable	0.2493***	0.0000(<i>assumed</i>)	0.0000(assumed)	not applicable	not applicable
r-statistic Wold (v2)	not applicable	181.38***	not applicable	22 75444	not applicable	not applicable
walu (X2) Housmon (v2)	not applicable	noi applicable	120.43***	33.23****	2/3.32	not applicable
·····	noi appiicable				ποι αρριτεασιε	noi applicable

Source: Author's estimations.

Note: ***,**,* denotes 1%, 5% and 10% levels of significance respectively.

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