Research Journal of Finance and Accounting
ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online)
Vol.8, No.10, 2017

Impact of Board Gender Diversity on Profitability of Agricultural Listed Companies in Kenya: 2008-2015

Rozmina Rana* Mwangi Mercy Wairimu
Chandaria School of Business, United States International University Africa, P.O. Box 4920-00100, Nairobi, Kenya

Abstract
The paper examines the impact of board gender diversity on profitability of the agricultural listed companies in the Nairobi Securities Exchange over the period 2008 to 2015. Profitability is measured using Tobin's Q as a market-based measure, and Return on assets (ROA) as an accounting-based measure. Panel data is analysed using Fixed Effect model and Random Effect model. The results for FEMDIR are mixed and different depending on the measure of profitability. They are negative and significant when using Tobin's Q and positive and statistically insignificant when ROA is used as the measure of profitability. The moderating variables also give different results depending on the profitability measure. BRDSIZE is negative and statistically significant when using Tobin's Q and is positive and insignificant when using ROA as the profitability measure. FIRMSIZE is negative and statistically significant when using Tobin's Q and positive and insignificant when using ROA. Irrespective of the profitability measure used, PWDIR was found to be positive and statistically significant. This means that presence of women on boards of agricultural listed firms will lead to increased profitability. The study recommends that agricultural firms listed at the NSE should ensure that they include women on their boards since the presence of women on boards is found to impact profitability positively.
Keywords: Gender Diversity, ROA, Tobin's Q, Profitability, Board

1. Introduction

1.1 Background to the study

According to Goudreau (2011) women are rising to highest levels of government in many countries, advancing to executive ranks at top corporations, and picking up more undergraduate and advanced degrees than men. Women's employment rates held up better than men's in the years following the recession (National Women's Law Center, 2013) and in 2015, a record number of women were on the FORBES list of World Billionaires (Navarro, 2014). The PWC (2013) report with data from 20 global markets showed that women comprised approximately 60% of employees in the financial services industry. Despite these successes, however, there is still a dearth of female directors on the boards of public companies around the world. Women held only 14% of board seats and a mere 2% of CEO positions in the financial services industry.

Board gender diversity is the presence of female directors in corporate boards of directors (Dutta & Bose, 2007; Campbell & Mínguez-Vera, 2008). A few countries, France and Norway among them, are blazing trails for board gender diversity, but most have a long way to go. In the S&P 500, women make up 20% of all directors, a 5% increase over the past decade (Stuart, 2015). Sectors that lead in gender-diverse boards include healthcare, finance, and consumer goods & services (Chanavat and Ramsden, 2014). Within the S&P 500, the basic materials sector ranks lowest, followed by the technology sector (Kelly, 2015). Board gender diversity also varies significantly by country. A 2014 report by Credit Suisse that compared percentage of women on boards in 43 countries found that, in 2013, estimates ranged as high as 39.7% in Norway to as low as 1.6% in Japan. Countries that had greater than 25% women on boards included Sweden, Denmark, Finland, and France.

Countries with less than 5% women on boards included Japan, Pakistan, South Korea, and Taiwan (CS Gender 3000, 2015). In 2015, the share of women on boards of large publicly listed companies in EU countries was 21.2%, with the UK slightly higher at 25.9% (European Commission, October 2015). A study by The Kenya Institute of Management (2012) revealed that state corporation boards in Kenya comprised 20% women and 80% men, whereas in publicly listed companies, only 12% of the board members were women. Further, at that time, only one company from the publicly listed companies had a woman chairperson. This is despite women making up 50.29% of the population according to the Kenya National Bureau of Statistics. Corporate boards in Kenya are said to be male dominated since the appointments are done in an old boy network (Ekadah & Mboya, 2011) in which the male directors introduce their friends to boards before they retire. These types of appointments, according to the Institute of Directors of Kenya, denies majority of the women the chance to be selected to corporate boards hence depriving organizations this important resource (Ekadah & Mboya, 2011).

Given the relatively low number of female board members, it is not surprising that gender diversity has become a focus of investors in recent years. In the wake of the 2008 financial crisis, many investors expect boards to lead companies in new directions, introduce fresh perspectives and focus more on risk mitigation (Ackerman, 2016). Recognizing also that boards of companies have less than equitable representation of the genders, many countries globally have resorted to imposing quotas to ensure more representation of women on

boards of public institutions. This has put many companies, especially publically listed companies under pressure to appoint female directors on their boards. Norway was one of the first countries in 2004 to impose a mandatory law requiring that 40% of the positions on the boards of listed companies to be held by female directors (Rose, 2013). Other European counterparts followed suit shortly after and notably, Finland imposed quotas in 2005 Spain in 2007, Belgium in 2011. This also spread to other parts of the world - for instance, Australia in 2009, New Zealand in 2012 and Singapore in 2012. In 2015, Germany introduced quotas requiring major companies to allot 30% of board seats to women (Copley, 2015). In 2012, the EU Commission issued a proposal for a directive to improve board gender diversity by 2020 (Cadman, 2015). In Kenya, the 2010 Kenya constitution acknowledged women and men have rights to equal treatment and equal opportunities in political, economic, cultural and social spheres and also imposed maximum quotas on single genders in elective or appointed bodies. Affirmative action of this nature has also been necessitated by what researchers have called the 'The Glass Ceiling' phenomena. The United States Federal Glass Ceiling Commission defines the glass ceiling as "the unseen, yet unreachable barrier that keeps minorities and women from rising to the upper rungs of the corporate ladder, regardless of their qualifications or achievements". The glass ceiling effect according to Sahoo and Lenka (2016) is demonstrated by the fact that despite adequate qualifications, varied experiences, and achievements, female employees are unable to climb the corporate ladder because of the organizational and supervisor biases that hinder their growth.

Several studies suggest that greater gender diversity in the boardroom improves financial performance. For examples studies in the US (Carter, D'Souza, Simkins & Simpson, 2010) found a positive relationship between the number of women on the Board and the ROA. The findings of a study in Australia (Vafaei, Ahmed & Mather, 2015) also found a positive association between board diversity and firm financial performance after control-ling for several firm-specific and governance variables. The PWC (2013) report showed having women representation on boards resulted in 42% higher return in sales, 66% greater return on invested capital, and 53% higher return on equity. Results of studies in Nigeria (Oludele, Oloko & Tobiah 2016; Akinyomi & Olutoye, 2014) found positive associations between gender board diversity and firm performance. Similarly, in Kenya, a positive association was found between women on boards and ROA (Letting', Aosa and Machuki (2012). On the other hand, studies in Netherlands, Denmark and Spain (Marinova, Plantenga and Remery (2015); Alvarado, Briones & Ruiz, 2011) found no association between gender diversity on boards and business success.

From the basic premise of both the Agency Theory and the Resource Dependency Theory (RDT), greater diversity on boards leads to improved financial performance. From the perspective of the Agency theory, diversity is a measure of independence thus reducing conflict while from the perspective of RDT, diversity would evidently mean broader skills and capabilities. However, it must be noted that empirical research has yielded mixed results. Positive associations between gender board diversity and performance have been found in several studies (Oludele et al., 2016); Akinyomi & Olutoye, 2014; Letting', Aosa and Machuki, 2012) while other studies found no association between gender board diversity and performance (Marinova et al., 2015; Alvarado et al., 2011).

In Kenya, the literature on the impact of women on boards on profitability of companies is scanty. As the agriculture sector contributes approximately 25% to the GDP of Kenya and considering the findings of studies in numerous countries which have demonstrated that better performance can be achieved by corporations with more women in decision making positions, this study is significant. This area has been under-researched meaning there is a limited base for academicians as well as inadequate information available to guide corporations and policy makers. This study is motivated by these gaps and will therefore be of significance to academia, corporations, shareholders as well as policy makers. The main objective of the study is therefore to examine the impact of gender board diversity on the profitability of companies within the agricultural sector which are listed on the NSE companies.

The study is organized into five sections; the first section provides a background to the study and the rest of the sections are organized as follows: Section two presents the theoretical foundation, the conceptual framework as well as the relevant empirical literature for the study. Section three discusses the methodology employed in the study. The fourth section presents the data analysis and discussions of the research findings. Finally, section five presents a summary of main research findings, conclusions, recommendations and suggestions for further research.

2. 0 LITERATURE REVIEW

2.1 Theories

The underlying premise of the Agency theory is the suggestion that there exists an inherent imperfection in the relationship between capital providers (principals) and fiduciaries (agents) of the capital. The original scholars to propose, explicitly, that a theory of agency be created, and to actually begin its creation, were Stephen A. Ross and Barry A. Mitnick in the early 1970s. Ross is responsible for the origin of the economic theory of agency, and Mitnick for the institutional theory of agency, though the basic concepts underlying these approaches are similar.

Research in corporate governance has been mainly driven by agency theory. This is the main theoretical approach underlying the idea that a more diverse board may improve performance, (Alvarado, 2015). Since the agency theory assumes a divergence between the interests of corporate managers and those of shareholders, asymmetric information and incomplete contracts lead to agency conflicts between capital providers and managers. These conflicts have associated costs. Internal factors (corporate governance structures) reduce these costs and might give an impulse towards better performance. Weak corporate governance causes agency costs and consequently poorer performance (Core et al., 2006).

The concept of the "*Resource Dependence Perspective"* (1978) gained public awareness through the book by Jeffrey Pfeffer and Gerald Salancik. A fundamental assumption of Resource Dependence Theory (RDT) is that dependence on "critical" and important resources influences the actions of organizations and those decisions and actions taken by an organization can be explained depending on the particular dependency situation, (Nienhüser, 2008). RDT considers how the external resources of organizations affect the behavior of the organization. Some considerations include the fact that organizations depend on resources which originate from the environment; the environment contains other organizations which means that the resources one organization needs are in the control of another organization making those resources a basis of power for the owning organization. This implies power and resources are directly linked and legally independent organizations therefore depend upon each other.

2.2 Conceptual Framework

Figure 1 below shows the relationship between board gender diversity, the moderating variables of the study and their impact on firm profitability.

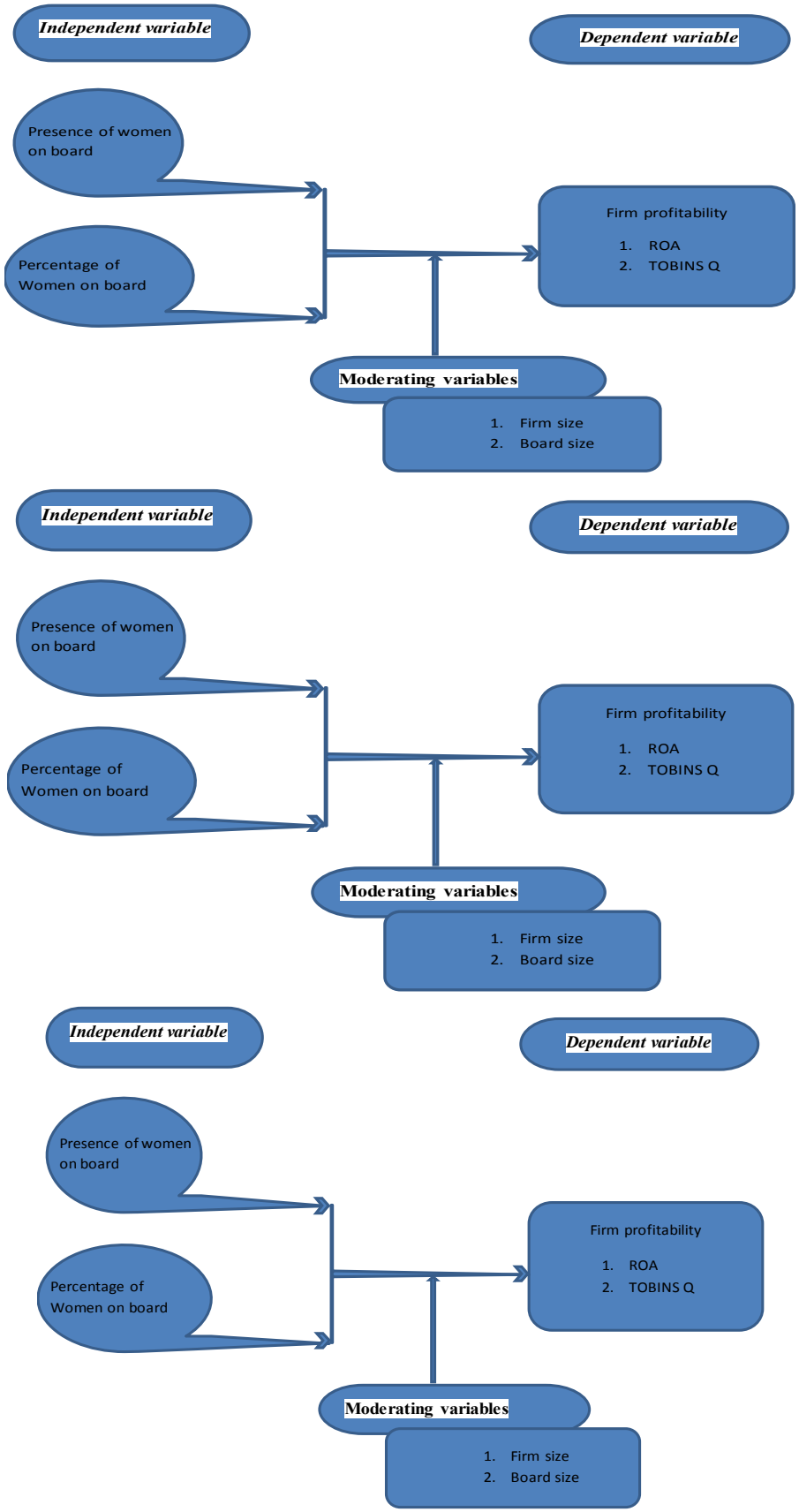

Figure 1. Conceptual Framework

2.3 Empirical Review

2.3.1 Gender Diversity and profitability

An empirical review of studies examining the impact of gender diversity on profitability of firms' shows mixed findings. Several studies have shown positive associations between gender diversity and profitability. For instance, Vafaei, Ahmed and Mather (2015) examined the association between gender diversity on corporate boards and the financial performance of a large sample of the top 500 listed companies in Australia during the period 2005–2011, and after controlling for a number of firm-specific, ownership and governance characteristics and potential endogeneity with the two-stage least square tests, results showed a positive association between gender diversity and firm performance. A study by Oludele et al. (2016) considered data from 34 of the 74 manufacturing companies in Nigeria. The findings showed a significant positive relationship between board gender diversity and financial performance of the companies. Another study (Akinyomi & Olutoye, 2014) found that having a female director on the Board of Directors of Banks in Nigeria had a positive effect on the profitability of the bank. Letting' et al. (2012) examined the relationships between board of directors' diversity and corporate performance of the diverse group of companies from all the sectors listed on the Nairobi Securities Exchange. Their findings show that statistically significant positive relationship exists between: ROA and age of board members, women on the board, educational qualifications and board member professional specialization; DY and age of board members and educational qualifications.

On the other hand, Alvarado et al. (2011) analysed data from companies on the Spanish Stock Exchange and the analysis technique selected was a dependent model based on a linear regression for panel data and this study found no relationship between gender diversity on boards and business success. Marinova et al. (2010) conducted a study on the effect of gender diversity on firm performance in Netherlands and Denmark. Data were obtained from one hundred and two Dutch companies and eighty-four Danish companies. The data were analyzed using two-stage least square regression analysis. Firm performance was measured with Tobin's Q, which is defined as the market value of equity plus book value of debt, all divided by book value of debt plus book value of equity. On the other hand they measured board gender diversity in two ways: (1) the percentage of women on the board (management board plus supervisory board); and (2) dummy variable indicating 1 if there is at least one woman on the board, or zero otherwise. The control variables used in the study include: board size, the share of independent directors, firm size, firm age and industry. The analysis revealed that about 40% of the selected firms have at least one woman in the boardroom. The study also reported that within the boards, the average share of women is 5.4%. However, the findings revealed that there is no significant relationship between board gender diversity and firm performance. This means that, within Dutch and Danish boardrooms, having a woman on board of directors does not result in a better firm performance.

In Kenya too, Ekadah and Josphat (2012) carried out a study on board gender diversity and banks' performance. Secondary data were obtained from the financial statements of forty-four commercial banks in Kenya from 1998 to 2009. The analysis was conducted using correlational and step-wise regression analysis. The results revealed that the proportion of female directors have negative relationship with bank performance just as was the case with presence of female directors on the board. Nevertheless, the proportion of female directors had a higher coefficient value when compared with that of the presence of female directors. Their findings implied that board diversity is negatively, although not statistically significant, related to performance of banks in Kenya.

Some studies showed different results for different measures of performance. Johansen (2008) carried out a time-series study on gender diversity and firm performance in four hundred and one companies in Sweden. Data were obtained from financial statements of the sample companies between 2004 and 2007. The study did not only consider the fraction of females that are on the board of directors and in management as provided in other studies, but also investigated the company's efforts in providing a work atmosphere which facilitates the involvement in addition to the development of women. Using ROA, Tobin's Q, and CAR as proxies for financial performance; the results of the regression analysis revealed that a positive relationship exists between gender diversity and organizational financial performance using ROA as a proxy for financial performance. However, there was no statistically significant relationship between CAR as dependent variable and gender diversity in the board.

Oba and Fodio (2013) carried out a study on board gender diversity on financial performance in Nigeria. The study concentrated only on the non-financial sector firms that are quoted on the floor of the Nigeria stock exchange. A sample of thirty (30) randomly selected companies for the period of 2005 to 2007 was used for the study. Data for the study was obtained from annual reports of the sample firms. Return on capital employed was used as a proxy for financial performance while the presence of female director, Blau's index and the proportion of females in the board represented gender diversity. Data analysis was conducted using regression model in other to test the relationship between the board gender mix and firm performance. The results revealed that there was an average of nine directors on each sample firm's board while 44.4% of the sampled firms had a female director on the board of directors. It was also revealed that female director's presence had a positive and statistically significant impact on financial performance. Similarly, the study reported that a positive and

statistically significant relationship exists between proportion of female in the board and financial performance.

Larkin, Bernardi and Bosco (2012) investigated the relationships that exist between board gender diversity, corporate reputation and corporate market performance in Fortune 500 companies. The study reported that, as the number of females who are directors increased, the probability of an increase in market performance increases. In other words, a positive association was observed between gender diversity in boardroom and organizational performance. However, the results revealed that the relationship between gender diversity in board and performance is not statistically significant.

Another study (Akinyomi & Olutoye, 2014) examined the effect of greater diversity of boards on profitability of banks in Nigeria. Using correlational research design, the study randomly selected ten banks in Nigeria and obtained data from audited annual reports of the selected banks. The dependant variable for profitability was return on equity was used as a proxy for profitability (dependent variable) while two indicators of gender diversity were the presence of females in the board of directors as well as the proportion of female in the board of directors. Four control variables applied were bank size, board size, loan to total assets and age of bank. The results of the regression analysis revealed that the presence of female director on the board has a positive but insignificant relationship with banks‟ profitability. Similarly, the result shows that the proportion of female in the board of directors has a positive but insignificant relationship with profitability in Nigeria. Furthermore, positive relationship was observed between profitability and each of bank size, board size, loan to total assets and bank age.

In a study (Matsa & Miller, 2011) which considered the impact of gender quotas on boards of Norwegian companies, it was found that implementing the quota resulted in a relative decline in operating profits over assets. Further analysis showed that most operating costs were down but labor costs increase by 4.1 percent of assets, on average, relative to unaffected firms after the quota ($p < 0.05$) and the increased labor costs arose from fewer layoffs (workforce reductions) and higher employment relative to countries that did not have a gender quota. The authors suggested that the quota may have been costly for firms in the short-term, but the fact that there were fewer layoffs may reflect a longer-term, more stakeholder-oriented perspective that could potentially result in long-term benefits for the country in terms of employee morale improvement as well as lower costs of recruitment and training.

2.3.2 Firm Size and profitability

In a study Kalsie and Shrivastav (2016) which sought to examine the relationship between firm size and firm performance 145 firms listed on the National Stock Exchange in India and which were non-financial in nature over a 5-year period, the findings showed that firm size, firm debt and beta of the firm are significantly negatively related to various performance measures other than Tobin's Q. The Beta results of the firm showed negative and significant relationships with various measures of performance thereby confirming positive and significant correlations between firm size and performance measures, namely, the MBVR, ROA and ROCE.

On the other hand, a study by Niresh and Velnampy (2014) which examined the effects of firm size on profitability of quoted manufacturing firms in Sri Lanka using data from 15 manufacturing companies which were active in Colombo Stock Exchange (CSE) between the years 2008 to 2012 found no evidence of relationship between firm size and profitability.

2.3.3 Board Size and profitability

A study by Kalsie and Shrivastav (2016) examined the relationship between board size and firm performance of 145 non-financial listed firms over a 5-year period. The board sizes were categorized as less than 6 Directors; 6–9 directors; 10–12 directors and over 15 directors. In the companies in the study, the minimum number of directors for all the observations was 4 while the maximum number of directors went up 22 with the average number being 10 directors. The results showed that the board size was significantly correlated with Tobin's Q at the 5 per cent level of significance. The study found a positive influence of the board size on firm performance meaning that a larger board size will enhance the performance of the firm.

A study by Larmou and Vafeas (2010) focused on a sample of small firms with a history of poor operating performance and from the results, the authors posed that increases in board size will be associated with better share price performance influenced also by positive perception by the public of increasing board sizes. The authors also stated that the converse applied, that is the public perceives reduction of size of board negatively thus advocating that firms with larger boards would have higher market values than those with small boards.

Guest, (2009) examined the impact of board size on firm performance for a large sample of 2,746 UK listed firms over 1981-2002. The findings were that board size has a strong negative impact on profitability, Tobin's Q and share returns.

The findings of a study in Turkey by Topak (2011) which employed panel data techniques to measure the relation between board size and firm performance for a sample of 122 Turkish firms for the period of 2004-2009, showed that there was no significant relationship between the board size and the firm performance. The findings of a study Carter et al. (2010) examined the business case of inclusion of women directors and ethnic minorities on boards of companies. Data was collected from firms in the S&P 500 index for the five-year period

1998–2002 and using estimation of Fixed Effect regression equations, the results showed a positive and significant relationship between both the number of women on the board and the number of ethnic minorities on the board and the Return on Assets (ROA).

3.0 Research Methodology

The main objective of this study is to determine the impact of board gender diversity on the profitability for the listed agricultural firms in Kenya. The study covered a period of 8 years from 2008 to 2015. The target population of the study consisted of all the six agricultural companies listed in the Nairobi Securities Exchange namely Eaagads Ltd, Kapchorua Tea Co Ltd, Kakuzi Ltd, Limuru Tea Co. Ltd, Sasini Ltd and Williamson Tea Kenya Ltd.

The study was carried out using descriptive research design, employing secondary quantitative data. The data was obtained from Nairobi Securities Exchange Handbooks and published financial statements and other corporate reports of the agricultural companies listed in the Nairobi Securities Exchange. Data relating to the profitability and the other Board gender attributes was collected by review of documents, annual reports and the published financial statements of the companies for 8 years from 2008 to 2015.

3.1 Research design

This study employs panel data framework to allow for differences in the form of unobserved individual firm's effect. The panel data methodology allows us to eliminate any unobservable heterogeneity that may be present among the companies in our sample and makes it possible to obtain more data points. There are various methods of estimating panel data which includes: pooled OLS regression, Fixed Effect model and Random Effect model. The pooled OLS regression deals with the pooling of all the entities together and running the regression model by taken into consideration the cross-section and time series in nature. The Fixed Effect model on the other hand allows for heterogeneity among the entities by allowing them to have their intercept value. Fixed effects can partly also mitigate endogeneity issues due to omitted variable bias (Wooldridge, 2014). The Random Effect model also allows for heterogeneity among the entities but the entities have a common mean value of the intercept, the discrepancy across entities is assumed to be random and uncorrelated with the explanatory variables. To decide on using either Fixed Effect or Random Effect, the Hausman test was conducted. The null hypothesis is random effect is appropriate and the alternate hypothesis is fixed effect is appropriate. When the p-value is statistically significant Fixed Effect is used otherwise Random Effect is used.

3.2 Model Specification

To investigate the impact of gender diversity on profitability of listed agricultural firms in Kenya, a modified version of the econometric model is used (Carter et al., 2010, Reguera-Alvarado et al., 2015; Adams and Ferreira, 2009, Bohren and Strom 2010).

The regression model is as follows:

$Y = \beta 0 + \beta 1\ PWDIR + \beta 2\ FEMDIR + \beta 3\ BRDSIZE + \beta 4\ FIRMSIZE + \varepsilon$----------Equation 1

Where,

Y = profitability as determined by return on assets (ROA); or Tobin's Q: $\beta 0$ = constant or intercept: $\beta 1 - \beta 4$ = regression coefficients: PWDIR = presence of female on board (dummy variable; 1=presence 0= none): FEMDIR= % of female members on board: BRDSIZE = natural logarithm of board size: FIRMSIZE= natural logarithm of assets: ε = error term

3.3 Measurement and definition of variables

3.3.1 Dependent Variables

Two commonly used proxies for profitability measurements ROA and Tobin's Q were used in the study (Carter et al., 2010; Adams and Ferreira, 2009; Gul et al., 2011). Tobin's Q is calculated taking the ratio of market value of the company to total assets (Bodie et al., 2015). ROA is calculated by dividing the net income of a company by the total assets (Hillier et al., 2010, Carter et al., 2010). Data for the calculations of Tobin's Q and ROA were collected from the financial reports and the NSE handbooks. Tobin's Q is believed to reflect the market expectations of future earnings and is thus a good proxy for a firm's competitive advantage (Montgomery and Wernerfelt, 1988), ROA is an accounting measure.

3.3.2 Independent Variables

The independent variable of primary interest is the gender variable (FEMDIR) which is the proportion of female directors on the board. It's calculated by dividing number of female directors with the total number of directors on the board (Mateos de Cabo et al. 2011, Adams and Ferreira 2009 and Gul et al. 2011). As proxies for the gender diversity of the board of directors, we first use a dummy variable, presence of women in board (PWDIR), that takes a value of one when a woman is present on the board, and zero otherwise.

3.3.3 Moderating Variables

Different types of moderating variables such as firm characteristics and board characteristics have been used. The study paper applies firm size as the firm characteristic variables. The natural logarithm of total assets is used as a proxy for firm size (FIRMSIZE) (Carter et al. 2010 and Gul et al. 2011). Board size (BRDSIZE) is used as a board characteristic control variable (Gillian et al. 2003 and Carter et al. 2010).

4.0 Results and Discussions

The study investigated the impact of gender diversity on profitability of listed agricultural firms in Kenya for eight years over 2008 to 2015. Fixed Effects model and Random Effects models were used for the regression analysis. The Hausman test was undertaken to decide on when to use Fixed Effects or Radom Effects models. The dependent variable was the firm performance whose proxies were both ROA and Tobin's Q. The independent variables were proportion of women on the board (FEMDIR) and presence of women on boards (PWDIR). The control variables were natural logarithm of board size representing the board characteristics (BRDSIZE) and the natural logarithm of total assets (FIRMSIZE) representing the firm characteristics.

The reminder of the section presents the results of panel unit root tests, descriptive statistics, and the empirical results of the relationship between board gender diversity and financial performance of agricultural firms listed on the NSE.

4.1 Panel Unit Root

The unit root test result is depicted in Table 1 below. FIRMSIZE is stationary at level, BRDSIZE, FEMDIR, ROA are stationary at first difference while Tobin's Q and PWDIR are stationary at 2nd difference. Since not all the variables are non-stationary at levels, the pre-condition for panel cointegration test is violated (Batagi, 2001 and Narayan et al., 2010). As a result, pooled OLS, Fixed Effects models, and Random Effects models estimates are considered.

Table 1: Unit Root Test

	LEVEL			I ST DIFFERENCE			2nd DIFFERENCE		
	LLC	PP Fisher	IPS	LLC	PP Fisher	IPS	LLC	PP Fisher	IPS
FEMDIR	-0.79555	10.4686	-0.19262	-6.04009***	17.2371***	-1.40372*			
FIRMSIZE	13.2437***	28.154***	22.2325**	-12.4939***	44.7569***	-5.52893***			
PWDIR	-0.29752	-0.12217	4.12043	-0.51895	6.16787**	-0.10696	4.34009***	.64843***	-1.42262*
BRDSIZE	3.68582***	11.9657	-1.07167	-5.70119***	33.9942***	-2.20041**			
ROA	-2.55592**	-0.65254	18.8436*	-5.1612***	32.4886***	-2.45738***			
TOBINS_Q	-0.73052	-0.18762	15.8977	-2.87242***	20.3308*	-1.07435	-9.10287***	36.5216**	-2.99671***

4.2 Descriptive statistics

Table 2: Descriptive Statistics of the Study

	BRDSIZE	FIRMSIZE	PWDIR	ROA	TOBINS_Q	FEMDIR
Mean	1.90143	21.11776	0.33333	0.14653	3.41141	0.17864
Median	2.07944	21.05267	0.00000	0.10225	0.46780	0.00000
Maximum	2.39790	23.46905	1.00000	1.26695	55.56247	5.00000
Minimum	1.09861	17.67658	0.00000	-0.17933	0.15237	0.00000
Std. Dev.	0.34352	1.42640	0.47639	0.22493	10.06879	0.71876
Skewness	-0.61880	-0.14055	0.70711	2.87457	4.06848	6.47977
Kurtosis	2.12167	1.98750	1.50000	14.60387	19.22548	43.99635
Jarque-Bera	4.60620	2.20836	8.50000	335.40490	658.95240	3697.30100
Probability	0.09995	0.33148	0.01426	0.00000	0.00000	0.00000
Sum	91.26868	1013.65200	16.00000	7.03332	163.74780	8.57475
Sum Sq. Dev.	5.54611	95.62699	10.66667	2.37782	4764.88400	24.28086

The mean board size of the agricultural listed companies in Kenya over 2008 to 2015 was 1.9 014 with a standard deviation of .3435. The average firm size, measured by the natural logarithm of total assets, was 21.11776 with a standard deviation of 1.4264. The mean % of women in boards in agricultural listed companies in Kenya was 0.0745 % with a standard deviation of 0.1078%. The presence of women in boards of listed agricultural companies was 0.0333 and a standard deviation of .4764. The mean return on assets (ROA) was 0.1452 and standard deviation was 0.2256. Average Tobin's Q was 3.366 and standard deviation was 10.07. Mean FEMDIR was 0.178 with a standard deviation of 0.718.

4.3 Multicollinearity test

To check for multicollinearity a correlation matrix was constructed. Correlation matrix shows the correlation between the independent variables. It can take values from -1 to 1 where -1 is perfect negative correlation and 1

is perfect positive correlation. The multicollinearity problem arises when the correlation between two variables exceeds 0.9. The pair-wise correlation matrix is presented in Table 3 below.

Table 3: Correlation table

	BRDSIZE	FEMDIR	FIRMSIZE	PWDIR	ROA	TOBINS_Q
BRDSIZE	1					
FEMDIR	-0.14525	1.00000				
FIRMSIZE	0.69612	-0.10125	1.00000			
PWDIR	-0.06845	0.04452	0.05267	1.00000		
ROA	-0.07706	-0.05005	-0.02340	-0.00007	1.00000	
TOBINS_Q	-0.40025	0.04216	-0.33435	0.37881	-0.08215	1.00000

In terms of the pair-wise correlation matrix, the highest correlation measured is the correlation between board size and firm size is 0.6924. We expected a high correlation between these variables since the board size would increase with firm size. All correlations are below 0.9 and we can therefore, we can conclude that we have no problem with multicollinearity (Wooldridge, 2014).

4.4 Empirical Results

4.4.1 The model using Tobin's Q

In order to determine the best fitting model a Haussmann test was conducted. It was shown that the p-value was 0.0031 at .05 level of significance implying that the firm effects are best modelled using the Fixed Effects method. (See appendix 1.a)

Table 4: Panel data analysis of the relationship between board gender diversity and Tobin's Q using pooled Fixed Effects model

Fixed effects Model				
Dependent Variable: DDTOBINS_Q(-2)				
Panel Least Squares				
Variable	Coefficient	Std. Error	Prob.	
C	63.20099	33.10146	0.07690	
DFEMDIR	-40.34458***	8.22041700	0.00020	
DBRDSIZE	2.910851*	1.36398900	0.05100	
DDPWDIR	5.799493***	0.97641900	0.00000	
FIRMSIZE	-2.915345*	1.55057400	0.08110	
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.851513	Mean dependent var		0.71458
Adjusted R-squared	0.756057	S.D. dependent var		2.350245
S.E. of regression	1.1608	Akaike info criterion		3.430432
Sum squared resid	18.86439	Schwarz criterion		3.921288
Log likelihood	-31.16519	Hannan-Quinn criter.		3.560657
F-statistic	8.920481	Durbin-Watson stat		1.817315
Prob(F-statistic)	0.000199			

Notes: ***, **, * Denote significance at the 1%, 5% and 10% levels, respectively. Variables: FEMDIR (Proportion of women on boards), FIRMSIZE (logarithm of the book value of the total assets of the firm), BRDSIZE (logarithm of the number of board directors of the firm). PWDIR (dummy variable 1= presence of women in board, 0= none)

The model derived is as follows

Y=63.20099-40.34458FEMDIR+2.910851BRDSIZE+5.799493PWDIR-2.915345FIRMSIZE

The overall Rs of the model was 85.1% adjusted to 75.6% meaning that the 85.1% of variations in the dependent variable firm performance as measured by Tobin's Q were explained by the independent variables in the study which included, PWDIR, FEMDIR, FIRMSIZE AND BRDSIZE.

The Durbin-Watson statistic was 1.817 meaning that there was no autocorrelation. The whole model had an F-statistic of 8.920 with a p value of 0.000199 meaning that it was significant.

Impact of proportion of women on bards (FEMDIR) on profitability: The proportion of directors on boards' variable (FEMDIR) had a negative coefficient of 40.344. The coefficient was statistically significant at 1%. This means that a unit increase in the proportion of women in the boards leads to a decrease of profitability measured by Tobin's Q of 40.344. The study is consistent with study by Ekadah and Josphat (2012) in Kenya who also concluded that the proportion of female directors have negative relationship with bank performance just as was the case with presence of female directors on the board. The study contradicts findings of Oba and Fodio (2013) who reported that a positive and statistically significant relationship exists between proportion of female in the board and profitability.

Impact of presence of women on bards (PWDIR) on profitability: *The* coefficient of PWDIR was 5.779 and

was statistically significant at 1%. This means that the presence of women in boards leads to increase in profitability by 5.779. The results are consistent with results of studies in Nigeria by Oludele et al. (2016) and Akinyomi & Olutoye, (2014) who found a positive association between gender board diversity and profitability. Vafaei, Ahmed and Mather (2015) also found board diversity is positively associated with profitability in Australia. Oba and Fodio (2013) concluded that female director's presence had a positive and statistically significant impact on financial performance. Larkin, Bernardi and Bosco (2012) reported a positive but statistically insignificant association between gender diversity in boardroom and organizational performance. On the other hand, studies in Netherlands, Denmark and Spain (Marinova et al., 2015); Alvarado, Briones & Ruiz, 2011) found no association between gender diversity on boards and business success in Spain also. The study is inconsistent with Ekadah and Josphat (2012) in Kenya who also concluded that the presence of female directors on the board has negative relationship with bank performance just as was the case with this study. The study is also consistent with both the Agency Theory and the Resource Dependency Theory (RDT), which premise that greater diversity on boards leads to improved financial performance.

Impact of board size on (BRDSIZE) on profitability: The coefficient of BRDSIZE was 2.910 and significant at 10%. This result is consistent with study by Kalsie and Shrivastav (2016) whose results showed that the board size was significantly correlated with Tobin's Q at the 5 per cent level of significance. The study found a positive influence of the board size on firm performance meaning that a larger board size will enhance the performance of the firm. Its also consistent with the study by Larmou and Vafeas (2010). On the other hand, the findings of a study in Turkey by Topak (2011) which employed panel data techniques to measure the relation between board size and firm performance for a sample of 122 Turkish firms for the period of 2004-2009, showed that there was no significant relationship between the board size and the firm performance.

Impact of firm size (FIRMSIZE) on profitability: The coefficient of firm size was negative 2.915 and significant at 10%. This result is inconsistent with findings by a study by Niresh and Velnampy (2014) which examined the effects of firm size on profitability of quoted manufacturing firms in Sri Lanka using data from 15 manufacturing companies which were active in Colombo Stock Exchange (CSE) between the years 2008 to 2012 found no evidence of relationship between firm size and profitability.

4.4.2 The model using ROA

In order to determine the best fitting model a Hausman test was conducted. It was shown that the p-value was 0.36 and insignificant at .05 level of significance implying that the firm effects are best modelled using the Random Effects method. (See appendix 1.b)

Table 5: Panel data analysis of the relationship between board gender diversity and ROA using pooled Random Effects model

Dependent Variable: DROA(-2)				
Panel EGLS (Cross-section random effects)				
Variable	Coefficient	Std. Error	Prob.	
C	-0.098708	0.476239	0.8375	
DFEMDIR	0.014419	0.034148	0.6765	
DBRDSIZE	-0.239625	0.176583	0.1869	
DDPWDIR	0.25906***	0.063914	0.0004	
FIRMSIZE	0.003801	0.022276	0.8659	
	Weighted Statistics			
R-squared	0.414997	Mean dependent var		-0.013133
Adjusted R-squared	0.321397	S.D. dependent var		0.200497
S.E. of regression	0.165164	Sum squared resid		0.681979
F-statistic	4.433707	Durbin-Watson stat		1.888943
Prob(F-statistic)	0.007603			

Notes: ***, **, * Denote significance at the 1%, 5% and 10% levels, respectively. Variables: FEMDIR (Proportion of women on boards), FIRMSIZE (logarithm of the book value of the total assets of the firm), BRDSIZE (logarithm of the number of board directors of the firm). PWDIR (dummy variable 1= presence of women in board, 0= none)

The model derived is as follows

Y=-0.098708+0.014419FEMDIR0.239625BRDSIZE+0.25906PWDIR+.003801FIRMSIZE

The overall Rs of the model was 41.4 % adjusted to 32.1% meaning that the 41.4% of variations in the dependent variable firm performance as measured by ROA were explained by the independent variables in the study which included, PWDIR, FEMDIR, FIRMSIZE and BRDSIZE. The Durbin-Watson statistic was 1.888 meaning that there was no autocorrelation. The whole model had an f-statistic of 4.433 with a p value of .007603 meaning that it was significant.

Impact of proportion of women on boards (FEMDIR) on profitability: The coefficient of FEMDIR was

0.014419. This means that there is a positive relationship between proportion of women in board and firm performance. It was not statistically significant. Similarly, in Kenya, a positive association was found between women on boards and ROA (Letting' et al., 2012). This result is partly consistent with results by Carter, D'Souza, Simkins & Simpson, (2010) whose results showed a positive but significant relationship between both the number of women on the board and the number of ethnic minorities on the board and the Return on Assets (ROA).

Impact of presence of women on bards (PWDIR) on profitability: The coefficient of PWDIR was 0.25906 and was significant at 1%. The result is consistent with Johansen (2008) study in Sweden who reported a positive relationship exists between gender diversity and organizational financial performance using ROA. The study is also consistent with both the Agency Theory and the Resource Dependency Theory, which premise that greater diversity on boards leads to improved financial performance.

Impact of board size on (BRDSIZE) on profitability: The coefficient of BRDSIZE was negative 0.239625 and insignificant. The results are partly consistent with findings by Guest (2009) who examined the impact of board size on firm performance for a large sample of 2,746 UK listed firms over 1981-2002 and concluded that board size has a strong negative impact on profitability, Tobin's Q and share returns.

Impact of firm size (FIRMSIZE) on profitability: The coefficient of firm size was negative 0.003801 and insignificant the results are partly consistent with finding of the study by Kalsie and Shrivastav, (2016) which showed that firm size, is significantly negatively related to various performance measures other than Tobins Q. The Beta results of the firm showed negative and significant relationships with various measures of performance thereby confirming positive and significant correlations between firm size and performance measures, namely, the MBVR, ROA and ROCE.

5. Conclusions, Recommendations and Suggestions for Further Study

The study sought to examine the impact of board gender diversity on profitability of the agricultural listed firms in Kenya for the period 2008 to 2015. ROA and Tobins Q were used as the proxies for profitability. Presence of women (PWDIR) on board and the proportion of women on boards (FEMDIR) were the variables used as proxies for board gender diversity.

Irrespective of the profitability measure used, PWDIR was found to be positive and statistically significant. This means that presence of women in boards of agricultural listed firms will lead to increased profitability. The results for FEMDIR are mixed and different depending on the profitability measure. They are negative and significant when using Tobin's Q and positive and statistically insignificant when ROA is used as the measure of profitability. The moderating variables also give different results depending on the profitability measure. BRDSIZE is negative and statistically significant when using Tobin's Q and is positive and insignificant when using ROA as the profitability measures. FIRMSIZE is negative and statistically significant when using Tobin's Q and positive and insignificant when using ROA. Further studies can be carried out looking at all the companies in the agricultural sector other than only the listed companies.

References

Adams, R. B., & Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance, *Journal of Financial Economics,* 94 (2), pp. 291– 309.

Alvarado, N. R., Briones, J. L., & Ruiz, P. (2011). Gender diversity on boards of directors and business success. *Investment Management and Financial Innovations*, 8(1), 199-209

Akinyomi, O. J., & Olutoye, E. A. (2014). Effect of board gender diversity on banks' profitability in Nigeria, *International Journal of Physical and Social Sciences,* 4(10), 225-237

Baltagi, B. H. (2001). Econometric analysis of panel data. Chichester, UK: John Wiley & Sons

Bodie, Z., Kane, A., & Marcus, A. (2009). Investments. New York: McGraw-Hill.

Bohren, O., & Strom, R. O. (2005). Aligned, informed and decisive: Characteristics of value-creating boards, Working Paper, *Norwegian School of Management* BI, Oslo.

Cadman, E. (2015). Europe presses UK to increase female director numbers, *Financial Times*.

Copley, C. (2015). German parliament approves legal quotas for women on company boards, *Reuters.*

Carter, D. A., D'Souza, F., Simkins, B. J., & Simpson, W. G. (2010). The gender and ethnic diversity of US boards and board committees and firm financial performance. *Corporate Governance*, 18(5), 396–414. http://doi.org/10.1111/j.1467-8683.2010.00809.

Credit Suisse Research Institute (2014). Gender diversity and corporate performance. [Online] Available: http://www.calstrs.com/sites/main/files/file-attachments/csri_gender_diversity_and_corporate_performance.pdf.

Ekadah, J. W., & Mboya, J. (2012). Effect of board gender diversity on the performance of commercial banks in Kenya. *European Scientific Journal, April Edition*, 8(7), 128-148

European Commission (2015). Gender balance on corporate boards: Europe is cracking the glass ceiling.

Gillan, S., Hartzell, J. & Starks, L. (2003). Explaining corporate governance: Boards, bylaws, and charter provisions, *University of Delaware* Working Paper.

Goudreau., J. (2011). Women beat men in advanced degrees, *Forbes.* April 27, 2011.

Gull, S., Irshad F., Zaman, K. (2011). Factors affecting bank profitability in Pakistan, *Romanian Economic Journal*, 14(39):61-87.

International Labour Office (2016). Women at work: Trends 2016. *International Labour Office*, Geneva: ILO, 2016 ISBN 978-92-2-130795-2 (print). [Online] Available: http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_457317.pdf.

Johansen, R. E. (2008). Gender diversity and firm performance. An empirical approach. Diploma Thesis in Finance. Swiss Banking Institute. University of Zurich. [Online] Available: http://www.bf.uzh.ch/publikationen/pdf/publ_1912.pdf

Kalsie, A., & Shrivastav, S. M. (2016). Analysis of board size and firm performance: Evidence from NSE companies using panel data approach, *Indian Journal of Corporate Governance*, 9(2), 148-172.

Kenya Institute of Management Report (2012). Bringing the other half to the boardroom: Case study of state corporations and listed companies in Kenya.

Kelly, H. (2015). Tech boards still lag when it comes to gender diversity. *CNN Money*. November 18, 2015.

Letting', N., Aosa, E., & Machuki, V. (2012). Board diversity and performance of companies listed in Nairobi Stock Exchange. *International Journal of Humanities and Social Science*, 2(11), 172-182.

Larmou, S., & Vafeas, N. J. (2010). The relation between board size and firm performance in firms with a history of poor operating performance, *Journal of Management and Governance*, 14: 61. doi:10.1007/s10997-009-9091-z

Marinova, J., Plantenga, J. & Remery, C. (2015). Gender diversity and firm performance. Evidence from Dutch and Danish boardrooms, *The International Journal of Human Resource Management*, Vol 27(15), 1777-1790.

Matsa, D. A., & Miller, A. R. (2011). Chipping away at the glass ceiling: Gender spillovers in corporate leadership. *American Economic Review*, 101(3): 635-39. doi: 10.1257/aer.101.3.635

McKinsey & Company (2013). Women matter 2013: Gender diversity in top management. Moving corporate culture. Moving boundaries.

Moleketi, G. J. F., & Mizrahi, S. (2015). Women board directors of Africa's top listed companies. *African Development Bank*.

Montgomery, C., A., & Birger, W. (1988). Diversification, Ricardian rents, and tobin's Q. *Rand Journal of Economics* 19 (4), Winter, 1988.

Morgan, M. (2005) Glass ceilings and sticky floors: Drawing new ontologies, *London School of Economics and Political Science*, *Department of Economic History*, Working Paper No. 228 – December 2005

Mateos de Cabo, R., Ricardo, G., & and María, J. N. (2015). Gender diversity on European banks´ boards of directors, *Journal of Business Ethics 109* (2012): 145-62.

National Women's Law Center (2013). For the first time in over six years, adult women's unemployment rate above men's, NWLC Analysis

Narayan, P.K., Narayan, S. & Popp, S. (2010). Energy consumption at the state level: The unit root null hypothesis from Australia. *Applied Energy*, 87(6), 1953–1962.

Navarro. A. (2014). The world's richest women 2014. *Forbes.* March 3, 2014.

Nienhüser, W. (2008). Resource dependence theory – How well does it explain behavior of organizations? *Management Revue*, 19(1+2): 9-32

Niresh, J. A. & Velnampy, T (2014). Firm size and profitability: A study of listed manufacturing firms in Sri Lanka, *International Journal of Business and Management*; 9(4), 57-64.

Oba, V. C., & Fodio, M. I. (2013). Boards' gender mix as a predictor of financial performance in Nigeria: An Empirical Study. *International Journal of Economics and Finance*, 5(2). http://dx.doi.org/10.5539/ijef.v5n2p170

Oludele, O. I., Oloko, M. A., & Tobiah, O. (2016). The impact of gender diversity on the financial performance of listed manufacturing companies in Nigeria, *International Journal of Economics, Commerce and Management*, IV(12) 291-605

Onyango, N. (2015). Perceived barriers to women's ascension to chief executive officer positions in Kenya's Largest Corporations.

Pai, K. & Vaidya, S. (2009). Glass ceiling: role of women in the corporate world. Competitiveness Review: *An International Business Journal*, Vol. 19 (2), 106 – 113

PWC (2013). Mending the gender gap. PriceWaterhouseCoopers LLP. [Online] Available: https://www.pwc.com/us/en/financial-services/publications/assets/pwc-advancing-women-in-financial-services.pdf

Reguera-Alvarado, N., de Fuentes, P., & Laffarga, J. 2015. Does board gender diversity influence financial performance? Evidence from Spain. *Journal of Business Ethics*, 1–14. doi:10.1007/s10551-015-2735-9

Rose, C., Munch-Madsen, P., & Funch, M. (2013). Does board diversity really matter? Gender does not but citizenship does., *International Jounal of Business Science and Applied Management*, Vol 8(1), 15-27.

Sahoo, D.K, & Lenka, U. (2016). Breaking the Glass Ceiling: Opportunity for the organization, industrial and commercial training, 48 (6), 311 – 319. http://dx.doi.org/10.1108/ICT-02-2015-0017

Topak, S.M. (2011). The effect of board size on firm performance: evidence from Turkey. *Middle Eastern Finance and Economics*, Issue 14, 119-127

Washington, D. (2008). The concept of diversity. [Online] Available: http://dwashingtonllc.com/images/pdf/publications/the_concept_of_diversity.pdf

Watson, K., & Detjen, J. (2014). Removing self-imposed barriers to success for high potential women in the workplace. *Orange Consulting Group*. [Online]. Available: http://www.orangegroveconsulting.com/wp-content/uploads/2014/06/Orange-Grove-Consulting-White-Paper.pdf

Recommendations of the Federal Glass Ceiling Commission Washington, D.C. (1995). A solid investment: Making full use of the human capital.

Ryan, M. K., & Haslam, S. A. (2005). The glass cliff: Evidence that women are over-represented in precarious leadership positions. *British Journal of Management*, 16, 81-90. DOI: 10.1111/j.1467-8551.2005.00433.x

Sivula, M., & Wilson, S. (2013). A research proposal: Does the glass ceiling show signs of breaking in the 21st Century? Wales University College of Business RSCH5500: *Business Information & Decision-Making*

Stuart. S. (2015). Spencer Stuart Board Index

The CS Gender 3000: (2014). Women in senior Management, *Credit Suisse*. September 2014.

Thomson Reuteurs (2013). Mining the metrics of board diversity. [Online]. Available: http://share.thomsonreuters.com/pr_us/gender_diversity_whitepaper.pdf

Vafaei, A., Ahmed, K., & Mather, P. (2015), Board diversity and financial performance in the top 500 Australian firms. *Australian Accounting Review*, 25: 413–427. doi:10.1111/auar.12068

Wooldridge, J. M., (2014). Introductory econometrics – A modern approach, *Thomson* – South- Western, Michigan.

Appendix 1a: HAUSEMAN TEST TOBIN'S Q

Correlated Random Effects - Hausman Test				
Test Summary		Chi-Sq. Statis	Chi-Sq. d.f.	Prob.
Cross-section random		15.9241790	4.0000000	0.0031000
Variable	Fixed	Random	Var(Diff.)	Prob.
DFEMDIR	-40.344576	-33.00255	3.929647	0.0002
DBRDSIZE	2.910851	1.907916	0.306592	0.0701
DDPWDIR	5.799493	5.144312	0.028257	0.0001
FIRMSIZE	-2.915345	-0.790939	2.323854	0.1634
Dependent Variable: DDTOBINS_Q(-2)				
Method: Panel Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	63.20099	33.10146	1.909311	0.0769
DFEMDIR	-40.34458	8.220417	-4.90785	0.0002
DBRDSIZE	2.910851	1.363989	2.134072	0.051
DDPWDIR	5.799493	0.976419	5.939554	0
FIRMSIZE	-2.915345	1.550574	-1.880172	0.0811
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.851513	Mean dependent var		0.71458
Adjusted R-squared	0.756057	S.D. dependent var		2.350245
S.E. of regression	1.1608	Akaike info criterion		3.430432
Sum squared resid	18.86439	Schwarz criterion		3.921288
Log likelihood	-31.16519	Hannan-Quinn criter.		3.560657
F-statistic	8.920481	Durbin-Watson stat		1.817315
Prob(F-statistic)	0.000199			

Appendix 1b: HAUSEMAN TEST ROA

Correlated Random Effects - Hausman Test				
Test cross-section random effects				
Test Summary		Chi-Sq. Statis	Chi-Sq. d.f.	Prob.
Cross-section random		4.3482770	4.0000000	0.3609000
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
DFEMDIR	0.011681	0.014419	0.000368	0.8866
DBRDSIZE	-0.152417	-0.239625	0.003441	0.1371
DDPWDIR	0.293797	0.25906	0.000329	0.0556
FIRMSIZE	-0.242317	0.003801	0.030606	0.1595
Dependent Variable: DROA(-2)				
Method: Panel Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.139943	3.756679	1.368214	0.1864
DFEMDIR	0.011681	0.039171	0.298203	0.7686
DBRDSIZE	-0.152417	0.186072	-0.819128	0.4224
DDPWDIR	0.293797	0.06644	4.421975	0.0003
FIRMSIZE	-0.242317	0.176358	-1.374005	0.1846
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.527337	Mean dependent var		-0.013133
Adjusted R-squared	0.314639	S.D. dependent var		0.200497
S.E. of regression	0.165984	Akaike info criterion		-0.492644
Sum squared resid	0.551017	Schwarz criterion		-0.025578
Log likelihood	17.38966	Hannan-Quinn criter.		-0.343226
F-statistic	2.479272	Durbin-Watson stat		2.206151
Prob(F-statistic)	0.043584			