International Journal of Business and General Management (IJBGM)
ISSN(P): 2319-2267; ISSN(E): 2319-2275
Vol. 3, Issue 1, Jan 2014, 9-30

International Academy of Science, Engineering and Technology
Connecting Researchers; Nurturing Innovations

EXPLORING BOARD SIZE AND FIRM PERFORMANCE: IS THERE A KUZNETS' CURVE RELATIONSHIP? EVIDENCE FROM NIGERIA

CHRIS OGBECHIE & BONGO ADI

Lagos Business School, Pan-Atlantic University, Lagos, Nigeria

ABSTRACT

Board of directors is an essential component of corporate governance especially in the post-crisis global organizational system. The Agency theory and the Resource Dependency theory emphasize the role of board size in determining the effectiveness of boards in corporate governance. This study draws from both theories and considers the issue of board size and organizational performance not from the perspective of how large or small boards should be, but from the angle of optimality. In so doing, the study explores the existence of an optimal board size for firms in Nigeria, as well as the impact of board size on organizational performance.

Using both mean reversion trend and random effect model the study finds the existence of a Kuznets' curve in the relationship between board size and firm performance and in line with previous studies but no optimal board size for the sampled 100 firms in Nigeria. However, when this sample is divided into financial and non-financial firms, we find evidence that the target board size is at least 12 directors for the financial firms. Estimates of the Arrelano-Bond dynamic panel data estimation further show that board size does not significantly influence organizational performance.

KEYWORDS: Firm Performance, Resource, Kuznets, Relationship, Nigeria

1. INTRODUCTION

The idea of a dichotomy between share holders objective and that of firms' managers became predominant in the 1960s. The view then is that managers would seek to maximize their own utility first then consider the implications of this for the firm (Baumol, 1959, 1962; Marris, 1964; Williamson, 1963). This position closely approximates the views of Berle & Means (1932) who recognized that the separation of shareholders' ownership and management control in a corporation results in agency problem. The agency problem arises when the principal (shareholders) lacks the necessary power or information to monitor and control the agent (managers). More so, the shareholders, in most cases, comprising many individuals in diverse locations will always be at the mercy of managers when urgent decisions must be taken; they will find it difficult reaching a consensus in such circumstances even if owners' negotiation was initiated.

The above scenario made it critical to have some control and oversight over managers. Company boards, therefore, became an essential component of corporate governance, with the role of monitoring management (Shleifer & Vishny, 1997). Recent discourseon corporate governance has overtly emphasized the role of company boards in organizations' performance. For instance, it is believed that a good board can provide a link between the firm and its environment, secure critical resources (Hillman *et al.*, 2000).

It has an important role to play in helping management make strategic decisions (Davies, 1999; Kemp, 2006). Furthermore, an effective board is likely to help the firm achieve superior performance (Hawkings, 1997). And is a source of strength in several ways such as attracting investment capital, improving valuation and share price performance and providing better long-term shareholder returns (Lee, 2001; Carlsson, 2001).

Despite the above emphasis on boards' positive contribution to firm performance, much of the recent corporate failures have yet been linked to company boards. Ogbechie (2012) notes that the financial meltdown of 2008 that led to the collapse of companies warranted more focus on board effectiveness, leading to emphasis on transparency, accountability, regulatory oversight and efficiency of boards. Again, the near collapse of 10 banks in Nigeria in 2009 was also connected to the activities of boards, leading to the dismissal and prosecution of boards of directors of 8 banks in the country. Even recent corporate scandals in corporations such as Enron, WorldCom, Tyco international in the U.S., HIH insurance in Australia, Parmalat in Italy, Saytem in India highlight the inadequate role played by boards, leading to patent company failures (France & Carney, 2002; Weekend Herald, 2003; Economist, 2003; Lockhart, 2004; Ogbechie, 2012).

These re-occurring corporate failures has spurted interest on what makes for an effective board. Researchers and Policy makers' focus have been on specific board characteristics – outsiders' representation, board size, board leadership, Board diversity[1] and CEO duality[2]– in explaining boards' effectiveness. In some of the studies, there has also been emphasis on factors such as board process, board committees and director characteristics. But in all these, board size in developing markets has not been adequately treated, despite evidence in the theory that board size is critical for board effectiveness, nay organizations' performance. The agency theory and resource dependency theory for instance support the notion that board size has significant economic impact on firm value (Ning*et al.*, 2010; Eyenubo, 2013). While the agency theory argues that large boards can be costly, increasing operational complexity and the potential for dissention among members and leading to lower organization value (Lipton &Lorsch, 1992; Jensen, 1993; Eisenberg *et al.*, 1998), resource dependency theory suggests that companies are better off with large boards – each new board member brings both expertise and access to resources, and the diversity allows the board members to provide management with high quality service (Zahra & Pearce, 1989). So, what actually offers the optimal board size, the agency theory or the resource dependency theory?

Indeed, large boards are susceptible to social loafing. They also "tend to be contentious and fragmented, which would reduce their ability to monitor and discipline senior management. In such cases, the senior managers can affirmatively take advantage of the board through coalition building, selective channeling of information, and dividing and conquering (Alexander *et al.*, 1993).But that does not make smaller board size more appealing, for in this case there are issues of group think and limited insight. So, it boils down to answering the question, "how large or small should companies' boards be?"

Various suggestions as well as institutional standards have been established to guide board size in various climes. In Nigeria, the code of Best Practices for Public Companies recommends that the Board of Directors should be composed of both executive and non-executive directors and should not exceed 15 persons or be less than 5 persons in total. The Code of Corporate Governance for Banks in Nigeria on the other hand recommends a board size of between 5 and 20 directors. So, between these wide margins, what constitutes an optimal board size still remains uncertain. Sanda *et al* (2010) using a sample of 93 firms for the period 1996 through 1999 in Nigeria proposed an optimal board size of 10. Some other scholars have argued that board size should be no greater than 8 or 9 for all firms (Lipton & Lorsch, 1992; Jensen, 1993). Hilb (2004) on the other hand recommends a small, legally accountable, and well-diversified board comprising a maximum of 7 members (including an independent chairman, independent members and the CEO) as

[1]Board diversity refers to the make-up of a company's board. It implies that the directors have different skills, knowledge and experience should be from different age groups and social status.Diversity can either be observable, such as gender, age, race and ethnicity, or non-observable such as knowledge, education, values, perception, affection and personality (Ogbechie, 2012).

[2]CEO duality is a situation where a firm's CEO also serves as the chairman of the board of directors.

the ideal board size for publicly quoted firms. And Ning *et al.* (2010) proposes an optimal board size of 8–11 directors, as U.S. publicly traded corporations tend to target this number over time. Thus there is yet to be a consensus on the issue of optimal board size.

The divergent views are believed to result from the difference in institutional, geographical and firm specific factors which in fluence board size decision. Such differences, which are very obvious between the developed and the developing markets, warrant a view of board size optimality from the lens of the developing markets. As such, in view of the little attention given to board size optimality in Africa, and in Nigeria specifically, this study will make significant contributions to the literature as well as corporate governance mechanisms with the following objectives: 1) to explore what constitutes optimal Board Size for companies in Nigeria.2) To examine the significance of board size for companies' performance, while controlling for endogeneity problems. The paper proceeds as follows: Section 2 provides a review of the literature on board Size. Section 3 explains the methodology and discusses the dataset used. Section 4 presents the empirical results, discusses them and relates them to the different strands of the literature. Finally, Section 5 concludes the paper.

2. BOARD SIZE OPTIMALITY: LITERATURE REVIEW

The debate on how large or small a corporate board should be has dominated the interest of researchers. This is not surprising, because of the substantial role boards have to play in corporate governance, and the understanding that size matters for the boards' efficiency. Two rival theories – Agency theory and Resource dependency theory – have emerged over the years as explanations to the question, "how large should board size be?"

Agency Theory

The theory argues that as firms grow in size, the shareholders (principals) lose effective control, leaving professional managers (agents) with specialized knowledge to manage the affairs of the business, and in so doing, these agents over time gradually gain effective control over the business (Mizruchi, 1983). Often times, this transfer of firm's control from principals to agents over time leaves the agents free to pursue their own selfish aims to the detriment of the principals. This situation provides potential for managerial mischief, which leads to the agency problem (Dalton *et al*., 2007). As such, some internal and external control mechanisms that will help check the excesses of the agents were required, and board of directors, became the suitable body to control the corporate agency problem, by governing management's decisions and assessing their impact on shareholders' wealth (Alchian & Demsetz, 1972; Fama & Jensen, 1983).

Agency theory defines the monitoring effectiveness of the board in terms of size and independence (Ogbechie, 2012). The proponents, as well as various empirical studies, argue that a substantial increase of the board size could result in a slowdown in decision making and an increase in costs, leading to lower firm/organizational performance (Alexander *et al.,* 1993; Yermack, 1996; Eisenberg *et al.*, 1998; Callen*et al.*, 2003; O'Regan & Oster, 2005; Gu *et al.,* 2010; Agoraki *et al.,* 2010).

Yermack (1996), in a review of the earlier work of Monks & Minow (1995), argues that large boardrooms tend to be slow in making decisions, and hence can be an obstacle to change. A second reason for the support for small board size is that directors rarely criticize the policies of top managers and that this problem tends to increase with the number of directors.

Examining the relationship between board size and firm performance, they conclude that the smaller the board size the better the performance, and thus proposed an optimal board size of ten or fewer. John & Senbet (1998) maintain that the findings of Yermack have important implications, because they may call for the need to depend on forces outside the market system in order to determine the size of the board.

Eisenberg *et al.* (1998) also find a negative correlation between board size and return on assets and operating margin for a sample of 900 small and mid-sized finish firms. And Brown & Maloney (1998) find that larger board size predicts lower stock price returns to acquiring firms intake overs. However, Bhagat & Black (1998) find that the inverse correlation between board size and performance is not robust to the choice of performance measure.

Guest (2009) examine the impact of board size on firm performance for a large sample of 2,746UK listed firms over 1981-2002. They find that board size has a strong negative impact on profitability, Tobin's Q and share returns, which is robust across econometric models that control for different types of endogeneity. He finds no evidence that firm characteristics that determine board size in the UK lead to a more positive board size–firm performance relation. In contrast, he finds that the negative relation is strongest for large firms, which tend to have larger boards. His evidence supports the argument that problems of poor communication and decision-making undermine the effectiveness of large boards.

Similarly, Eyenubo (2013) examined the relationship between bigger board and financial performance, by looking at sample of 50 firms listed in the Nigerian Stock Exchange during the period 2001–2010. Using regression analysis, his finds that bigger board Size affects the financial performance of a firm in negatively.

In all, the theoretical and the empirical supports for agency theory of board size have become popular. The argument points towards a smaller board size for optimal performance. But what does "small" imply in the context of Nigeria? To what extent must board size grow before it becomes large, thereby impeding firm performance? Of course the agency theory does not answer the question, which warrants a further exploration of the board size discourse.

Resource Dependency Theory

In direct contrast to the agency theory, the resource dependency theory suggests that companies with larger boards do better. Large boards are more likely to contain directors with greater diversity in education and industry experience. This diversity allows the board members to provide management with high quality advice (Zahra & Pearce, 1989). The argument is that each new board member brings both expertise and access to resources. Thus, having more board members would provide the firm with greater expertise and access to resources.

These resources could include access to markets, access to new and better technologies, and access to raw materials among other things (Ning*et al.* 2010). According to Dalton & Dalton (2005), the advantage of larger board size is the greater collective information that the board subsequently possesses and hence larger boards will lead to higher performance.

Proponents of resource dependence theory argue that organizational survival is dependent on the ability to access critical resources from the environment (Casciaro and Piskorski, 2005; Pfeffer and Salancik, 1978). Firms actively manage their resource environments by maintaining external linkages to organizations on which they depend for critical resources (Hillman, 2005; Westphal et al., 2006). Boards also react in the same way, for example by adding a representative of a critical resource to the board constitutes a way of managing this dependence and benefiting the firm (Ogbechie, 2012). The argument is that directors with high social capital can bring information about the external environment, other firms' strategies, and prospective managerial talent to the firm (Certo, 2003; Davis, 1999; Haunschild, 1993). Ultimately, these ties can impact on the performance of the board and hence of the firm (Nahapiet & Ghoshal, 1998). Modern boards are therefore composed on the basis of the resources the directors will bring to the board (Ogbechie, 2012)

There is also empirical support for the resource dependency theory. Pfeffer (1973) finds that board size is positively correlated with the sources of funding in health care firms. Provan (1980) finds a positive and significant correlation between board size and nonprofit firms access to sources of funding. And Chaganti *et al.* (1985) find that firms with smaller boards are associated with a higher rate of bankruptcy.

More so, Booth & Deli (1996) contend that environmental uncertainty generally leads to large board size, arguing that larger board allow firms access to the expertise necessary to overcome this uncertainty. Accordingly, in a meta-analysis of 131 studies drawn from an aggregate of 20,620 companies, Dalton *et al*. (1999) find a non-zero and positive board size and performance relationship. And Kiel & Nicholson (2003) find positive board size effects in Australia.

Kyereboah-Coleman & Biekpe (2005) find a positive relationship between the board size and the value of firm in developing markets. And Eyenubo (2013) maintain that a bigger board brings higher management skills and makes it easier for the board to make strategic decisions that result in improving the value of a firm. Similarly, a CEO can easily manipulate a smaller board and can compromise the efficiency and independence of a board. But larger boards are more independent and efficient, as the CEO cannot manipulate it.

Notwithstanding these findings and the alluring theoretical position of the resource dependency proponents, common sense suggests that much as larger board size may be beneficial to firm performance, boards cannot get infinitely large, for then it creates more costs than benefits to the firm. So, there is the need for knowledge on how large board size needs to be before further increase becomes suboptimal. And this cannot be addressed in the context of just the resource dependency theory.

Agency and Resource Dependency Theories: Is there a Kuznets' Curve?

In view of optimality and the recognition that there could be a mid-way between having too large or too small board sizes, Hillman & Dalziel (2003) integrates agency theory and resource dependency theory. Based on the idea that directors serve as monitors and provide access to resources, they argue that viewing governance through only one theory provides an incomplete understanding of board functions and small boards may not be optimal for all companies. Other studies also find that small boards may not always be optimal. Several prior studies have provided support for optimal board size.

Hiner (1967) argues that there is a threshold where board size may have an inverse impact on firm performance. Lipton & Lorsch (1992) argue that the optimal board size appears when additional benefits, such as additional information, expertise, and monitoring of more board members is equal to additional costs such as free-riding problems, operational complexity and member conflicts within the board. Yermack (1996) finds that the correlation between firm value and board size has a convex shape, suggesting that the largest proportion of firm value lost, due to the increase in board size, occurs when a board grows from small to medium size. And Sanda*et al.* (2010) find that the relationship between firm performance and board size is positive up to a point. Beyond this point a negative relationship is predicted to set in. In other words, there is the possibility of an optimal board size in Nigeria, for size matters. Following these empirical positions, it can be deduced that the debate is no more on small or large boards. But on how small or large board size need to be for optimality to be attained. The argument goes that as board size rise it adds more value to the firm, but then becomes detrimental to the firm beyond an optimal point.

This relationship between board size and firm performance, which allows for optimality, typically replicates what is popularly termed the Kuznets' curve – inverted u-shaped curve of inequality – in economic development theory. Kuznets (1995) used this hypothesis to show that as economies develop, they first witness rising levels of inequality, then attain a peak where inequality is at its maximum, and then begin to decline as development rise.

Going forward, it follows that such relationship established by Kuznets, which we experiment in board size in Nigeria (see figure 1 below), has been empirically argued indirectly in various climes, as recorded in the preceding paragraphs.

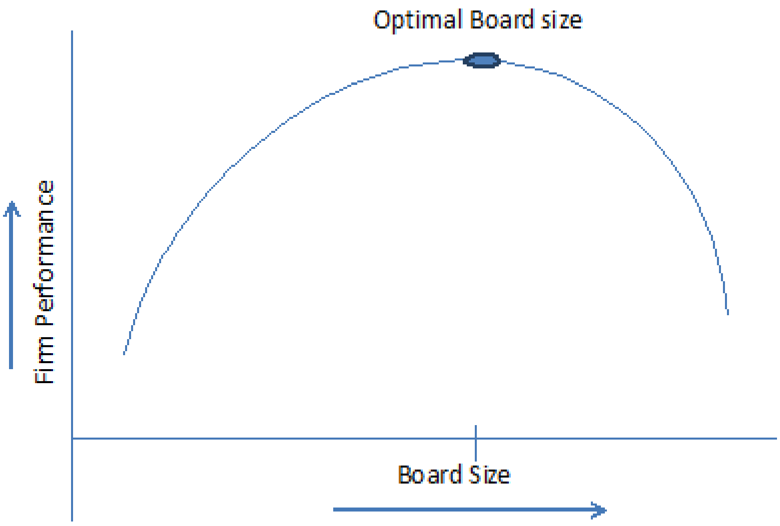

Figure 1: Kuznets' Curve of Board Size

The curve above represents what Hiner (1967), Lipton &Lorsch (1992), Yermack (1996), Hillman & Dalziel (2003) and Sanda*et al.* (2010) argued in the preceding paragraphs. The upward sloping portion of the curve represents the argument of the resource dependency theorists, while the downward sloping portion represents the argument of the Agency theorists. We proceed to methodologically experiment the existence of this Kuznets' curve – a mid-way between the Agency theory and Resource dependency theory – in board size in the Nigerian context.

3. THEORETICAL FRAMEWORK

In view of the shortcomings of considering board size from the perspective of a single theory and the possibility of the existence of a Kuznets' curve of board size, this study is based on the combination of both the agency and resource dependency theories. Thus we adopt the approach of Hillman & Dalziel (2003), Ning*et al.* (2010) and integrate agency theory and resource dependency theory to explore what the optimal board size of corporations is in Nigeria. Agency theory outlines the costs of large boards, while the resource dependency theory offers that there are benefits of having a large board. Therefore, if both theories are reliable, an optimal board will be one that strikes a balance – minimizing the costs of too small or too large boards, and maximizing benefits. This balance is what we explore in Nigeria in the context of the Kuznets' inverted u-shaped curve shown in figure 1 above.

Data and Methodology

We use a sample of 100 firms quoted in the Nigerian Stock Exchange during the period 1999 – 2008. In achieving the first objective of this study, we explore the possibility of a mean reversion trend[3] in board size in Nigeria, given the sample. Here we categorize the board sizes into the following groups: 3-5, 6-8, 9-11, 12 and above, and compare the mean of these board size groups in 1999 and in 2008, subjecting the differences to tests of significance to see if there is movement towards a given board size range, which could then be the optimal size. The sample is further splitin to two – financial and non-financial firms – because of different regulatory codes[4] that apply to these sectors, which affect board size. This is necessary to see if the earlier finding will be sustained. A random effect model (subject to Hausman test for model selection) including firm performance, board size, squared board size and relevant controls – Debt, firm size (measured by total asset), age and number of outside directors – is further employed to calculate optimal board size value and for comparison with findings from the previous method. These methodological approaches will reveal what board size is in Nigeria at the optimal point shown in the Kuznets' curve in figure 1 above.

For the second objective, dynamic linear panel-data model is adopted. A major econometric concern highlighted in recent studies is that past and current firm performance determines board size (Lehn *et al*., 2004; Boone *et al*., 2007; Coles *et al*., 2008; Guest, 2008; Linck *et al*., 2008; Guest, 2009; Sanda *et al.,* 2010). Ordinary least squares and fixed effects analysis will be biased in the presence of such dynamic and simultaneous endogeneity (Guest, 2009). Therefore, in order to deal with the problems of unobserved heterogeneity, simultaneous endogeneity and dynamic endogeneity, we employ the optimal Generalized Method of Moment (GMM) dynamic panel data estimation (Arrelano-Bond dynamic panel-data estimation), as found robust by various studies (Arrellano & Bond, 1991; Wintoki, 2007; Guest, 2009). This approach allows board size to be determined by past and present performance, and therefore provides an appropriate econometric specification fordealing with the endogeneity problems. The approach includes lagged performance as an explanatory variable, and takes first differences, which eliminates thecompany specific fixed effects. GMM estimation then uses lagged levels (by two periods and earlier) of board size and performance as instruments, which controls for both dynamic and simultaneous endogeneity. Debt, firm size, age and number of outside directors are used as controls and are also treated as endogenous. And two measures of firm performance –Return on Asset and Return on Equity – are used as dependent variables.

4. RESULTS AND DISCUSSIONS

Does Kuznets' Curve of Board Size Exist in Nigeria?

In answering the above question, which is the major thrust of this study, we examined the possibility of mean reversion trend in board size in Nigeria over time. We divided the board sizes of all the 100 firms sampled in this study into four groups – 3-5, 6-8, 9-11, 12 and above – and computed the mean of these groups in 1999 and in 2008, subjecting their differences to tests of significance. We first employed the Wilcoxon-Mann-Whitney test, relaxing the assumption of normal distribution in the board size sample being examined. The result of the various tests for each of the board size groups (see appendix 1 table 1a through 4a) showed no significant difference between the means of board size groups in 1999 and in 2008. For the groups 3-5, 6-8, 9-11 and 12 and above directors, the probability of the z-score is 0.3782, 0.5536, 0.3494 and 0.5905 respectively, which are all nonsignificant at the 0.05 level of significance.

---

[3]Ning*et al* (2010) used the term mean reversion trend to explain the finding amongst a sample of US firms between 1988 and 1999 that firms with fewer than 8 – 11baord size tend to significantly increase their board size towards this range,whereas firms with board size larger than this range tend to reduce it.

[4] The code of Best Practices for Public Companies, developed by the Securities and Exchange Commission (SEC), recommends that the Board of Directors shall be composed of both executive and non-executive directors and should not exceed 15 persons or be less than 5 persons in total. Whereasthe Code of Corporate Governance for Banks in Nigeria, developed by the Central Bank of Nigeria (CBN) recommends a board size of between 5 and 20 directors.

We re-examine this finding by upholding the assumption of normal distribution in the board size sample and thus apply t test on the board size group mean differences. The results captured in appendix 1 table 1b through 4b show that the mean difference of all the board size groups 3-5, 6-8, 9-11 and 12 and above directors, with probability values 0.8169, 0.5722, 0.5205 and 0.7527 respectively, are again statistically nonsignificant at the 0.05 significance level. This indicates that over time, board of directors in Nigerian firms does not move towards a given value which could be judged the optimal size. Although Ning*et al* (2010) used this same approach and found optimal board size of 8 – 11 directors for US publicly quoted firms, we do not find such evidence for Nigerian firms in this study.

In a bid to verify the robustness of this finding, we further employ a random effect model, with board size, squared board size, number of outside directors, debt, firm size and firm age as the explanatory variables for firm performance (return on asset, ROA). The motivation for this is to use partial differential calculus to compute optimal values for board size. We first subject this model to a Hausman test for fixed effects. The result of this test (see appendix 4 table 13), with a probability value of 0.5091, which is nonsignificant at 5% level of significance, leads to the acceptance of the null hypothesis that a random effect model is appropriate and will yield consistent estimates.

We therefore estimate the random effect model, with results (see appendix 4 table 12) showing both board size and squared board size as nonsignificant explanatory variables for firm performance (ROA) in Nigeria. Moreover, Board size is found to have positive impact on firm performance. This impact turns negative when board size is squared, implying that there exists Kuznets' curve of board size in Nigeria. Specifically, the implication of this is that at some point, further increase in board size no longer accounts for improved firm performance as the resource dependency theorists argue. It rather begins to constitute a bane to organizational performance. In other, when boards are unnecessarily large, they become unwieldy. Decision making becomes slow. Issues of moonlighting erupt. And the board may suffer executive capture. All these then lead to poorer organizational performance as posited by the agency theorists.

Notwithstanding the established evidence of Kuznets' curve in board size in Nigeria above, we, however, do not proceed to compute the optimal value of board size using partial differentiation. This is because the impact of both board size and squared board size variables on firm performance are nonsignificant. This, in essence, validates the earlier evidence that there is no specific board size that could be considered as optimal for all the publicly quoted companies in Nigeria. However, the evidence of Kuznets' curve of board size in Nigeria implies that firms operating within different institutional and geographical settings in the country need to work out what there optimal board size is. Not doing this will warrant firms reaping a sub-optimal value from their board of directors, or a beyond optimal board value which will still be lower and inefficient.

In view of the different regulatory codes that govern financial and non-financial publicly quoted firms in Nigeria, we consider further split the sampled 100 firms into financial and non-financial firms. We reapply the above tests of mean reversion trend to these two categories. In the nonfinancial firms, the Wilcox on-Mann-Whitney test (see appendix 2 tables 5a through 8a) for board size groups 3-5, 6-8, 9-11 and 12 and above directors has probability values 0.3782, 0.6153, 0.0958 and 0.6872, which shows evidence of no significant difference in the means of these groups in 1999 and 2008 at the 0.05 significance level. The t tests for these same groups (see appendix 2 tables 5b through 8b) uphold this result, thereby corroborating the earlier evidence of non-movement towards a perceived optimal board size.

Interestingly, the case of financial firms in Nigeria differs from the earlier findings. First, none of the 31 financial firms sampled in the study has board size falling in the group 3–5 directors. Subjecting the mean difference of remaining 3 groups to tests of significance, both the Wilcoxon-Mann-Whitney test and t test, with probability values of 0.0423 and

0.0325 respectively, show statistically significant difference in the mean of board size group 6 – 8 directors in 1999 and 2008. For the other two groups, 9 – 11 directors and 12 and above directors, there is no significant difference (see appendix 3 tables 9a to 11b).

The board size group, 6-8 directors, with significant mean difference has its mean increase from 6.43 in 1999 to 7.38 in 2008. The board size group 12 and above directors is the most stable group, as its mean fell from 14.75 in 1999 to 14.53 (a difference of 0.22) in 2008, whereas that of the group 9-11 directors fell from 10.08 in 1999 to 9.8 (a difference of 0.28) in 2008.

The implication here is that the most stable and hence optimal board size for financial firms in Nigeria is at least 12 directors. Movement of board sizes over time, however, goes to emphasize the relevance of both the agency theory and the resource dependency theory in board size choice among financial firms in Nigeria. We observe that financial firms in the smaller board size group (6-8 directors) raised their board sizes in line with the resource dependency theory argument of benefits of large boards, which comes from diversity, experience, social capital and access to resources (see Pfeffer & Salancik, 1978; Haunschild, 1993; Nahapiet & Ghoshal, 1998; Davis, 1999; Certo, 2003; Casciaro and Piskorski, 2005; Dalton & Dalton, 2005; Ogbechie, 2012). On the other hand, in the larger board size categories, financial firms' board size decisions rely more on the agency theory. They follow the agency theory argument that substantial increase of the board size results in a slowdown in decision making and an increase in costs, leading to lower firm/organizational performance (Alexander *et al.,* 1993; Eisenberg *et al.,* 1998; Callen *et al.*, 2003; O'Regan & Oster, 2005; Gu *et al.,* 2010) and reduce board size over time as observed.

Capping up, we infer that neither the agency theory nor the resource dependency theory on its own explains firms' board size decision in Nigeria. Firms act in line with both theories at different times in the organization's life. This submission supports the conclusion of Hillman & Dalziel (2003); Ning *et al* (2010) and Sanda *et al.* (2010) who assert that organizations consider agency costs and value maximization when making board size decisions. Boardsoften weigh the costs and benefits of a large or small size and choose the size that they deem optimal.

Does Size Matter?

Various attempts have been made in the past to assess the role of board size in organizational performance. These efforts have often been faulted due to the negligence of endogeneity problems in the methodological approach of these studies. Simultaneous endogeneity and dynamic endogeneity are often highlighted to render the results of various studies on the impact of board size on firm performance suspect. In an attempt to circumvent these endogeneity concerns and produce consistent and reliable results, we resorted to dynamic panel data instrumental variable approach. We thus employed the Arrelano-Bond dynamic panel data estimation technique. In using this method, we modeled board size against two measures of firm performance – Return on Assets (ROA) and Return on Equity (ROE) – and used debt, number of outside directors, firm age and firm size (total assets) as control variables. Appendix 5 table 14a shows the result of this estimation for ROA. In this result we controlled for heteroskedasticity and found the coefficient of board size to be positive but no nsignificant at the 0.05 significance level. We confirm the efficiency of this result by testing for the presence of autocorrelation in the residuals. Table 14b in appendix 5 shows the result of autocorrelation tests to the 4^{th} order. It reveals the absence of autocorrelation in the result, implying that our finding with respect to the impact of board size on ROA in Nigeria is efficient.

We repeat the above estimation procedure using ROE as the measure of firm performance. Again, after ensuring that the estimation result is heteroskedasticity consistent, we find the coefficient of board size to be positive and no nsignificant (see appendix 5 table 15a). We further test for autocorrelation to the 4th order, and the result (see table 15b appendix 5) reveals the absence of autocorrelation in the residuals. This resultsupports the work of Pfeffer (1973), Kiel & Nicholson (2003), Kyereboah-Coleman & Biekpe (2005), Sanda *et al.* (2010) who found board size to have positive impact on firm performance. It however contradicts the work of Gertner & Kaplan (1996), Denis & Sarin (1999), Ning *et al* (2010) and Eyenubo (2013) whose studies support the agency theory that rising board size significantly impedes firm performance.

It therefore follows that board size does not significantly impact organizational performance in Nigeria. Connecting this with the inferences in the previous section, we surmise that before board size reaches the optimal point, increasing the size of an organization's board improves firm performance in Nigeria, but only marginally. This negligible contribution to firm performance however disappears and even turns negative beyond the optimal board size of the firm in question. Additionally, Nigerian firms seeking for ways to improve their financial performance need not place much emphasis on increasing board size, as this has been found to play only a marginal and negligible role. Other organizational and institutional factors are more crucial for firm performance in the country. These factors, which are subject to verification and opens the door for further research, could be organizations' management style, organizational culture, employee remuneration and motivation, economies/diseconomies of agglomeration and scale and economic geography.

5. CONCLUSIONS

The numerous corporate governance failures in different parts of the world in recent years have renewed the interest of both researchers and regulators on corporate governance efficiency. Board of directors is understood to be a very essential component of the corporate governance structure. Boards are the managers' manager.

The extent to which boards of directors are able to manage the managers is defined, in the language of the agency and resource dependency theories, by size. This study therefore sought to underline the optimal board size for publicly quoted companies in Nigeria. This optimal board size if it exists ought to be the most efficient for companies, in terms of contribution to corporate governance an organizational performance.

We assessed the possibility of firms moving towards a particular board size over the period of the study. Evidence for all the 100 sampled firms show that there is no significant movement towards a given board size. However, this finding does not hold when the sampled firms are divided into financial and nonfinancial firms. For the financial firms, we find evidence that the target board size group is at least 12 directors. Furthermore, a random effect model showed evidence of an inverted u-curve of board size for all the sampled publicly quoted companies in Nigeria.

Thus although we are unable to establish an optimal board size for the public quoted companies as a whole, we are able to establish that such an optimal size exists for each firm, given the evidence of Kuznets' curve of board size. It is not surprising that a unique optimal board size could not be established for all the publicly quoted companies, because these firms are actually of different sizes and operate in often divergent institutional, regulatory and organizational contexts. Given this,firms therefore need to consider there geographical, organizational and institutional specificities, then establish what an optimal board size is for themselves. This size does not need to be static; it may have to change as the institutional, organizational and operational realities of the firm changes.

The existence of Kuznets' curve of board size in Nigeria further clarifies that the impact of board size on firm performance in Nigeria neither supports only the agency nor resource dependency theory. Both theories play a role. The finding from the optimal GMM estimation and the random effect model both affirms this position. Notwithstanding this, how large or small board size is does not significantly influence organizational performance.

This opens up areas of further research as follows: since board size does not matter significantly for firm performance, does board composition matter? Does CEO duality matter? Does board diversity matter? More so, could organizations' management style, organizational culture, employee remuneration and motivation, economies/diseconomies of agglomeration and scale and economic geography be the real determinants of organizational performance in Nigeria?

In sum, organizations seeking to improve their corporate governance must seek and attain their optimal board size. Only then can the best value be achieved from the board.

REFERENCES

1. Agoraki, M., Delis, M. & Staikouras, P. (2010). The Effect of Board size and Composition on Bank Efficiency. *International Journal of Banking, Accounting and Finance* 2(4), 357 - 386

2. Alchian, A. & Demsetz, H. (1972).Production, Information Costs and Economic Organization. *American Economic Review 62*(5), 777-795.

3. Alexander, J., Fennell, M., & Halpern, M. (1993), Leadership Instability in Hospitals: The Influence of Board-CEO Relations and Organizational Growth and Decline. *Administrative Science Quarterly 38*, 74-99.

4. Baumol, W. (1959) *Business Behavior, Value and Growth*. New York, USA: Macmillan

5. Baumol, W. (1962) On the Theory of Expansion of Firms. *The American Economic Review 52*(5), 1078 – 1087

6. Berle, A. & Means, G.(1932).*The Modern Corporation and Private Property*. New York: Macmillan.

7. Bhagat, S. & Black, B. (1998).Bard Independence and Long-term Firm performance? *Working Paper.*

8. Brown, W. & Maloney, M. (1998). Exit, Voice, and the Role of Corporate Directors: Evidence from Acquisition Performance *Working Paper*.

9. Callen, J., Klein, A. & Tinkelman, D. (2003). Board Composition, Committees, and Organizational Efficiency: The Case of Nonprofits, Non-profit and Voluntary Sector *Quarterly 32*(4), 493-520.

10. Casciaro, T. & Piskorski, M. (2005). Power Imbalance, Mutual Dependence, and Constraint Absorption: A Closer Look at Resource Dependence Theory. *Administrative Science Quarterly50*(2), 167-199

11. Central Bank of Nigeria (2006).*Code of Corporate Governance for Banks in Nigeria Post-Consolidation*. Abuja: CBN

12. Certo, S. (2003). Influencing Initial Public Offering Investors with Prestige: Signalling with Board Structures. *Academy of Management Review 28*(3), 432-446.

13. Chaganti, R., Mahajan, V., &Sharma, S. (1985).Corporate Board Size, Composition and Corporate Failures in Retailing Industry. *Journal of Management Studies22*, 400-416.

14. Dalton, D., Daily, C., Johnson, J. & Ellstrand, A. (1999) Number of directors and financial performance: a meta-analysis, *Academy of Management Journal42*, 674-686.

15. Dalton, D. & Dalton, C. (2005) Boards of Directors: Utilizing Empirical Evidence in Developing Practical Prescriptions, *British Journal of Management16*, 91-97.

16. Dalton, D., Hitt, M., Certo, S. & Dalton, C. (2007).The Fundamental Agency Problem and Its Mitigation.

17. In J. Walsh & A. Brief (Eds.), *The Academy of Management Annals*(1st ed.)(pp. 1-64). New York: Lawrence Erlbaum Associates.

18. Davies, A. (1999). *A Strategic Approach to Corporate Governance*. London: Gower Press.

19. Denis, D. & Sarin,A. (1999) Ownership and Board Structures in Publicly Traded Corporations. *Journal of Financial Economics* 52, 187-224.

20. Eisenberg, T. Sundgren, S& Wells, M. (1998).Larger Board Size and Decreasing Firm Value in Small Firms. *J. FIN. ECON48*(35).

21. Eyenubo, S. (2013) The impact of bigger board size on financial performance of firms: The Nigerian experience. *Journal of Research in International Business and Management 3*(3), 85-90.

22. Fama, E. & Jensen, M. (1983).Separation of Ownership and Control. *Journal of Law and Economics 26*(2), 301–325.

23. Gertner, R. & Kaplan, S. (1996). The Value-Maximizing Board. University of Chicago Working Paper.

24. Guest P. (2009). The Impact of Board Size on Firm Performance: Evidence from the UK. *European Journal of Finance, 15* (4), 385-404.

25. Gu, H., Langabeer II, J. & Helthon, J. (2010). Board Composition and Financial Performance in Major Hospitals. *International Journal of Corporate Governance 2* (1), 21 – 30.

26. Haunschild, P. (1993). The Impact of Interlocks On Inter-Organizational Imitation. *Administrative Science Quarterly 38*(4), 564–583.

27. Hilb, M (2004). New Corporate Governance. New York: Springer.

28. Jensen, M. (1993) The modern industrial revolution, exit, and the failure of internal control systems, *Journal of Finance48*, 831-880.

29. John, K. & Senbet, L. (1998). "Corporate governance and board effectiveness" *Journal of Banking and Finance22*, 371–403.

30. Kiel, G. & Nicholson, G. (2003). Board Composition and Corporate Performance: How the Australian

31. Experience Informs Contrasting Theories of Corporate Governance. *Corporate Governance 11*, 189–205.

32. Kyereboah-Coleman, A. & Biekpe, N. (2005).The relationship between board size, board composition, CEO duality and firm performance: experience from Ghana. *Working paper*, University of Stellenbosch Business School, Cape Town.

33. Lipton, M. and Lorsch, J. W. (1992) A modest proposal for improved corporate governance, *Business Lawyer48*, 59- 77.

34. Marris, R. (1964). *The Economic Theory of Managerial Capitalism.* London: Macmillan.

35. Mizruchi, M. (1983).Who controls whom? An Examination of the Relation between Management and Boards of Directors in Large American Corporations. *Academy of Management Review 8*, 426-435.

36. Monks, R & Minow, N. (1995).Corporate governance on equity ownership and corporate value. *Journal of Financial Economics 20*, 293–315.

37. Nahapiet, J. & Ghoshal, S. (1998). Social Capital, Intellectual Capital, and the Organizational Advantage. *Academy of Management Review23*, 242-66

38. Ning, Y., Davidson, W. & Wang, J. (2010). Does Optimal Corporate Board Size Exist? An Empirical Analysis.*Journal of Applied Finance20*, 57-69.

39. O'Regan, K. & Oster, S. (2005). Does the Structure and Composition of the Board Matter? The case of Non-profit Organizations. *Journal of Law, Economics and Organization 21*, 205-227.

40. Pfeffer J., Salancik G. (1978). *The External Control of Organisations: a Resource Dependence Perspective.* New York: Harper and Row

41. Sanda, A., Mikailu, S. & Garba, T. (2010).Corporate governance mechanisms and firms' financial performance in Nigeria. *Afro-Asian Journal of Finance and Accounting 2* (1), 22 – 39.

42. Williamson, O. (1963) Managerial Discretion and Business Behavior. *The American Economic Review 53*(5), 1032 – 1057.

43. Westphal, J., Boivie, S., & Daniel H. (2006). The Strategic Impetus for Social Network Ties: Reconstituting Broken CEO Friendship Ties. *Strategic ManagementJournal27*, 425-445.

44. Yermack, D. (1996). Higher market valuation of companies with a small board of directors. *Journal of Financial Economics40*, 185–211.

APPENDICES

Appendix 1

Table 1a: Group one (3 – 5 Directors)

```
Two-sample Wilcoxon rank-sum (Mann-Whitney) test

          a1 |      obs    rank sum    expected
-------------+---------------------------------
           0 |        6          61          54
           1 |       11          92          99
-------------+---------------------------------
    combined |       17         153         153

unadjusted variance       99.00
adjustment for ties      -35.91
                      ----------
adjusted variance         63.09

Ho: threef~e(a1==0) = threef~e(a1==1)
             z =   0.881
    Prob > |z| =   0.3782
```

Table 1b: Group One (3 – 5 Directors)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	6	4.833333	.1666667	.4082483	4.404903	5.261764
1	11	4.545455	.2073046	.6875517	4.083551	5.007358
combined	17	4.647059	.1470588	.6063391	4.335308	4.95881
diff		.2878788	.3090067		-.3707535	.946511

diff = mean(0) - mean(1) t = 0.9316
Ho: diff = 0 degrees of freedom = 15

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.8169 Pr(|T| > |t|) = 0.3663 Pr(T > t) = 0.1831

Table 2a: Group Two (6 – 8 Directors)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

a2	obs	rank sum	expected
0	37	1266.5	1313.5
1	33	1218.5	1171.5
combined	70	2485	2485

unadjusted variance 7224.25
adjustment for ties -927.76

adjusted variance 6296.49

Ho: sixeight(a2==0) = sixeight(a2==1)
z = -0.592
Prob > |z| = 0.5536

Table 2b: Group Two (6 – 8 Directors)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	37	7.135135	.1294604	.7874771	6.872577	7.397693
1	33	7.242424	.1378288	.7917663	6.961676	7.523172
combined	70	7.185714	.0938984	.7856108	6.998392	7.373037
diff		-.1072891	.1890351		-.4845028	.2699246

diff = mean(0) - mean(1) t = -0.5676
Ho: diff = 0 degrees of freedom = 68

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.2861 Pr(|T| > |t|) = 0.5722 Pr(T > t) = 0.7139

Table 3a: Group Three (9 – 11 Directors)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

a3	obs	rank sum	expected
0	37	1239.5	1313.5
1	33	1245.5	1171.5
combined	70	2485	2485

unadjusted variance 7224.25
adjustment for ties -969.72

adjusted variance 6254.53

Ho: nineel~n(a3==0) = nineel~n(a3==1)
z = -0.936
Prob > |z| = 0.3494

Table 3b: Group Three (9 – 11 Directors)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	37	9.756757	.141874	.8629859	9.469023	10.04449
1	33	9.878788	.1212121	.6963106	9.631887	10.12569
combined	70	9.814286	.0938984	.7856108	9.626963	10.00161
diff		-.1220311	.1889036		-.4989823	.2549201

diff = mean(0) - mean(1) t = -0.6460
Ho: diff = 0 degrees of freedom = 68

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.2602 Pr(|T| > |t|) = 0.5205 Pr(T > t) = 0.7398

Table 4a: Group Four (12 and above)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

a4	obs	rank sum	expected
0	14	230	245
1	20	365	350
combined	34	595	595

unadjusted variance 816.67
adjustment for ties -39.80

adjusted variance 776.86

Ho: twelve~e(a4==0) = twelve~e(a4==1)
z = -0.538
Prob > |z| = 0.5905

Table 4b: Group Four (12 and above)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	14	14.14286	.7020938	2.626994	12.62608	15.65964
1	20	14.4	.466792	2.087557	13.42299	15.37701
combined	34	14.29412	.3927358	2.290023	13.49509	15.09314
diff		-.2571429	.8090921		-1.90521	1.390924

diff = mean(0) - mean(1) t = -0.3178
Ho: diff = 0 degrees of freedom = 32

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.3763 Pr(|T| > |t|) = 0.7527 Pr(T > t) = 0.6237

Appendix 2

Table 5a: Group One (3 – 5 Directors)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

a1	obs	rank sum	expected
0	6	61	54
1	11	92	99
combined	17	153	153

unadjusted variance 99.00
adjustment for ties -35.91

adjusted variance 63.09

Ho: threef~e(a1==0) = threef~e(a1==1)
z = 0.881
Prob > |z| = 0.3782

Table 5b: Group One (3 – 5 Directors)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	6	4.833333	.1666667	.4082483	4.404903	5.261764
1	11	4.545455	.2073046	.6875517	4.083551	5.007358
combined	17	4.647059	.1470588	.6063391	4.335308	4.95881
diff		.2878788	.3090067		-.3707535	.946511

```
    diff = mean(0) - mean(1)                                      t =   0.9316
Ho: diff = 0                                     degrees of freedom =       15

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.8169         Pr(|T| > |t|) = 0.3663          Pr(T > t) = 0.1831
```

Table 6a: Group Two (6 - 8 Directors)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

a2	obs	rank sum	expected
0	30	867.5	840
1	25	672.5	700
combined	55	1540	1540

```
unadjusted variance      3500.00
adjustment for ties      -505.68
                      ----------
adjusted variance        2994.32

Ho: sixeight(a2==0) = sixeight(a2==1)
             z =   0.503
    Prob > |z| =   0.6153
```

Table 6b: Group Two (6 - 8 Directors)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	30	7.3	.1368782	.7497126	7.020053	7.579947
1	25	7.2	.1527525	.7637626	6.884734	7.515266
combined	55	7.254545	.1012321	.7507572	7.051587	7.457504
diff		.1	.2047548		-.3106861	.5106861

```
    diff = mean(0) - mean(1)                                      t =   0.4884
Ho: diff = 0                                     degrees of freedom =       53

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.6864         Pr(|T| > |t|) = 0.6273          Pr(T > t) = 0.3136
```

Table 7a: Group Three (9 – 11 Directors)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

a3	obs	rank sum	expected
0	25	588.5	675
1	28	842.5	756
combined	53	1431	1431

```
unadjusted variance      3150.00
adjustment for ties      -452.10
                      ----------
adjusted variance        2697.90

Ho: nineel~n(a3==0) = nineel~n(a3==1)
             z =  -1.665
    Prob > |z| =   0.0958
```

Table 7b: Group Three (9 – 11 Directors)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	25	9.6	.1732051	.8660254	9.242522	9.957478
1	28	9.892857	.1393417	.7373268	9.606952	10.17876
combined	53	9.754717	.1107622	.8063608	9.532456	9.976978
diff		-.2928571	.2202599		-.7350473	.149333

diff = mean(0) - mean(1)   t = -1.3296
Ho: diff = 0   degrees of freedom = 51

Ha: diff < 0   Ha: diff != 0   Ha: diff > 0
Pr(T < t) = 0.0948   Pr(|T| > |t|) = 0.1896   Pr(T > t) = 0.9052

Table 8a: Group Four (12 and above Directors)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

a4	obs	rank sum	expected
0	6	28.5	30
1	3	16.5	15
combined	9	45	45

unadjusted variance 15.00
adjustment for ties -1.13

adjusted variance 13.88

Ho: twelve~e(a4==0) = twelve~e(a4==1)
z = -0.403
Prob > |z| = 0.6872

Table 8b: Group Four (12 and above Directors)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	6	13.33333	.4944132	1.21106	12.0624	14.60426
1	3	13.66667	.8819171	1.527525	9.872084	17.46125
combined	9	13.44444	.412011	1.236033	12.49435	14.39454
diff		-.3333333	.9258201		-2.52255	1.855883

diff = mean(0) - mean(1)   t = -0.3600
Ho: diff = 0   degrees of freedom = 7

Ha: diff < 0   Ha: diff != 0   Ha: diff > 0
Pr(T < t) = 0.3647   Pr(|T| > |t|) = 0.7294   Pr(T > t) = 0.6353

Appendix 3

Table 9a: Group One (6 – 8 Directors)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

a2	obs	rank sum	expected
0	7	39.5	56
1	8	80.5	64
combined	15	120	120

```
unadjusted variance        74.67
adjustment for ties        -8.67
                        ----------
adjusted variance          66.00

Ho: sixeight(a2==0) = sixeight(a2==1)
             z =  -2.031
    Prob > |z| =   0.0423
```

Table 9b: Group One (6 – 8 Directors)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	7	6.428571	.2020305	.5345225	5.934221	6.922922
1	8	7.375	.3238992	.9161254	6.6091	8.1409
combined	15	6.933333	.2281743	.8837151	6.443948	7.422718
diff		-.9464286	.3954398		-1.800724	-.0921328

```
    diff = mean(0) - mean(1)                                 t =  -2.3934
Ho: diff = 0                                degrees of freedom =       13

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.0162         Pr(|T| > |t|) = 0.0325          Pr(T > t) = 0.9838
```

Table 10a: Group Two (9 – 11 Directors)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

a3	obs	rank sum	expected
0	12	114.5	108
1	5	38.5	45
combined	17	153	153

```
unadjusted variance        90.00
adjustment for ties       -15.44
                        ----------
adjusted variance          74.56

Ho: nineel~n(a3==0) = nineel~n(a3==1)
             z =   0.753
    Prob > |z| =   0.4516
```

Table 10b: Group Two (9 – 11 Directors)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	12	10.08333	.2289083	.7929615	9.57951	10.58716
1	5	9.8	.2	.4472136	9.244711	10.35529
combined	17	10	.1714986	.7071068	9.636439	10.36356
diff		.2833333	.3817843		-.5304207	1.097087

diff = mean(0) - mean(1) t = 0.7421
Ho: diff = 0 degrees of freedom = 15

Ha: diff < 0 Pr(T < t) = 0.7653
Ha: diff != 0 Pr(|T| > |t|) = 0.4695
Ha: diff > 0 Pr(T > t) = 0.2347

Table 11a: Group Three (12 and above Directors)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

a4	obs	rank sum	expected
0	8	103	104
1	17	222	221
combined	25	325	325

unadjusted variance 294.67
adjustment for ties -12.69

adjusted variance 281.97

Ho: twelve~e(a4==0) = twelve~e(a4==1)
z = -0.060
Prob > |z| = 0.9525

Table 11b: Group Three (12 and above Directors)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	8	14.75	1.161126	3.284161	12.00437	17.49563
1	17	14.52941	.5294118	2.182821	13.40711	15.65171
combined	25	14.6	.5033223	2.516611	13.56119	15.63881
diff		.2205882	1.101235		-2.05749	2.498666

diff = mean(0) - mean(1) t = 0.2003
Ho: diff = 0 degrees of freedom = 23

Ha: diff < 0 Pr(T < t) = 0.5785
Ha: diff != 0 Pr(|T| > |t|) = 0.8430
Ha: diff > 0 Pr(T > t) = 0.4215

Appendix 4

Table 12: Random Effect Model

```
Random-effects GLS regression                   Number of obs      =       823
Group variable: comp                            Number of groups   =       100

R-sq:  within  = 0.0045                         Obs per group: min =         4
       between = 0.0080                                        avg =       8.2
       overall = 0.0029                                        max =        10

Random effects u_i ~ Gaussian                   Wald chi2(6)       =      2.39
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.8805
```

roa	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
bdsz	73.14063	176.3493	0.41	0.678	-272.4977	418.7789
bdsz2	-3.049689	5.692189	-0.54	0.592	-14.20617	8.106798
outd	23.89049	141.2387	0.17	0.866	-252.9323	300.7132
debt	5.98e-08	2.05e-06	0.03	0.977	-3.96e-06	4.08e-06
fsize	2.08e-07	1.07e-06	0.19	0.846	-1.89e-06	2.31e-06
age	4.454432	5.342399	0.83	0.404	-6.016479	14.92534
_cons	-869.3887	658.791	-1.32	0.187	-2160.595	421.818
sigma_u	0					
sigma_e	2308.05					
rho	0	(fraction of variance due to u_i)				

Table 13: Hausman Test for Fixed Effect

	Coefficients (b) fe	Coefficients (B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
bdsz	410.547	73.14063	337.4063	292.7657
bdsz2	-14.87607	-3.049689	-11.82638	11.20735
outd	12.53368	23.89049	-11.3568	140.3594
debt	2.90e-07	5.98e-08	2.30e-07	1.50e-06
fsize	-4.12e-07	2.08e-07	-6.20e-07	1.10e-06
age	26.13497	4.454432	21.68054	32.99245

```
                b = consistent under Ho and Ha; obtained from xtreg
    B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test:  Ho:  difference in coefficients not systematic

            chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =        3.30
          Prob>chi2 =      0.5091
```

Appendix 5

Table 14a: Optimal GMM Estimation (Firm Performance = Return on Asset, ROA)

```
Arellano-Bond dynamic panel-data estimation  Number of obs         =       322
Group variable: comp                         Number of groups      =        94
Time variable: year
                                             Obs per group:    min =         1
                                                               avg =  3.425532
                                                               max =         5

Number of instruments =     20               Wald chi2(9)          =     30.18
                                             Prob > chi2           =    0.0004
Two-step results
                                   (Std. Err. adjusted for clustering on comp)
```

roa	Coef.	WC-Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
roa						
L1.	-.6601368	.1373559	-4.81	0.000	-.9293494	-.3909242
L2.	-.3691727	.1320832	-2.80	0.005	-.628051	-.1102943
L3.	-.0595348	.0670949	-0.89	0.375	-.1910384	.0719688
L4.	-.0329291	.0364109	-0.90	0.366	-.1042932	.038435
bdsz	316.9967	446.5304	0.71	0.478	-558.1868	1192.18
debt	1.03e-07	5.38e-07	0.19	0.848	-9.50e-07	1.16e-06
outd	-241.1926	419.2755	-0.58	0.565	-1062.957	580.5722
age	-3.881458	29.16909	-0.13	0.894	-61.05183	53.28892
fsize	1.92e-08	3.87e-07	0.05	0.960	-7.39e-07	7.78e-07
_cons	-719.1833	1108.95	-0.65	0.517	-2892.685	1454.319

```
Instruments for differenced equation
        GMM-type: L(2/3).roa L(2/2).bdsz
        Standard: D.debt D.outd D.age D.fsize
Instruments for level equation
        Standard: _cons
```

Table 14b: Test for Autocorrelation

Arellano-Bond test for zero autocorrelation in first-differenced errors

Order	z	Prob > z
1	-.97479	0.3297
2	.27021	0.7870
3	-1.0945	0.2737
4	-.12659	0.8993

H0: no autocorrelation

Table 15a: Optimal GMM Estimation (Firm Performance = Return on Equity, ROE)

```
Arellano-Bond dynamic panel-data estimation  Number of obs      =       318
Group variable: comp                         Number of groups   =        95
Time variable: year
                                             Obs per group:   min =       1
                                                              avg =  3.347368
                                                              max =       5

Number of instruments =     20               Wald chi2(9)       =   1759.59
                                             Prob > chi2        =    0.0000
Two-step results
                                   (Std. Err. adjusted for clustering on comp)
```

roe	Coef.	WC-Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
roe						
L1.	-.8816226	.4189558	-2.10	0.035	-1.702761	-.0604842
L2.	-.8630973	.4207844	-2.05	0.040	-1.68782	-.038375
L3.	-.8659443	.412855	-2.10	0.036	-1.675125	-.0567633
L4.	.2865313	2.307795	0.12	0.901	-4.236663	4.809726
bdsz	1098.842	2296.227	0.48	0.632	-3401.68	5599.365
debt	-3.66e-07	2.01e-06	-0.18	0.855	-4.30e-06	3.57e-06
outd	-989.1159	2324.08	-0.43	0.670	-5544.229	3565.997
age	11.45064	84.74026	0.14	0.893	-154.6372	177.5385
fsize	-1.80e-07	1.23e-06	-0.15	0.884	-2.60e-06	2.24e-06
_cons	-2307.763	2951.819	-0.78	0.434	-8093.222	3477.697

```
Instruments for differenced equation
        GMM-type: L(2/3).roe L(2/2).bdsz
        Standard: D.debt D.outd D.age D.fsize
Instruments for level equation
        Standard: _cons
```

Table 15b: Test for Autocorrelation

Arellano-Bond test for zero autocorrelation in first-differenced errors

Order	z	Prob > z
1	-.38602	0.6995
2	-.94481	0.3448
3	.654	0.5131
4	-.31978	0.7491

H0: no autocorrelation